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Scales of Sovereignty:  
The Search for Watershed Democracy in the Klamath Basin

By

Daniel Reid Sarna-Wojcicki

A dissertation submitted in partial satisfaction of the  
requirements for the degree of:

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in

Environmental Science, Policy and Management

in the

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University of California, Berkeley

Committee in charge:

Professor David Winickoff, Chair

Professor Isha Ray

Professor Louise Fortmann

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## **Abstract**

Scales of Sovereignty:  
the Search for Watershed Democracy in the Klamath Basin

by

Daniel Reid Sarna-Wojcicki

Doctor of Philosophy in  
Environmental Science, Policy and Management

University of California, Berkeley

Professor David Winickoff, Chair

This dissertation examines the politics of knowledge in collaborative watershed governance institutions of the Klamath River Basin of Northern California and Southern Oregon. The waters of the Klamath are shared between farmers, fisherfolk, indigenous communities, hydro-electric facilities and one of the most biologically diverse eco-regions in the United States. Since 1986, the watershed has provided the primary spatial unit for resolving resource conflict by coordinating agency and citizen science, guiding integrated resource management and cultivating a shared sense of place and belonging among Klamath watershed inhabitants. For nearly three decades, the Klamath Basin has served as a laboratory for experiments in “*watershed democracy*”- a form of hydrologically-grounded political association that attempts to facilitate the direct participation of all watershed inhabitants in knowledge production, deliberation and collective action at the watershed scale. Through the idiom of *watershed democracy*, I connect empirical research on the outcomes of nearly three decades of community-based natural resource management in the Klamath with theoretical debates waged over the last century and a half regarding the question of scale in environmental science, democratic governance and natural resource management.

In this dissertation, I analyze the watershed as a scale of knowledge production, a site of democratic deliberation and a unit of environmental governance. I investigate whether the watershed is the most appropriate socio-spatial unit for representing people and place in the Klamath, paying particular attention to the impact of collaborative watershed governance arenas on the ability of Karuk Tribal members to participate in knowledge-production and decision-making for natural resource management in their ancestral territory in northern California.

Through participatory research with the Karuk Tribe’s Department of Natural Resources, participant observation, document analysis and interviews with

Federal, State, Tribal and local agency scientists and representatives, I follow knowledge and policy-making processes across a diverse range of institutions engaged in Klamath watershed governance. Combining participatory research and participant observation with theoretical insights from political ecology, science and technology studies (STS) and indigenous studies scholarship, I evaluate the processes and outcomes of collaborative watershed-based governance according to its impacts on local watershed ecosystems and communities. Drawing on the theoretical framework of “co-production”, I analyze the mutually constitutive relations between watershed science, watershed governance institutions, the materialities of Klamath watershed-ecosystems and the distributions of resource benefits and burdens in Klamath communities. I follow Klamath experiments in watershed democracy negotiate the basic terms of political life such as property, territory, sovereignty and the public good, as well as the material conditions and flows of watershed resources and the patterns of access to, ownership in and distribution of these resources.

While the Klamath experiments in collaborative environmental governance at the watershed scale have opened up opportunities for Karuk representatives to participate in knowledge production and decision-making, the watershed scale has itself constrained the focus of integrated resource management, limiting the kinds of knowledge that can pattern as reliable and the types of restoration and management projects that can issue from Klamath collaborative governance forums. I demonstrate how Karuk representatives have both leveraged and critiqued the watershed as a way of conceptualizing Klamath watershed-ecological processes and as a socio-spatial unit for approaching ecological restoration and cultural revitalization in their ancestral territory. Watershed science and watershed governance forums were sometimes leveraged by Karuk representatives to substantiate Karuk sovereignty and resource rights and at times rejected for not being able to convey distinct Karuk epistemologies, ontologies and cosmologies. I demonstrate how collaborative watershed management forums have struggled to render different types of indigenous, local and scientific knowledge commensurable and have instead provoked debates about how to produce knowledge about nature in ways that are appropriate for the local community and its ecosystems.

I draw attention to the cultural politics of scale to critique watershed-centric management and search for alternative ways of representing the multiple scales through which Klamath inhabitants understand and value nature. I compare watershed-based governance with two other emerging scales of democratic resource governance- *firesheds* and *foodsheds*- in their abilities to bring together diverse forms of environmental knowledge around multiple nested scales of social and ecological processes. *Firesheds* are emerging areas of community-based fire management patterned according to the way fire burns across the western Klamath landscape. *Foodsheds* are another emerging form of community-based resource governance taking shape in the Klamath around the spatial and temporal characteristics of food resources and their associated management practices in forest ecosystems. Comparing watersheds, *firesheds* and *foodsheds* opens up the

question of scale in collaborative environmental governance by highlighting tensions among different ways of producing knowledge, managing resources and acting collectively at different bioregional scales in the Klamath.

Against watershed-centric approaches to ecological democracy, I argue for deliberative multi-scalar approaches to implementing collaborative environmental governance, cultural revitalization and watershed-ecosystem restoration in the Klamath. Multi-scalar perspectives can accommodate multiple ways of making knowledge while avoiding homogenizing diverse situated perspectives into a single way of seeing Klamath eco-cultural landscapes. I argue for “*democratizing scale*” in order to define an appropriate scalar framework for producing knowledge, representing human values and making decisions about the management of natural resources. Collaborative environmental governance requires an accompanying democratization of scale to accommodate the myriad ways of knowing nature and making a living in Klamath watershed-ecosystems. Scalar formations that are produced through deliberative democratic processes can provide more inclusive grounds than watersheds for democratic environmental governance and multispecies world-making.

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Professor David Winickoff, thank you for being an excellent mentor and for teaching me so much about research, writing and all other things academia. Thank you for being patient with my erratic swings of interest, for reading everything and for always providing trenchant feedback. Professor Louise Fortmann, thank you for encouraging me to think critically about everything from land tenure to authorship practices among rural livelihood participatory researchers. Thank you for supporting me in pursuing community-engaged research and working towards epistemic justice. Thank you to Jeff Romm for first introducing me to the Klamath and teaching me so much about watershed governance, Federal Indian law and, most importantly, the blues. Professor Isha Ray, thank you for first setting me down the course of study that lead me here and helping me bring it all together towards the end. I would also like to acknowledge Berkeley professors Nancy Peluso and Cori Hayden for their guidance through coursework, qualifying exams and field research.

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Daniel Reid Sarna-Wojcicki  
Oakland, CA  
6/30/2015

## Introduction

### ***1. The biophysical and institutional complexity of the Klamath***

The Klamath River drains a ten million acre basin as it flows from the Cascade Range in southern Oregon to the Pacific Ocean in northern California. Along their 250-mile journey to the sea, the waters of the Klamath are shared between two States, indigenous communities, farmers, ranchers, fisherfolk, hydroelectric facilities, and what is considered to be one of the most biologically diverse eco-regions in the western United States<sup>1</sup>. While numerous hydrologic, ecological and geologic factors contribute to the unique biophysical complexity of the Klamath, numerous socio-cultural and political-economic factors result in a diverse institutional landscape, rendering Klamath watershed ecosystems and human communities difficult to represent both scientifically and politically. This dissertation examines the role of knowledge practices in grounding modes of democratic environmental governance and shaping human-nature relations in the Klamath. Specifically, I analyze the watershed as a way of seeing and managing Klamath ecological and cultural landscapes. Approaching the watershed simultaneously as a scale of knowledge production, a site of democratic deliberation and a unit of environmental governance, I investigate whether the watershed is the most appropriate socio-spatial unit for representing people and place in the Klamath. I argue for and adopt a theoretical position that focuses on the co-production of knowledge, nature and society and allows me to analyze the mutually constitutive relations between knowledges of watershed processes, institutions of watershed governance, the specific materialities of Klamath watershed-ecosystems and the distributions of resource benefits and burdens in Klamath communities.

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<sup>1</sup> See e.g. Olson, David, Dominick A. DellaSala, Reed F. Noss, James R. Strittholt, Jamie Kass, Marni E. Koopman and Thomas F. Allnut. "Climate Change Refugia for Biodiversity in the Klamath-Siskiyou Ecoregion" *Natural Areas Journal*, 32(1):65-74, pg. 65: "The Klamath-Siskiyou Ecoregion (KSE) contains globally important biodiversity—only five other temperate forests regions are as diverse or home to as many endemic species and ancient lineages...the Klamath Basin is one of the most ecologically diverse ecosystems in the western United States"; California Department of Fish and Game. *State Wildlife Action Plan*, 2014, 5.1 North Coast and Klamath Province, 5.1.1 Geophysical and Ecological Description of the Province, p 269: "The region's inland Klamath-Siskiyou mountain ranges are recognized for their biological diversity; they have been designated as an area of global botanical significance by the World Conservation Union (IUCN), as one of 200 global conservation priority sites by the World Wildlife Fund, and as a proposed United Nations' biosphere reserve"; Ricketts, T.H., E. Dinerstein, D.M. Olson, C.J. Loucks, W. Eichbaum, K. Kavanagh, P. Hedao, P. Hurley, K.M. Carney, R. Abell, and S. Walters. 1999. *Ecoregions of North America: A conservation assessment*. Island Press. Washington DC. 485 pp; See also DellaSala, D. A., S. B. Reid, T. J. Frest, J. R. Strittholt, and D. M. Olson. A global perspective on the biodiversity of the Klamath-Siskiyou ecoregion, *Natural Areas Journal*, Vol. 19, No. 4 (1999), pp. 300-319.

Through participatory research with the Karuk Tribe's Department of Natural Resources, participant observation, document analysis and interviews with Federal, State, Tribal and local agency scientists and representatives, I follow knowledge and policy-making processes across a diverse range of actors and institutions engaged in Klamath watershed governance. Against watershed-centric approaches to ecological democracy, I argue that a multiscalar approach that considers "foodsheds" and "firesheds" alongside watersheds more accurately represents biophysical dynamics of the Klamath and more responsibly represents the knowledges and values of the communities inhabiting Klamath watershed-ecosystems<sup>2</sup>. Based on research findings, I work towards a deliberative multiscalar approach to environmental governance in the Klamath that elaborates the spatial contours and nesting patterns of resource governance units through inclusive and adaptive democratic processes that are responsive to people and place. This introductory chapter provides an overview of the social and ecological complexity of the Klamath, an introduction to the politics of knowledge in Klamath environmental conflicts and a summary of the main arguments and chapters of the dissertation.

The Klamath's unique geologic, hydrologic and ecological conditions support one of the most biologically diverse eco-regions in the Western United States<sup>3</sup>. Rainfall varies drastically from west to east in the Klamath Basin, averaging from around 80 inches per year in the temperate rainforests on the coastal side of the basin to around 50 inches in the middle section of the basin, then dropping to around 13 inches in the arid upper basin<sup>4</sup>. The complex geology and rugged topography of the Klamath creates vertical precipitation gradients and diverse soil types, generating high microclimatic variability and patchy vegetation mosaics even within a single creekshed. These unique habitat conditions support diverse flora and fauna, including many species endemic to California<sup>5</sup>. Numerous

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<sup>2</sup> For a discussion of the concept of Response-ability, see Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke University Press: 2010; see also Haraway, Donna. *When Species Meet*. Univ of Minnesota Press: 2008. For a discussion of Lacan's use of the concepts of response and reaction see also Derrida, Jacques. 2003. "And Say the Animal Responded?" In *Zoontologies: The Question of the Animal*. Wolfe, Cary ed. Univ of Minnesota Press:2003.

<sup>3</sup> See e.g. Ricketts et al. 1999; DFG 2014 p 269; DelaSalla 1999; Sawyer, John. "Why are the Klamath Mountains and Adjacent North Coast Floristically diverse?" *Fremontia*. P 3, Vol 35:3, Summer 2007; Vance-Borland, K., R. Noss, J.R. Strittholt, P.A. Frost, C. Carroll, and R. Nawa. 1995. A biodiversity conservation plan for the Klamath/Siskiyou region. *Wild Earth* 5 (4):52-59;

<sup>4</sup> Klamath, CA (044577), Period of Record Monthly Climate Summary, Period of Record : 7/ 1/1948 to 8/31/2005. Averages 80.16 inches/yr, Western Regional Climate center ; Orleans, CA (046508) Period of Record Monthly Climate Summary, Period of Record : 4/ 1/1903 to 3/31/2013, Average precipitation 51.03 inches/year; Fort Jones Ranger Station, CA (043182) Period of Record Monthly Climate Summary Period of Record : 1/ 9/1936 to 3/28/2013. 20.47 in/yr, Klamath Falls 2 SSW, OR(354506) Period of Record Monthly Climate Summary Period of Record : 1/ 1/1928 to 5/31/2013 Average precipitation: 13.72 in/yr.

<sup>5</sup> Sawyer 2007, p. 3: "It is the home of 3,540 native and naturalized vascular plant taxa (species, subspecies, and varieties), more than grow in New England and Canada combined"; A biological assessment by DellaSala et al (1999) ranked the Klamath-Siskiyou region as the fifth richest

rare, endangered and threatened wildlife species make their homes in the Klamath, from listed Coho salmon and lost-river Suckers to spotted owls, pine martins, giant pacific salamanders and pacific fishers. From its headwaters to its mouth, the upslope reaches of its drainages to the aquatic ecosystems of its streams, the Klamath Basin supports a diverse array of habitats and ecosystems. The biophysical complexity of the Klamath is compounded by an equally complex socio-cultural, political, economic and institutional diversity. In this chapter and throughout the dissertation, I demonstrate how epistemological questions regarding the way water flows through the watersheds and ecosystems of the Klamath entangle with ethical and political questions that emerge from tensions among the many different ways of generating knowledge and making a living in the Klamath.

Though only around 115,000 humans inhabit the basin, the Klamath supports a diverse variety of human cultures, languages, rural economies and livelihood practices<sup>6</sup>. To begin with, the many indigenous communities of the Klamath have inhabited its watersheds and managed its landscapes for ceremonial, subsistence and commercial purposes since time immemorial<sup>7</sup>. Despite over a

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coniferous forest in terms of species diversity; The International Union for the Conservation of Nature considers the region one of notable botanical importance, see e.g. Wagner, D. H. Klamath-Siskiyou region, California and Oregon, USA, In: Davis, S. D., V. H. Heywood, O. Herrera-MacBryde, J. Villa-Lobos, and A. C. Hamilton (eds), *Centres of Plant Diversity, the Americas, Vol. 3*, World Wildlife Fund for Nature and IUCN (World Conservation Union), New York: 1997, pp. 74-76; see also Vance-Borland 1995; Sleeter, Benjamin M. and James Calzia. Klamath Mountains Ecoregion. *USGS Land Cover Trends Project*, 2014: "The Klamath-Siskiyou region is widely recognized as an important biodiversity hotspot ...containing more than 3,500 plant species, more than 200 of which are endemic. Twenty-nine different species of conifers can be found in the Klamath".

<sup>6</sup> California North Coast Regional Water Quality Control Board. Klamath River TMDL's/ Total Maximum Daily Loads Draft document. Sec. 1.6.1 "Population and Land Ownership", p 10: The human population in the Klamath River basin was estimated in the 2000 US Census to be about 114,000 (United States Census Bureau [USCB] 2000). The largest population concentrations lie in the upper Klamath agricultural area, the Shasta River Valley, and Scott Valley. The largest population center is Klamath Falls in Oregon (19,462 people in 2000) followed by Yreka, California (7,290 people).

<sup>7</sup> See e.g. Salter, John. *White Paper on Behalf of the Karuk Tribe of California*. A context Statement Concerning the Effect of the Klamath Hydroelectric Project on Traditional Resource Uses and Cultural Patterns of the Karuk People within the Klamath River Corridor. Karuk Tribe Department of Natural Resources: 2003; see also Chartkoff, Joseph L. and Kerry K. Chartkoff. 1975. Late Period Settlement of the Middle Klamath River of Northwest California. *American Antiquity*, vol. 40, no. 2 172-179; "Time immemorial" is an artifact of English common law. To be recognized by courts, practices had to be proven to be unchanging since "time out of mind", "time immemorial", or "for time whereof the mind of man runneth not to the contrary". See definition by Blackstone (1765) Commentary I, viii 281: "a time before legal history and beyond legal memory". This definition of time immemorial initially referred to occurrences outside living memory, but then acquired a specific legal definition through Statues as a specified point of legal memory. It was originally set at the Norman Conquest of 1066 and then at the coronation of Henry II in 1154 through the Statute of Merton in 1236. The Statute of Westminster in 1275 (3 Edw. I cap. 5) then defined "time immemorial" at the accession of Richard I, July, 6 1189. It was believed that it was impossible to prove anything beyond that point. See Getzler, Joshua. *A History of Water Rights at Common Law*. Oxford University Press: 2004, p. 195.

century and a half of colonialism and genocide, the Klamath is one of the few remaining places in California where indigenous communities still reside in their ancestral territories, speak indigenous languages and practice traditional forms of resource management<sup>8</sup>. In the lower basin, the Yurok reservation extends from the mouth of the Klamath one mile on each side of the river, about 44 miles upstream to the mouth of the Klamath's largest tributary, the Trinity River. The Hoopa reservation encompasses twelve square-miles along the Trinity River, while the Karuk Tribe's ancestral territory lies in the middle section of the Basin. The Quartz Valley Rancheria is located near the small town of Fort Jones, California and includes 174 acres along the Scott River, another of the Klamath's major tributaries. The Klamath Tribes, composed of Klamath, Modoc, and Yahooskin Paiute Tribal members, possess around 300 acres in fragmented parcels near the towns of Chiloquin and Klamath Falls in Southern Oregon.

Another focus of this dissertation is the ways in which the relative jurisdictions and sovereignties of Tribal, State and Federal agencies are articulated and contested through negotiations around watershed science and policy. In addition to distinct languages and cultural practices, the indigenous communities of the Klamath possess different sets of land, water and fishing rights and complex relationships with the County, State and Federal agencies that manage resources on or near their territories. Sovereignty and self-determination carry different legal, political and cultural meanings for each Tribe and its members. How sovereignty is defined in relation to the many public agencies with varying amounts of jurisdiction over natural resource management in and around tribal territories as well as *vis-à-vis* the rights, privileges and obligations of other resource users and members of the general public is incredibly complex and deeply contested.

The land, water, forest and mineral resources of the Klamath have supported settler livelihoods and resource-based rural economies since the mid 19<sup>th</sup> century. Resource extraction began with the "fur rush" in the 1820s and was quickly followed by the gold rush in the 1850s-1870s. After the gold resources were mostly depleted by the end of the 19<sup>th</sup> century, the region transitioned to ranching, agriculture and timber-based economies. The Klamath is still characterized by a rural economy centered predominantly around agriculture, ranching, fishing, logging and recreation<sup>9</sup>. The largest cities in the Klamath are

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<sup>8</sup> See e.g. Kroeber, Alfred. *Handbook of the Indians of California*. 1925; Gifford, EW, "Karok", *University of California Publications in Anthropological Records*. 1952, Vol. XIII 1949-1952; Kroeber, Theodora. Introduction to Kroeber, Alfred Louis, and Edward Winslow Gifford. *Karok myths*. Univ of California Press, 1980, p. xviii.

<sup>9</sup> From United States Department of Agriculture Natural Resources Conservation Service. *Work Plan for Adaptive Management, Klamath River Basin, USDA: 2004*, pg. 2, Table 1: Land Use/Land Cover Klamath Basin: Total area of the Klamath Basin: 10,080,800 acres; Total Federal/State/Tribal land in Klamath Basin: ~6,335, 800 acres; total Tribal land in Klamath Basin: ~90,000 acres; Total private land in Klamath Basin: 3,745,000 acres, includes ~2000 farms on ~ 557,000 acres; 80% of these are irrigated 3. ~220,000 of the irrigated acres use Bureau of Reclamation-provided water; Cropland and Pasture: 556,800 acres, Rangelands: 795,200 acres, Private Forestlands: 2,184,000,

Klamath Falls in Oregon with around 25,000 people followed by Yreka in California, with around 7,500 people. In the arid upper basin, farmers divert water mostly to grow potatoes, horseradish and alfalfa to graze cattle. Much of the agriculture and ranching in the Klamath occurs through small-scale and family-owned farms. Many family farms trace their titles back to Homestead Act claims or military land auctions after World Wars I and II<sup>10</sup>.

Along the tributaries in the wetter middle and lower sections of the Klamath, water users divert water mainly for domestic use and marijuana cultivation as well as for fruit, wine grape and nut production. Seven dams, built between 1902 and 1962, line the middle and upper stretches of the Klamath, generating around 169 megawatts at capacity and serving about 70,000 households<sup>11</sup>. Directly downstream from the dams and diversions of the upper basin lies about 200 river miles of prime habitat for endangered salmon runs and some of the most biodiverse aquatic and terrestrial ecosystems of North America.

Though all Klamath communities depend on the Klamath's natural resources to support their livelihoods, rural economies and cultural practices, their land and water uses are often positioned directly in conflict. Upstream water diversions for irrigation and impoundments to generate electricity have significant impacts on the timing, quantity and quality of water flowing downstream, which in turn impacts downstream fisheries and the human communities that depend on them. Application of fertilizer and pesticides, land conversion and fire behavior in the upslope and upstream regions of the Klamath also impact the quality, quantity, temperature and timing of water flowing through Klamath watersheds. However, the impacts of particular land and water uses on other resource uses and on specific processes and dynamics of Klamath watersheds are both scientifically complex and politically contested. Though watershed science is recruited as a neutral and objective medium for resolving resource conflicts, the suite of scientific disciplines that seek to authoritatively represent the impacts of human land and water uses on watershed-ecosystem processes- e.g. hydrology, geomorphology, biogeochemistry, geohydrology, ecohydrology, fire and forest ecology, fisheries biology and aquatic ecology- have themselves become both battle-grounds for resource conflicts as well as common grounds for collaborative resource management.

## **2. Klamath environmental conflict**

Records of resource conflict in the Klamath date back to the first contact between indigenous communities and the hoards of fur trappers, miners and explorers who came from all over the world in search of the Klamath's riches and

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Urban or Developed Lands: 6,600 acres, Commercial/Industrial: 16,500 acres; Residential: 9,900 acres.

<sup>10</sup> See e.g. *Life Magazine*, January 20, 1947.

<sup>11</sup> Pacificorp. *Klamath River Hydroelectric Project Fact Sheet*. 2011.

natural resources. The first waves of colonization brought deadly conflicts between indigenous and settler communities ranging from formal military engagements such as the Red Cap war of 1855 and the Modoc wars of the 1870s to civilian-driven genocide through deceit and murder resulting in tragedies such as infamous Indian Island/Tuluwat massacre<sup>12</sup>. Another result of colonization was “indirect genocide” as a result of disease and malnutrition due to lack of adequate access to traditional food sources<sup>13</sup>. This was perpetuated in the 20<sup>th</sup> century by waves of “cultural genocide” through forced removal of indigenous youth to boarding schools, removal of artifacts and ancestral remains, tribal termination, language-loss and forced assimilation.

For many Tribes in the Klamath, early-to-mid 20<sup>th</sup> century cultural genocide was compounded by “ecological genocide”, or criminalization of indigenous resource management practices such as the lighting of prescribed fires, hunting, fishing and gathering which increased indigenous communities’ lack of access to traditional foods and resulted in their inability to practice ceremonies and perpetuate indigenous culture<sup>14</sup>. Klamath indigenous communities proved resilient by revitalizing cultures, ceremonies and traditional resource management despite threats of harsh punishment including fines and even imprisonment. Tribal members, ceremonial leaders and cultural practitioners to this day face harsh penalties and harassment by Fish and Game wardens, Forest supervisors and law enforcement officers for practices such as using prescribed fire, hunting, and fishing; practices Tribal members see as integral to maintaining their culture, asserting political sovereignty and practicing their religion<sup>15</sup>. As Leaf Hillman, the director of the Karuk Tribe’s Department of Natural Resources has described:

“In order to maintain a traditional Karuk lifestyle today, you need to be an outlaw, a criminal, and you had better be a good one or you’ll likely end up spending a great portion of your life in prison...It is a criminal act to be a Karuk Indian in the 21st century”<sup>16</sup>.

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<sup>12</sup> Bledso, Anthony Jennings. 1885. *Indian Wars of the Northwest: A California Sketch*, ch 6, p. 153; See also Most, Stephen. *River of Renewal*. Oregon Historical Society Press: 2004; Norton, Jack. *Genocide in Northwestern California*. Indian Historian Press: 1979.

<sup>13</sup> Norton 1979; see also Chapter 4 and Minutes of Col. Reddick McKee, esp. October 1851.

<sup>14</sup> Noorgard, Kari. *The Effects of Altered Diet on the Health of the Karuk People Karuk Tribe of California*, 2005. Filed November 2005 with Federal Energy Regulatory Commission on Behalf of the Karuk Tribe in the Klamath River Project re-licensing process; Reed, Ron and Kari Marie Norgaard. 2010. “Salmon Feeds Our People” pp 7-16 in Walker Painemilla, K., Rylands, A B., Woofter, A., & Hughes, C. eds. *Indigenous People and Conservation: From Rights to Resource Management*. Conservation International. Arlington VA; Norgaard, Kari Marie 2014 “The Politics of Fire and the Social Impacts of Fire Exclusion on the Klamath” *Humboldt Journal of Social Relations*. 39: 73-97.

<sup>15</sup> Noorgard, Kari. *Karuk Traditional Ecological Knowledge and the Need for Knowledge Sovereignty: Social, Cultural and Economic Impacts of Denied Access to Traditional Management*. Karuk Tribe of California, 2014.

<sup>16</sup> Hillman 2004, quoted in Norgaard 2014.

After successive waves of physical, cultural and ecological genocide, resource conflicts between the communities of the Klamath transitioned mainly to a “cold war” revolving more around legal, political and scientific battles that have played out in courts, regulatory hearings and the media. Since the 1970s, Tribes have made significant gains in terms of Federal and State recognition of Tribal institutions, but not without significant scientific, legal and political struggle.

After many Tribes were terminated by Congress in the 1950s and stripped of their formally-recognized legal and political statuses as well as their land and water rights, beginning in the 1970s the tribes of the Klamath started reclaiming federal recognition and began asserting Tribal fishing rights. As we will see in chapters 3 and 4, this resulted in the “fish wars” of the late-1970s, or clashes between State and Federal officials, commercial fishermen and Tribes in the Klamath. “The “fish wars” were followed by the so-called “herbicide wars” in the early- 1980s, which pitted hippie communes, environmentalists and Tribes against the US Forest Service over their aerial herbicide spraying operations. The herbicide wars were followed by the “timber wars” in the 1990s, which erupted around the effects of timber production on spotted owl habitat. The spotted owl crisis was followed in turn by the “water wars”, conflicts in the early 2000s between farmers, fisherfolk, Tribes and hydropower dam operators over minimum in-stream flows needed to support endangered Coho Salmon.

### **3. Knowledge Politics in Klamath environmental governance**

These waves of resource conflicts over the past three decades have in many ways turned on the *politics of knowledge*. Whether it’s controversy over salmon harvests and population levels, the effects of herbicides on drinking water, the impact of logging on spotted owl habitat or the effects of upstream agricultural diversions and hydropower generation on downstream fish habitat, Klamath environmental conflicts have been channeled through negotiations over what constitutes credible knowledge of nature. Over the past few decades, the long history of environmental conflict and struggles between the different communities of the Klamath over access to land and water resources have been channeled through science battles, or what Holly Doremus terms “*combat biology*” (see Ch 3)-debates over the way water does and should flow through Klamath communities and watershed-ecosystems. In this chapter and throughout the dissertation, I demonstrate how knowledge about Klamath watersheds has become a site of both conflict and alliance formation in political negotiations over territory, sovereignty and the distribution of natural resources in the Klamath.

The Klamath is often described by environmental scientists and policy makers as an “upside down” river basin. In the standard narrative of watershed degradation, the “pristine” headwaters in the upslope and upstream areas become



contaminated by human land and water use as they flow downhill<sup>17</sup>. However, in the Klamath, the major water quality impacts from agriculture, ranching and dams occur mostly in the upper-Basin, whereas the downstream tributaries provide much of the cool and clean water that downstream fisheries and human communities depend on. This has significant implications for watershed relations in the Klamath and for the politics of watershed knowledge in Klamath environmental conflicts. Land and water uses and the cultures and economies that depend on them are linked hydrologically through the flow of water. Upstream and upslope land and water uses impact the timing, magnitude and quality of water flowing downstream and the transport of suspended sediment and solutes. Changes in the timing, quantity and quality of water flows in turn impacts the livelihoods and cultural practices of downstream communities that depend on particular watershed functions, flow-regimes and water quality conditions. However, the extent of land and water use and the impacts to local watershed ecosystems vary according to a complex set of social and biophysical factors that link diverse livelihood practices to one another and to the more-than-human ecosystems they take place in.

Therefore, as this dissertation will argue, the science behind the impact of human land and water use practices on Klamath watershed-ecosystem processes is an important site of contestation, negotiation and collaboration in Klamath environmental governance. In Chapters 3-6, I follow knowledge conflicts over watershed science through courtrooms, administrative hearings, congressional committees and shareholder meetings. I demonstrate how the science behind the way water flows through the ecosystems and communities of the Klamath is caught directly in the middle of debates around political questions related to resource rights, property claims and control over natural resources. I argue that, in knowledge and resource conflicts, epistemological and ontological questions of how to best represent complex watershed ecosystems are compounded with political and ethical questions related to how to best represent human values and define the common good for Klamath inhabitants and the variously scaled publics with interests at stake in Klamath natural resource management. Efforts to collectively understand and represent Klamath watershed-ecosystem processes are connected to attempts to achieve a just distribution of resource benefits and burdens in Klamath watershed communities.

#### **4. The watershed as site of ecological democracy**

A watershed is an area of land that drains to a common outlet<sup>18</sup>. The watershed has long served as the primary spatial unit through which processes

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<sup>17</sup> See e.g. Forsyth, Tim and Andrew Walker. *Forest Guardians, Forest Destroyers: The Politics of Environmental Knowledge in Northern Thailand*. University of Washington Press: 2008.

<sup>18</sup> Leopold, Luna. M Gordon Wolman and John Miller. *Fluvial Processes in Geomorphology*. Dover: 1992 (1962). "Watersheds are hydrologic systems where inputs and outputs of water, sediment and nutrients are cycled within topographically restricted landscape units", see McGuire, Kevin and Jeff McDonnell. "Stable isotope tracers in watershed hydrology" in Michener, Robert, and Kate

such as democratic deliberation, conflict resolution, knowledge-generation and collaborative resource governance are organized in the Klamath. For nearly 30 years, representative and deliberative bodies have been convened around watersheds to bridge cultural and epistemic divides, harmonize Federal, State, Tribal and local agency knowledges and cultivate a shared sense of place and belonging among Klamath watershed inhabitants. In this dissertation, I take up the idiom of “watershed democracy”, a set of theories, policies and practices dating back to the mid 19<sup>th</sup> Century that advocates direct inclusion of those inhabiting a particular watershed in producing knowledge and making decisions about the management of natural resources within that watershed. By examining the past thirty years of collaborative resource governance in the Klamath as experiments in “watershed democracy”, I attempt to connect empirical research on the outcomes of three decades of community-based natural resource management in the Klamath with theoretical debates waged over the last century and a half and revived in the last decade over the appropriate scale of democratic environmental governance.

In the laboratory of Klamath watershed democracy, I see an opportunity to study the practice of actually existing democracy and observe how it informs environmental governance processes and outcomes in a complex eco-hydrologic and social system containing multiple sovereign entities, all representing different publics and claiming jurisdiction over resource management. The successes and shortcomings of Klamath experiments in watershed democracy have much to teach 21<sup>st</sup> century resource management theory and practice about strategies for both learning together and learning to live together in place.

As with the several states attending the constitutional convention, the advocates of watershed democracy in the Klamath seek a “*more perfect union*” among the diverse inhabitants, communities, publics and representative institutions with stakes in the procedures and outcomes of Klamath resource management<sup>19</sup>. I draw on this phrase from the preamble of the US Constitution to focus on the many dimensions of the constitutive nature of this movement towards collaborative watershed-based governance. I argue through this dissertation that the watershed provides a template for patterning democratic social and political life and guiding experiments in multi-species world-making in the Klamath. Extending the boundaries of membership in the political community beyond humans, the resource management agencies of the Klamath seek to institute a “more perfect union” between resource users, the other-than-human inhabitants of their watersheds and the abiotic elements like water and sediment that circulate through and bind them. Klamath watershed democracies attempt to represent both nature and society through a collective composition or arrangement of the cosmos.

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Lajtha (eds). *Stable isotopes in ecology and environmental science*. John Wiley & Sons, 2008. P 335, Dunne, T. & Leopold, Luna. 1978. *Water in Environmental Planning*. W.H. Freeman, San Francisco, CA, McGuire.

<sup>19</sup> “We the People of the United States, in Order to form a more perfect Union...do ordain and establish this Constitution for the United States of America”, US Const. pmb1.

Through the watershed, the many resource-dependent communities, representative institutions, publics and more-than-human inhabitants become one, *e pluribus unum*, but through what procedures and mechanisms are these motley collectives brought together?

This dissertation analyzes the ways in which the watershed has emerged as a socio-spatial formation and a scale of knowledge-generation, democratic deliberation and resource governance in the Klamath. I investigate how transitioning to watershed-based collaborative governance has shifted power relations among the many public, Tribal and non-government institutions involved in managing Klamath resources as well as modes of citizen inclusion and participation in knowledge-production and decision-making for environmental governance. I ask how collaborative watershed governance has changed the ways individuals, institutions and communities relate to one another and to the landscapes they live and work in. I argue throughout this dissertation that the watershed must be theorized and analyzed on three distinct, yet related registers:

1. As a *scale of knowledge production*, an epistemic framework that shapes how knowledge of nature is generated and an ontology that positions relations between nature and society.
2. As a *scale of environmental governance* and a set of institutions and practices associated with particular regimes of political representation, deliberation and collective action in natural resource management.
3. As a *political imaginary* that attempts to define what democracy means in the context of ecosystem restoration and environmental governance.

As a scale of knowledge generation, the watershed provides a template for organizing understandings of biophysical processes by segmenting the world according to the way water flows across the landscape. The watershed provides a way of seeing social and ecological phenomena, dividing nature into digestible chunks, highlighting certain variables of interest, and rendering them commensurate across space and time. The watershed concept allows scientists to harmonize diverse sources of ecological and hydrologic data and connect various terrestrial and aquatic ecological and hydrologic variables. The watershed concept connects human land and water uses in “upslope” and “upstream” regions of drainage systems with downstream flow regimes, in-stream water quality and habitat conditions.

I demonstrate in Chapters 3-6 how the diverse knowledge-making cultures of the Klamath support multiple epistemologies and ontologies of the watershed that erupt in tension in moments and come together collaboratively in others. I investigate how transitioning to watershed-based governance has shaped the

conditions under which knowledge is generated, circulated, contested and deemed credible in scientific communities. I demonstrate that, although watersheds were supposed to provide “neutral” grounds for assembling diverse knowledges, watershed forums have actually struggled to harmonize different types of indigenous, traditional, local, and scientific knowledge and have instead provoked debates about what constitutes credible knowledge of nature and who has authority to represent the array of values and interests related to watershed resources. Klamath experiments in watershed democracy could not bring to closure debates around what constitutes credible knowledge about watershed processes, what watersheds are ontologically, how they should be represented politically and scientifically, and who should benefit from their resources or from the process of restoring them.

As an institutional formation, the watershed provides a way of organizing relations among humans and between humans and the more-than-human world. Conceived of as a socio-spatial formation, the watershed shapes patterns of social and political life in time and space. I demonstrate in this dissertation how the watershed has defined the spatiality of environmental governance in the Klamath, giving form to institutional boundaries and jurisdictions, guiding integrated water resource management and ecosystem restoration, implementing endangered species habitat protection and shaping regulatory policy in the Klamath from 1850 to the present (2014). In Chapters 3-6, I demonstrate how power relations between Federal, State, Tribal and non-government agencies are reshuffled as democratic environmental governance is aligned with Klamath watersheds. These new institutional configurations have rerouted flows of epistemic and political authority among the many public, private and tribal institutions, citizens, publics and landowners attempting to influence the management of Klamath natural resources. Collective movements towards and away from the watershed have reconfigured the boundaries and terms of citizenship, the conditions of membership in the political community and the scope of the rights and obligations that citizenship entails. I argue that, in Klamath experiments in watershed democracy, the basic terms of political life such as property, territory, sovereignty and the public good are being actively negotiated, as are the actual flows of material resources and the patterns of access to, ownership in and distribution of these resources.

As a political ideal, the watershed also harbors an imaginary of democracy. In Ezrahi’s terms, a democratic imaginary is a “fiction, metaphor, idea, image, or conception that acquires the power to regulate and shape political behavior and institutions”<sup>20</sup>. This dissertation argues that theories and practices of democratic environmental governance are worked out through scientific and political engagement with Klamath watershed-ecosystems. According to Randy Hester, the ideal of “ecological democracy” combines the political aspirations of human freedom and self-determination with the science and awareness of ecological

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<sup>20</sup> Ezrahi, Yaron. *Imagined Democracies: Necessary Political Fictions*. Cambridge University Press: 2012, p 3.

interconnectedness<sup>21</sup>. In this dissertation, I demonstrate that what ecological democracy means for the diverse communities of the Klamath and how it is put into practice in relation to natural resource management has been worked out through collaborative watershed management over the past three decades. In particular, the role of science in guiding resource policy and defining relationships among human institutions and between humans and nature has been negotiated through collective scientific and social experiments at the watershed scale. Over the last thirty years, the Klamath has become a laboratory for local, State, Tribal and Federal agencies experimenting with community-based ecological restoration and resource management. In Klamath experiments in watershed democracy, we see numerous public, Tribal and private institutions negotiate their sovereignties, jurisdictions and territories as they claim authority to define and act on behalf of nature and the public good.

In this dissertation, I demonstrate how the watershed has operated on all three of these levels, simultaneously grounding knowledge production, environmental governance and democratic imaginaries in the Klamath. However, in separating out watershed governance into separate registers, I don't mean to imply that nature, science and society are fundamentally separate domains or that they influence one another in a predictable, mechanistic or linear fashion. Rather, the purpose of this approach is to demonstrate the *mutually constitutive* relations between knowledge, nature and society. In Chapter 1, I outline how the theory of "co-production" (Jasanoff 2004) helps me analyze complex and multi-directional linkages between understandings of watershed processes, institutions of watershed governance and complex materialities of Klamath watershed ecosystems<sup>22</sup>. As I argue extensively in Chapter 1, co-production allows investigate the science-nature-society interface in Klamath watershed democracy from three angles.

On one hand, the theoretical framework of co-production allows me to examine how transitioning to collaborative watershed-based governance has shaped the ways in which knowledge about nature is generated, circulated, contested and deemed credible. On the other, it allows me to analyze the role that expert knowledge of nature plays in determining whether environmental governance processes are procedurally or substantively legitimate. Co-production also allows me to follow how collaborative watershed-based approaches to environmental governance have changed the ways individuals, institutions and

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<sup>21</sup> Hester, Randy. *Design for Ecological Democracy*. MIT press: 2006. Hester argues that democracy is government by the people, guided by principles of equality, freedom, and public goods, whereas ecology is the science of relationships between organisms and environments- the study of natural processes, interactions, relationships- and essentially a science of interdependencies and interconnection. His argument is that bringing the sciences of ecology together with democratic modes of governance creates "responsible freedom" and that "ecological democracy will produce radically new forms of habitation", pgs. 6-7.

<sup>22</sup> Jasanoff, Sheila. *States of Knowledge: the Co-production of Science and the Social Order*. Routledge: 2004.

communities manage land and water resources and relate to the landscapes and environments they live in.

## 5. The cultural politics of knowledge and nature

The term “cultural politics of watershed knowledge” speaks to issues that reside at the intersections of politics, culture and the many ways of knowing nature and living in Klamath watersheds. In this dissertation, I portray knowledge of nature as politically and culturally charged and explore the full range of practices and power dynamics that underlie understandings and explanations of linked ecological, hydrologic and social processes. Rather than seeing knowledge, culture and politics as separate and distinct domains of human activity, taken together, the “cultural politics of watershed knowledge” points to the fact that knowledge about watersheds is always produced in connection with particular political cultures, livelihood practices and ways of life<sup>23</sup>. By invoking the “cultural politics of knowledge”, I argue that social and political factors such as collective action institutions, property regimes, livelihood practices, and struggles over resource access both shape and are shaped by the production, circulation, contestation and application of knowledge. I demonstrate the ways in which political cultures shape the production of knowledge about watershed systems and, conversely, in the role watershed science plays in shoring up modes of democratic theory and practice, supporting cultural practices and stabilizing regimes of collaborative resource governance.

To view knowledge as always already political means seeing the practices and cultures of knowledge making as entangled in webs of myriad actors attempting to influence one and other, gain access to resources and shape the distribution of nature’s benefits and burdens. However, the way actors and institutions produce watershed knowledge in the Klamath isn’t only about struggles for power and domination or competition for control over territory and resources, but also about finding common ground among diverse ways of understanding, valuing and living in nature. Seeing culture and politics shape knowledge practices also involves seeing ways in which communities come together around ways of understanding the world and ways in which collective understandings of nature cement social bonds and ground modes of collective action. In the cultural politics of watershed knowledge, the practices of knowing nature are deeply entwined with the arts of living together and acting collectively. The stabilization of collective ways of generating, circulating and certifying knowledge about nature, however temporary and partial this resolution may be,

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<sup>23</sup> The concept of cultural politics approaches culture as an arena wherein knowledges, political-economic values and cultural meanings are forged and contested. Any invocation of culture, either by actors or analysts, is itself political- there can be no apolitical practice, communication or analysis of culture just as there can be no politics apart from a particular political culture. See e.g. Armitage, John, Ryan Bishop and Douglas Kellner. “Introducing Cultural Politics”. *Cultural Politics*, (2005).

has played a large role in grounding modes of democratic deliberation and collective action in resource management in the Klamath.

This dissertation also demonstrates the ways in which the cultural politics of knowledge in Klamath environmental conflicts have prompted a search for more democratic ways of producing knowledge and making resource management decisions, as well as better ways of accommodating the multiple livelihoods and cultural practices nestled within the complex watershed ecosystems of the Klamath. In Klamath environmental governance, the arts and technologies of the possible aren't restricted to humans, but also include the search for better ways of politically and scientifically representing the non-human biotic communities and abiotic dynamics that comprise Klamath watershed-ecosystems. As Jane Bennet has remarked (2010), "democratic politics does involve humans acting in concert, but in concert with quite an ontologically diverse range of actors"<sup>24</sup>. The cultural politics of watershed knowledge in the Klamath has also inspired a search ways of bringing diverse communities together in experimental ways of "getting-on" with non-human others in a more-than-human world<sup>25</sup>.

Specifically, I look at the sets of knowledge practices, laws and regulatory policies that mediate relationships between humans and a range of non-human watershed inhabitants such as salmon (Ch 3, 4, 6), elk (ch 5), beaver (Ch 6) and spotted owl (Ch 4). I argue that material-semiotic relationships with these non-humans not only promote fuller understandings and more nuanced readings of the habitat mosaics that compose watersheds, but also provide important cues for managing watershed ecosystems on behalf of their human and more-than-human inhabitants. Through the set of methods described in the next section, I examine the role that watershed science has played in grounding modes of democratic governance and shaping human-nature relations in the Klamath.

## 6. Structure of Study

The next chapter (Chapter 1) lays out the basic theoretical framework and methodological approach that guides my research on Klamath experiments in watershed democracy and the role of knowledge practices in democratic environmental governance more generally. Combining participatory research and participant observation with theoretical insights from political ecology, science and technology studies and indigenous studies scholarship, I develop a methodological framework that allows me to both descriptively analyze and normatively evaluate the processes and outcomes of collaborative watershed-based governance according to its impacts on local watershed ecosystems and communities.

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<sup>24</sup> Bennet, Jane. "Thing Power" in Braun and Whatmore (Eds) *Political Matter: Technoscience, Democracy and Public Life*. University of Minnesota Press. 2010, p. 55.

<sup>25</sup> On the "more-than-human" see e.g. Deborah Bird Rose, Thom van Dooren, Matthew Chrulew, Stuart Cooke, Matthew Kearnes and Emily O'Gorman. "Thinking Through the Environment, Unsettling the Humanities". *Environmental Humanities* 1 (2012) 1-5.

Participatory research with members of the Karuk Tribe's Department of Natural Resources played a significant role in shaping my research process and how I came to view the many epistemologies and ontologies of Klamath watershed processes and the politics of scale in Klamath environmental governance. The Karuk Tribe is a federally recognized Indian tribe, with the second largest tribal membership in California<sup>26</sup>. However, their 1851 treaty with the US government was never ratified and so, to this day, they do not have a reservation. Their Aboriginal Territory includes an estimated 1.38 million acres across in middle stretch of the Klamath, roughly between the Seiad Valley and Bluff Creek drainages. Approximately 95% of this land is now under US Forest Service jurisdiction, beginning with the creation of the Klamath National Forest in 1905 and continuing with the creation of Six Rivers National Forest in 1947<sup>27</sup>.

I will demonstrate in Chapter 4 how USFS management of Karuk ancestral lands resulted in criminalization of traditional resource management practices such as prescribed burning, fishing, hunting and gathering. Converting the watershed-ecosystems of the Klamath to timber plantations has in turn resulted in a loss of biodiversity and diverse habitat mosaics, the reduction of ecological and cultural resilience and has contributed to a lack of access to subsistence and cultural resources for tribal members. Collaborative watershed governance forums over the past three decades have therefore provided important opportunities for Karuk tribal members to be able to influence how the Forest Service manages resources in their ancestral territory. In this dissertation, I follow the ways Karuk scientists and representatives have both leveraged and challenged the watershed as a spatial unit for implementing ecological restoration and cultural revitalization in their ancestral territory.

Over five years (2009-2014), I engaged in participatory research with the Karuk Department of Natural Resources through the Karuk-UC Berkeley Research Collaborative (KBC) on initiatives related to watershed and fire management policy, food sovereignty, ecological restoration and cultural revitalization<sup>28</sup>. In the next chapter and throughout the dissertation, I argue why participatory research provides an important component of movements among STS, political ecology and geography scholars to democratize science and decolonize environmental governance. In this case, participatory research provided a unique angle on the ways processes and outcomes of collaborative watershed governance were perceived, leveraged and contested by members and representatives of an indigenous community. The Karuk Tribe's distinct political and legal status related

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<sup>26</sup> Recognition refers to the process by which Tribes' distinct political and legal status as sovereign, self-governing entities is "recognized", or formally acknowledged, by State and Federal governments of the United States.

<sup>27</sup> Tripp, Bill. Understanding the Indian Connection to Land and Place. *Evergreen Magazine*. Spring 2014, pg. 12.

<sup>28</sup> For info on the Karuk-UC Berkeley Collaborative, see: <http://nature.berkeley.edu/karuk-collaborative/>, last visited 6/20/15.



to their sovereign resource rights and Karuk scientists' epistemologies, ontologies and cosmologies provided unique insight into the watershed as a scale of knowledge-making and resource governance. Engaged scholarship methodologies drew my attention to the importance of scalar formations in structuring the range of inclusions and exclusions and that determine whose knowledges, values and perspectives come to matter in directing Klamath environmental governance.

Through participatory research endeavors and conversations with my community partners and dissertation committee, I designed a set of mixed research methods including:

1. Participant observation in collaborative water, fire and food governance forums.
2. Document analysis of case law, Federal, State, Tribal and local agency regulatory policy and implementation regulations, planning documents and project reports.
3. In-depth, semi-structured interviews with scientists and representatives of Federal, State, local and Tribal government agencies, landowners and community members.

Employing this set of methods, I researched and analyzed the politics of knowledge in collaborative watershed governance in three watershed communities in the middle reach of the Klamath. The reasoning and politics behind the spatial structure of my research is discussed in detail in Chapter 1. I initially chose the three Sub-basins of the Scott, Salmon and Mid-Klamath, roughly between the towns of Yreka, Ca and Weithcpech, CA, on the advice of my community partners and committee, as they roughly encompassed a bioregion that overlapped with the "Western Klamath mountains", the "Klamath-Siskiyou biogeographical province" and the un-dammed stretch of the Klamath between Iron Gate dam and the confluence of the Klamath and the Trinity River, which is where the "lower Klamath" bioregion begins. My study focus is also roughly co-terminus to the Karuk ancestral lands and the areas where most Karuk tribal members live. As I explain below, the political, economic and environmental issues facing the watershed communities of the Salmon, Scott and Mid-Klamath Sub-basins also represent a wide swath of watershed management issues facing water-scarce coastal communities in California and other Mediterranean climates around the world.

The 480,640-acre Salmon River Basin is mostly wilderness and 98.7% public land, managed mainly by the Klamath National Forest but also by the Bureau of Land Management, the US and California Fish & Wildlife Services, the National Marine Fisheries Service, the State and Regional water boards, the US Environmental Protection Agency and the National Park Service. It is considered one of the Klamath's most "pristine" watersheds and home to one of the last runs of

Spring Chinook salmon in northern California. About 67% of the watershed lies in the Karuk Tribe's Ancestral Territory and the area near the Salmon and Klamath River confluence, known as *Katamiin*, is regarded by the Karuk Tribe as the "Center of the World"<sup>29</sup>. Since the 1960s, the Salmon has been home to hippie communes and back-to-the landers, fishermen, recreationalists and environmental activists. Since the 1970s, debates have raged over the US Forest Service's management of timber plantations, aerial herbicide spraying, fire suppression, road building in Karuk sacred sites and cultural management areas, criminalization of traditional resource management practices and denied access to traditional foods.

The Middle-Klamath (or mid-Klamath) Sub-basin is a conglomerate of tributaries and their drainages between the Trinity River and Iron Gate Dam, but excluding the Salmon, Scott and Shasta watersheds. As explained in detail in Chapter 3, the division of the Klamath into Sub-basin watersheds, which occurred through the Klamath Fisheries Task Force "Long-range" planning process, instigated considerable debate about the implications of demarcating watersheds for the relative jurisdictions and sovereignties of local, State, Federal and Tribal agencies. The mid-Klamath Sub-basin encompasses about 975,360 acres (1,524 square miles) in total. The Pacific Maritime influenced western or "lower mid-Klamath Sub-basin" is separated from the more arid climates of the eastern or "upper" mid-Klamath Sub-basin<sup>30</sup>. The division between the lower and upper mid-Klamath also captures the general land-designation and ownership shift from US Forest Service "public" land and Karuk ancestral territory in the lower sub-basin to "checker-boarded" Federal, tribal and private ownership in the eastern/upper portion of the Sub-basin. The mid-Klamath faces similar issues to the Salmon related to the legacies of mineral and timber extraction such as fire suppression, acid mine drainage, disconnected flood planes, erosive roads and reduced forest stand and habitat diversity, but is also similarly the site of collaborations between NGOs, USFS, the Karuk tribe and private landowners.

The Scott River drains a remote 520,617 acre (812.2 mi<sup>2</sup>) watershed, just up-stream from the Salmon sub-basin. Regulatory conflict in the Scott revolves around the impact of groundwater withdrawals for cattle ranching on in-stream flow patterns and endangered Coho Salmon habitat. Though the Scott is not part of the Karuk Tribe's ancestral territory, due to its importance as spawning and rearing habitat for Coho and Chinook salmon and Steelhead trout, Karuk scientists and representatives consider it both a religious duty and legal responsibility to protect water quality and Salmon habitat in the Scott watershed. This brings up tensions between up-stream and downstream communities' priorities for watershed management and questions around who belongs to a watershed community, or whose knowledge, values and voices matter in setting regulatory policy and guiding resource management for a particular watershed. The Scott has taken center stage in Klamath resource conflicts and become a central site for

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<sup>29</sup> Salmon River Restoration Council. *Salmon River Community Watershed Restoration Plan*. 2000.

<sup>30</sup> Mid-Klamath Watershed Council. *Mid-Klamath Sub-basin Restoration Plan*. 2008.

State-wide negotiations over the authority of Federal and State wildlife and water agencies to regulate groundwater-use on private lands.

For each of the watershed governance processes listed below in Table 1, I attempt to analyze the way watershed knowledge is generated, deemed credible, contested, stabilized, circulated, taken up into policy and used to ground collective action in different epistemic communities.

**Table 1:** *Watershed governance processes analyzed.*

Sponsoring Agencies	Watershed Governance Processes
Klamath Fisheries Task Force (congressionally appointed inter-agency, multi-stakeholder body)	Long Range Plan (1991); Mid-Term Evaluation (1999)
US EPA, North Coast Regional Water Quality Control Board, Karuk Tribe	Beneficial Use, TMDL development and TMDL implementation plans for Scott River (2006), Salmon River (2006), and Klamath main-stem (2010); Karuk Tribe Water Quality Control Plan (2002)
National Marine Fisheries Service	Southern Oregon/Northern California Coast Coho Recovery Plan (ongoing)
US Forest Service	Pacific Northwest Forest Plan (1995), Watershed Analyses for Bluff Creek (ongoing), Salmon River (1995); Klamath River Basin Assessment (1997), Land and Resource Management Plans, Orleans Community Fuels Reduction Project, Road-decommissioning projects
Federal Energy Regulatory Commission	Klamath Hydroelectric Settlement Agreement (2010); Klamath Basin Restoration Agreement (2010)
Watershed Councils (Mid-Klamath Watershed Council, Salmon River Restoration Council, Scott River Watershed Council); Upslope Working Group; Western Klamath Restoration Partnership	Watershed education programs in local schools, community outreach, volunteer coordination, community restoration projects, BMP development, monitoring and restoration planning, WUI and private lands work, collaborative fire management, private lands restoration, noxious weeds removal, Fire Learning Network Open Standards “scoping” process
Karuk Tribe Dept. of Natural Resources	Karuk Tribal harvest monitoring project (1991); Klamath River Water Temperature Monitoring (1994); Water Quality Monitoring Report (2001, 2002, 2003); Ecosystem Restoration Program Final Report (2001, 2002); Water Quality Assessment Report 305(b); Eco-cultural Resource Management Plan (2011), Individual MOUs and MOAs with USFS, SWRCB, and USFWS for gov-to-gov relations, restoration and monitoring projects, cultural resource area and tribal trust protection

In following the cultural politics of watershed science *in action* in each of these watershed governance forums, I observe how different epistemic communities generate, circulate, and apply watershed knowledge in their attempts

to collectively manage land and water resources at the watershed scale<sup>31</sup>. I attempt to understand how watershed science is generated by the diverse individuals, institutions and networks of actors engaged in Klamath resource management, set to work by policy makers, leveraged by courts, tribes and NGOs and put into practice in everyday resource management. In following the embodied practices through which watershed knowledge is made and applied in every day resource management, I am interested in everything from a family managing a tan-oak stand to a multi-agency, large-scale ecosystem restoration at the scale of millions of acres.

Throughout my research, I paid close attention to the way science is called upon to speak for nature, stand for culture, deliver justice and allocate resources inside these emerging governance spaces. In this dissertation, I demonstrate the ways unfolding knowledge practices are connected with shifting institutional forms such as regulatory policies, property rights in land and water, and techniques for assessing resource values. I attempt to come to terms with the way new democratic knowledge practices and governance processes condition rights in representative institutions, regulate access to watershed resources and shape the distribution of watershed benefits and burdens.

In looking at how watershed democracy plays out *on the ground*, I am concerned with the impacts and implications of knowledge practices, both individual and collective, on actual material watershed-ecosystem processes and in turn on the culture, health and economies of the people inhabiting and working in the Klamath. Overall, in following watershed knowledge in the making, in action and on the ground, I am concerned with the influence that networked representations and embodied performances of watersheds have on actual material watershed-ecosystem processes and on those who depend on those processes for their lives and livelihoods.

By analyzing the politics of knowledge in collaborative watershed governance in each of these Sub-basins, I attempt to focus on an important dimension of some of the most critical water issues facing California environmental governance today: e.g. groundwater and surface water connections (Ch 6), private land and water-use impacts on public resources (Ch 3, 6), effects of hydropower generation on fisheries habitat, (Ch 3,4) conflicts between agricultural water uses and environmental regulation (Ch 3,6), tensions between upstream/downstream and in-basin/out-of basin water uses (Ch 3, 4, 6), upslope land-use and in-stream flow connections (Ch 4, 5), the fire-water-fish interface (Ch 4, 5), the water-food-energy interface (Ch 3-6) and adaptive governance for climate change-induced changes in snow fall and precipitation patterns (Ch 6).

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<sup>31</sup> see e.g. Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers through Society*. Harvard University Press: 1988.

## 7. Findings:

As opposed to expert-driven, top-down models of epistemic and political authority characteristic of early-to-mid 20<sup>th</sup> century resource management in the Klamath, collaborative watershed governance offered Karuk tribal members and representatives real opportunities to participate in knowledge production and decision-making for ecosystem restoration and resource management. Though they did not always agree, Basin-wide deliberative bodies brought together farmers, ranchers, fisherfolk, timber companies, environmentalists and Tribal members for the first time to share knowledge and make collective decisions about the management of natural resources. However, as I show in Chapters 3 and 4, epistemologies and ontologies of the watershed did not always harmonize through collaborative watershed management forums. Watershed science struggled to render different types of indigenous, traditional, local, and scientific knowledge commensurable and instead provoked debates about appropriate ways of producing knowledge about nature.

I demonstrate in Chapters 3, 4 and 5 how Karuk scientists and representatives both leveraged and critiqued the watershed both as a way of conceptualizing watershed-ecological processes and as a way of approaching ecological restoration and cultural revitalization. Watershed science and watershed-based governance forums were at times leveraged by Karuk tribal members and representatives to substantiate Karuk sovereignty, self-determination and resource rights, and at times rejected for not being able to convey distinct Karuk epistemologies, ontologies and cosmologies. Through knowledge conflicts over epistemologies and ontologies of watershed processes, the representativeness of the watershed has itself been called into question- its representativeness as a natural form in its ability to register local biophysical and ecological dynamics, and as an institutional form, in the ability of watershed assemblies to speak for the knowledges and values of their constituents. In particular, the watershed was critiqued for not capturing the unique spatialities of fire behavior, wildlife movements, soil-vegetation interactions or the specific habitat conditions of cultural resources such as basketry materials or regalia species.

I examine two spatial frameworks, “firesheds” and “foodsheds”, that have emerged as alternative scalar frameworks to the watershed for making knowledge and implementing ecological restoration in the Klamath. I argue for deliberative multi-scalar approaches to implementing collaborative ecological restoration and environmental governance. Multi-scalar perspectives can accommodate multiple ways of seeing and living in nature while avoiding homogenizing diverse situated and partial perspectives into a single way of seeing Klamath eco-cultural landscapes. I also make an argument for “*democratizing scale*”- meaning finding ways of facilitating deliberative inquiry on the question of the appropriate scales for representing people and places, producing knowledge and making decisions about the management of natural resources. In order to accommodate diverse

ways of knowing, valuing and living in nature, ecological democracy must also be able to find common ground among the different scales through which different epistemic communities understand nature. I argue that efforts to democratize environmental governance in the Klamath require an accompanying democratization of scale to accommodate the myriad ways of making knowledge and living in Klamath watershed-ecosystems.

### ***8. Chapter Summaries:***

This section provides an overview of the main arguments of each chapter in the dissertation. The next chapter (Chapter 1) lays out the basic theoretical framework and methodological approach that guides my research on Klamath experiments in watershed democracy and the role of knowledge practices in democratic environmental governance more generally. This chapter lays out three clusters of theoretical debates and bodies of literature that I draw from and that I hope my research will contribute to:

- 1. The role of knowledge and expertise in democratic environmental governance*
- 2. The effects of watershed governance on indigenous peoples' political, cultural and ecological self-determination*
- 3. The cultural politics of scale in democratic environmental governance*

Chapter 2 narrates a history of the theories and practices of watershed democracy in the Western United States through examining moments in which watershed science and institutions of watershed governance were co-produced. The goal of Chapter 2 is to provide relevant background on the theories and practices of watershed democracy and demonstrate how understandings of watershed processes take shape in dialogue with particular political-economic formations, ways of inhabiting watershed ecosystems and modes of allocating watershed resources.

Chapter 3 analyzes the epistemic cultures and regulatory landscapes of the Klamath by asking “how Klamath watersheds and watershed institutions think”. I give an overview and background of the major areas of law and regulatory policy directing land and water use in the Klamath as well as the different theoretical positions from which to study the multiple ontologies and epistemologies of Klamath watersheds and the mutually constitutive relations between expertise, regulatory policy and the materialities of Klamath sociocultures. In particular, I dissect two formative moments in the history Klamath watershed governance, the formation of the Klamath Fisheries Task Force in 1986 and the Fish Kill of 2002-2003, through two different theoretical frameworks: co-production and scale performativities. I argue through these cases for the importance of attending to the precise ways in which knowledge-making and governance processes at the

watershed scale materially shape watershed-ecosystems, redistribute resource benefits and burdens and reconfigure patterns of access to resources and representative institutions. Through an analysis of these two important incidents in the history of Klamath watershed governance through two different theoretical frameworks, I set the stage for the next three empirical chapters (Ch 4-6) in which I examine the complex relationships between knowledge of watershed processes, institutions of watershed governance and watershed materialities in the Salmon, mid-Klamath and Scott Basins.

Chapter 4 examines the history and cultural politics of watershed governance in the mid-Klamath and Salmon River sub-basins, which lie mainly within Karuk ancestral territory. The history of watershed-based governance in these two Sub-basins demonstrates how knowledge of Klamath watersheds has been built through power struggles, resource conflicts, and disputes over sovereignty and territory. The alignment of resource governance institutions with the watershed results from negotiations and compromises that occasionally find closure along drainage boundaries. Watershed boundaries initially formed the basis of County and Forest District boundaries in early US state-making practices. Beginning in the late 1980s, the watershed became a primary arena through which issues of sovereignty, representation, property and cultural difference were worked out. For over two decades, the watershed served as the primary unit for combining different types of scientific, local and indigenous knowledge, resolving resource conflicts, allocating resources and guiding ecosystem restoration. Beginning around 2005, concerns related to wildland fire and local food insecurity shifted the inter-agency collaborative efforts of the mid-Klamath away from the watershed framework and towards a regional governance framework oriented around firesheds and foodsheds.

Chapter 5 compares watersheds, firesheds and foodsheds as different ways of grounding democratic environmental governance in the social and ecological particulars of place in the Klamath to explore questions of scale in collaborative natural resource management. Firesheds are emerging arenas of community-based fire management patterned according to the way fire burns across the western Klamath landscape. Foodsheds are another emerging form of community-based resource governance taking shape in the Klamath around the spatial and temporal characteristics of indigenous food resources and their associated management practices in forest ecosystems. Epistemic and political power take on distinct forms through each space of governance and shape Karuk sovereignty, territory, resource access and political and cultural self-determination. Following my community partners engage the more-than-human at multiple nested scales opens up new understandings of Klamath eco-cultural landscapes and new possibilities for democratic environmental governance. I argue that multiscale perspectives can provide more inclusive grounds than watersheds for democratic environmental governance and multispecies world-making in the Klamath.

Chapter 6 follows the waters of the Klamath underground in one of its most contested tributaries, the Scott River, where the science of groundwater hydrology entangles with property regimes to arrange relations between State and Federal agencies, landowners and other-than-human watershed inhabitants. Regulatory conflict in the Scott centers around whether or not the watershed can furnish adequate baseflows in the dry summer months to support endangered Coho Salmon, at the same time when ranchers depend on groundwater withdrawals to grow alfalfa and graze cattle. The geohydrology behind the precise effect that ranchers' groundwater pumping has on subsurface flows and, in turn, on in-stream flows and habitat conditions is caught in the middle of these conflicts. The authority of public agencies to regulate land and water use on private lands depends on their being able to prove connections between isolated instances of groundwater pumping and cumulative watershed-scale effects on in-stream flow dynamics and Coho habitat conditions. Therefore, in the Scott, the meaning and scope of private property rights in land and water and the privileges and obligations these rights confer are being negotiated alongside debates about the connections between subsurface and surface flows. I examine the role that knowledge politics play in negotiating the boundaries between the jurisdictions of different "publics" as well as between public and private property in the Scott subterranean.

In the conclusion (Chapter 7) I argue that, although the Klamath experiments in watershed democracy have to some extent expanded opportunities for watershed inhabitants to participate in knowledge generation and decision-making for resource management, the watershed scale has itself constrained the focus of management, limited the kinds of knowledge that can pattern as reliable and skewed the types of projects that can issue from collaborative resource governance processes.

To better depict the way water flows through Klamath watersheds and more responsibly represent the multiple scales through which watershed inhabitants understand and value nature, I suggest the need for multi-scalar governance institutions, the boundaries and nesting patterns of which are themselves designed through democratic processes. I argue that "*democratizing scale*" holds promise for detaching institutions of democratic environmental governance from the fixed scale of the watershed and reopening questions around issues of scale and self-determination to place-based multiperspectival inquiry. I give examples in Chapters 3-6 of different ways of bringing together diverse forms of environmental knowledge and place-based values around the multiple nested scales of social and ecological processes in the Klamath. I argue that, in order to accommodate diverse ways of knowing and living in nature, an ecologically and democratically grounded politics must also be able to find common ground among the different scales through which people understand and relate to nature. By arguing for *democratizing scale*, my intention is to open up questions about scalar approaches to knowledge production, environmental governance and democratic deliberation in Klamath resource management debates specifically as well as in



contemporary debates about sustainable water governance and ecosystem restoration more generally.

## Chapter 1

### *Are watersheds “the natural home of democracy”?*

#### **1. Watersheds**

Conceived of as a biophysical spatial unit, a *watershed* is defined as any area of land that “sheds” or contributes water to a common waterbody or outlet such as a stream, river, lake, reservoir, bay or city<sup>32</sup>. The terms *drainage basin* and *catchment*, though typically reserved for larger and smaller units of land respectively<sup>33</sup>, also evoke the journeys of water between sky, land and sea. Rain falls and is “caught” in basin-shaped formations through which it “drains” and “sheds” as it flows through the landscape. Watersheds, catchments and river basins all denote the distinct shapes and patterns that water both creates and follows as it runs downhill.

The drainage formation is held by scientists and resource managers to be a natural and universal spatial formation, evidenced even in indented traces on the surface of Mars<sup>34</sup>. On the websites of many US water and environmental agencies

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<sup>32</sup> “Watershed, or catchment, is a topographically delineated area drained by a stream system; that is, the total land area above some point on a stream or river that drains past that point. The watershed is a hydrologic unit often used as a physical-biological unit and a socioeconomic-political unit for the planning and management of natural resources.” Brooks, Kenneth N., Peter F Ffolliott, Hans Gregersen and Leonard DeBano. *Hydrology and the Management of Watersheds*. 3<sup>rd</sup> Edition. Iowa State Press: 2003, p. xiii.

<sup>33</sup> Calder, Ian. *Blue Revolution: Integrated Land and Water Resource Management*. Earthscan. 2005, pg. xvii “Originally ‘catchment’ may have meant just the headwaters where impoundments had been built to capture water for supply, irrigation and hydroelectricity purposes. Now catchments are regarded more as the hydrological units which occupy the whole land surface of the globe”; Leopold, Luna. M Gordon Wolman and John Miller. *Fluvial Processes in Geomorphology*, 1992 (1962), p. 131: “The drainage area may be defined as the area which contributes water to a particular channel or set of channels...It provides a limited unit of the earth’s surface within which basic climatic quantities can be measured and characteristic landforms described, and a system within which a balance can be struck in terms of inflow and outflow of moisture and energy”; United Nations Environmental Programme. *Integrated Watershed Management*. Introduction Pt 3, p. 1, “Definitions: Watershed”: “Drainage basin (catchment area) is the area which supplies a river system, lake or reservoir with water. The whole area consists of smaller sub-catchments supplying tributaries of the main river and direct catchments, which drain straight into a lake or main river. The boundary line separating catchments is called a drainage divide or watershed divide”; United States Geological Survey. Water Science School. “The word watershed is sometimes used interchangeably with drainage basin or catchment” <http://water.usgs.gov/edu/watershed.html>. L.v. 5/1/15.

<sup>34</sup> Aharonson, Oded and Maria T. Zuber, Daniel H. Rothman, Norbert Schorghofer, and Kelin X. Whipple. “Drainage Basins and Channel Incision on Mars” *PNAS*: 1780–1783, February 19, 2002, vol. 99, no. 4; Grant, John and Timothy Parker. Drainage evolution in the Margaritifer Sinus region, Mars. *Journal of Geophysical Research*, Vol. 107, 2002; Hynes, Brian and Roger Phillips. “New data reveal mature, integrated drainage systems on Mars indicative of past precipitation”. *Geology*; September 2003; v. 31; no. 9; p. 757–760.

is currently posted some version of the slogan: “we all live in a watershed”<sup>35</sup>. Drawing attention to the fact that every square-inch of land on this planet is connected to a drainage outlet is meant to connect land and water users to one another and to place through an awareness of their hydrologic interconnectivity and interdependence. Though the basic drainage form is held as universal on an abstract theoretical level, on the ground, every watershed ecosystem is unique. As we will see, the actual journey of water through a particular watershed is mediated by complex webs of socio-cultural, political-economic and biogeochemical processes that comprise each watershed ecosystem and community. Yet the form of the drainage basin has been abstracted, circulated and deployed by resource management institutions around the world, both scientifically to describe the flow of water across the landscape as well as politically to represent resource users through bioregionally-scaled institutions.

For centuries, the pattern that water traces as it drains down the Earth's surface has lent its shape to the way scholars and statesmen have figured their conceptions of the ideal political community. In the next chapter, I examine how the watershed has captured the political imaginations of ancient Mesopotamian emperors, French enlightenment cartographers, hydraulic engineers, American New Deal reformers, post-War systems theorists and hippie back-to-the-land beat poets. Watershed-based institutions now represent watersheds and their human and non-human communities around the world. However, articulations of the watershed in scientific discourse and instantiations of watershed governance in human institutions are as unique, diverse and complex as the world's watershed ecosystems themselves. Watershed governance differs widely as a product of distinct historical, socio-cultural, political-economic and ecological contexts. However, all theories, imaginaries and practices of watershed-based governance share the premise that the drainage patterns given by nature provide appropriate shapes for the boundaries of resource governance institutions. Proponents of watershed-based governance all assume that organizing institutions around watersheds will harmonize relations among humans and between humans and the more-than-human worlds they inhabit.

From a scientific perspective, the watershed provides a unit well-suited for analyzing the specific hydrologic, biogeochemical and ecological processes and

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<sup>35</sup> E.g.: New York State Department of Environmental Conservation 2009 publication “We all live in a Watershed”; Santa Clara Valley Water District Newsletter 2015 “We all live in a watershed- let's protect it!": “Everyone is part of the watershed, because the watershed is everywhere!” Michigan State University Water. “No matter where you are, you live in a watershed”, “We all live in a watershed!” 2014; Missouri Dept. of Natural Resources: “No matter where you go, from small towns to big cities, down on the farm or back at the ranch, you're always in a watershed” <http://www.dnr.mo.gov/env/wpp/watersheds.htm> ; South Carolina Department of Health and Environmental Control: “All living things, including humans, are connected in a watershed so even if you don't live near a body of water, your everyday actions may affect water quality because you are always in a watershed”, <https://www.scdhec.gov/environment/water/shed/>; all l.v 5/1/15.

dynamics operating within a particular area<sup>36</sup>. Watersheds are assumed to comprehensively encompass the flow of water as well as the transport of sediment, solutes, nutrients and pollutants through watershed ecosystems and human communities. The watershed gaze allows the analyst to link upslope and upstream land and water-use activity with downstream flow regimes, in-stream water quality and habitat conditions<sup>37</sup>.

More than a holistic hydrologic unit, the watershed also performs a working model of an ecosystem in expressing the relationships between abiotic elements such as water, sediment, nutrients and the plant and animal communities that depend on and interact with them<sup>38</sup>. The watershed “stands-in” for hydrologic, ecological and social systems, representing at once the human communities, non-human plants and animals and the abiotic elements that cycle through and bind them. A watershed provides a way of wrestling with nature’s “wild profusion” and the intricate complexities of coupled human and natural systems by highlighting specific features particular to place and rendering them commensurate with or comparable to other such complex systems around the planet<sup>39</sup>.

For these reasons, the watershed has provided the political unit *par excellence* for implementing ecosystem management as well as integrated water management, linking the most intimate details of local creeksheds and their human and more-than-human inhabitants with vast bioregions, nation-states and global geopolitical formations. We will see in this chapter how hydrologists, ecologists, environmental activists, bioregionalists and commons theorists alike have grounded utopian political imaginaries in the watershed. Over the last hundred years, the watershed has become a primary locus of environmental governance not only in the Klamath, but also across California, the United States and around the

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<sup>36</sup> Leopold, Luna et al 1967, p 131: “The drainage basin provides a limited unit of the earth’s surface within which basic climatic quantities can be measured and characteristic landforms described...The amount of precipitation that falls over a given drainage basin can be measured and, given adequate instrumentation, the quantity of water that flows out of the drainage basin in stream channels, the changes in ground water storage and the evaporation and transpiration by plants can be estimated. In addition rates and kinds of denudation may be measured as material transported in solution or as clastic load in stream channels.”

<sup>37</sup> E.g Leopold 1967, see above citation; Reid, Leslie M.; Ziemer, Robert R.; Furniss, Michael. Watershed Analysis in the Federal Arena. *Watershed Management Council Newsletter* 6(2): 6-11. Fall 1994, p 7-8.

<sup>38</sup> See e.g. Lotspeich, Frederick B. Watersheds as the Basic Ecosystem: This Conceptual Framework Provides a Basis for a Natural Classification System”. *Water Resources Bulletin*. Vol 16, No. 4. August, 1980; Tansley (1935) originally defined an ecosystem as “a system resulting from the integration of all living and nonliving factors of the environment”.

<sup>39</sup> Lowe, Celia. *Wild Profusion: Biodiversity Conservation in an Indonesian Archipelago*. Princeton University Press. 2006, Pgs 2-3: “Natures are “made” at the intersection of humans with their particular social histories, and plants and animals with their unique evolutionary and ecological histories. Neither “science” nor “society” will tell us all the interesting things one might want to know about these natures. To proceed further, one must travel along a path between the human and the wild profusion.”

world as resource management institutions have aligned their jurisdictions and management scopes with the watershed<sup>40</sup>.

## 2. Watershed democracy

More than a preferred unit of integrated ecosystem science and environmental governance, I attempt to show in this dissertation how the watershed has also become a preferred *political or institutional* unit for implementing democratic governance- for guiding the apportionment of valuable and finite resources, grounding the production of credible knowledge, patterning collective action, and debating matters pertaining to public life. This dissertation develops, analyzes and contests the concept of “*watershed democracy*” as a way of making sense of the past thirty years of attempts to collaboratively manage natural resources in the Klamath. *Watershed democracy* is a hydrologically-grounded political ideal and associated set of theories and practices that have been articulated and re-articulated since the mid-19<sup>th</sup> century in the US west and around the globe in different historical, political, cultural, economic and geographical contexts. As invoked in the title, this dissertation is itself a search for watershed democracy, both what it has meant historically in US resource management policy as well as how it has been operationalized by the watershed communities of the Klamath.

Theories of watershed democracy anchor attempts to directly engage all inhabitants, representative institutions and resource users of a watershed in producing knowledge and making decisions about the management of the land and water resources within their watersheds. Framing the past three decades of collaborative natural resource management in the Klamath as “experiments in watershed democracy”, I attempt to link empirical research on the processes and outcomes of watershed-based governance in the Klamath with theory and practice that emerged in the late 19<sup>th</sup> century and was revived in the 1930s and again in the mid-1980s (See Ch 2). Situating recent attempts in the Klamath to collaboratively manage land and water resources at the watershed scale against the ways in which similar political and scientific imaginaries have been articulated historically helps refine the concept of watershed democracy and evaluate its potential for guiding democratic natural resource management in the Klamath.

Theories of watershed democracy hold that watersheds should be managed by those who inhabit them, know them intimately, depend on their terrestrial and aquatic resources and have the most at stake in maintaining particular watershed conditions, functions and flow regimes. In the flow of water through landscapes

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<sup>40</sup> see Chapter 2 for detailed discussion about the diffusion of collaborative watershed management institutions in the 1990s; see also Sabatier, Paul, Chris Weible and Jared Ficker, “Eras of Water Management in the United States: Implications for Collaborative Watershed Approaches” in Sabatier, Paul, Will Foct, Mark Lubell, Zev Trachten berg, Arnold Vedliz and Marty Matlock. *Swimming Upstream: Collaborative Approaches to Watershed Management*. MIT Press: 2006.

and communities, theories of watershed democracy evince a natural inclusiveness as well as a discordant harmony of order and disorder, freedom and necessity, in which to ground democratic resource management. As next chapter will demonstrate, more than a mere imaginary, watershed democracy has been reinvented and redeployed numerous times in diverse historical, social and geographical contexts and has become a standard trope and practice of natural resource management. Over the past hundred years in the Klamath, across the United States and around the globe, the watershed has become a primary site of democratic environmental governance. In the next section, I specifically examine the historical links between nature, science and democracy in theories and practices of watershed democracy.

### **3. Science, nature and democracy: the watershed's supposed democratic affinities**

Next chapter, I analyze the entwined histories of watershed science and watershed governance over the past two centuries. I examine links between the intellectual history of the watershed and historical patterns in the governance of watershed systems to set the stage for understanding how watershed democracy emerges and unfolds in the Klamath. Delving into the interface between knowledge of nature and natural resource governance is important for understanding what is unique about Klamath watershed democracy and also for understanding academic debates about relationships between knowledge and politics in democratic environmental governance. Each time the watershed provides a template for democracy, it articulates different relationships between expert and non-expert knowledges, states and their publics, political economies and the nature-cultures they are embedded within. In this section, I briefly introduce the history of the theory of watershed democracy and explore the changing relations it posits between science, nature and democratic governance as it is deployed in diverse contexts.

Many water scholars trace the origins of the discourse of watershed democracy back to the late 19<sup>th</sup> century writings and ravings of geologist, ethnologist and civil war general John Wesley Powell<sup>41</sup>. In charge of surveying first the Colorado River and later the water resources and indigenous languages of the US, Powell famously suggested that the state boundaries of the arid West should be organized according to drainage divides. Within each watershed, Powell envisioned a "body of interdependent and unified interests and values" that implied "common rights and common duties"<sup>42</sup>. Powell argued that watershed commonwealths

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<sup>41</sup> see e.g. Worster, Donald. 2003. *Watershed Democracy: Recovering the Lost Vision of John Wesley Powell*. 23 *J. Land Resources & Evtl. L.* 57.

<sup>42</sup> Powell, John. *The Century Illustrated Monthly Magazine*, 1890. Volume 18; Volume 40, p. 114: "Thus it is that there is a body of interdependent and unified interests and values, all collected in one hydrographic basin, and all segregated by well-defined boundary lines from the rest of the world. The people in such as district have common interests, common rights and common duties, and must necessarily work together for common purposes."

should be allowed to organize under national and state laws and “make their own laws for the division of the waters, for the protection and use of the forests”<sup>43</sup>. He saw within each river basin a “natural community” within which “all living things were inextricably linked by their common water course”<sup>44</sup>. For Powell, this hydrologic connectivity entailed that watershed inhabitants “must necessarily work together for common purposes” and amounted to a “simple logic that demanded that humans become part of that natural community”<sup>45</sup>. For Powell, the fate of democratic governance in the US west hinged upon crafting such hydrologically-scaled political bodies, where justice and democratic governance mirrored the flow of water through watershed systems. In Powell’s imaginary of river basin commonwealths, government science played the role of handmaiden of democracy and civilization in the US west<sup>46</sup>. Government experts elucidated the natural order of the landscape and handed it over to “the people” who would then advance civilization as they tamed the landscapes of the US west.

Powell suggested that the boundaries of the States of the US West be drawn around watersheds. The institutional design of political districts and jurisdictions would have mimicked the flow of water from small streams and their creeksheds into larger rivers and their sub-basins, eventually connecting the entire watershed institutionally through a common authority. Court appeals, electoral processes, and tax revenue would flow from “tributary” districts into “mainstem” jurisdictions covering vast watershed regions. Powell pitched his vision of “river basin commonwealths” in front of Congress, State legislatures, presidential primaries and State constitutional conventions. As next chapter explores in detail, Powell’s ideas were dismissed during his lifetime as those of a power-hungry socialist fanatic. However, his notion of riverbasin commonwealths endured, and his vision of the West as a mosaic of watershed republics, each responsible for the management of its own land and water resources, has colored imaginaries of democratic resource management policy ever since.

After Powell, watershed democracy was reinvented numerous times in numerous historical and geopolitical contexts. Of particular importance to this dissertation is that each articulation of the imaginary of watershed democracy posits a different role for expert science in both democratic governance and the management of natural resources. Each evocation of watershed democracy articulates a different relationship between expert and citizen knowledges, State institutions, civil society organizations, publics and the complex materialities of particular watershed ecosystems. When Powell’s ideas were picked back up by early 20<sup>th</sup> century progressivists such as Powell’s successor at the Bureau of Ethnology W.J. McGee and forester Gifford Pinchot, they were infused with newer

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<sup>43</sup> Powell 1890, p. 47.

<sup>44</sup> Loeffler, Jack and Celestia Leffler. *Thinking Like a Watershed: Voices from the West*. UNM Press. 2012. p 29.

<sup>45</sup> Powell 1980, p 114, Loeffler, Jack 2012 p 29

<sup>46</sup> See e.g. Powell, John. *The Century Illustrated Monthly Magazine*, 1890. Volume 18; see also Powell, John Wesley. *Truth and Error: Or the Science of Intellection*. 1898.

ideas about the role of expert scientists and managers in commanding nature and engineering society as well as concerns related to conflicts over the impacts of newer water uses such as hydropower generation on the timing and magnitude of water flows through watersheds<sup>47</sup>.

In early 20<sup>th</sup> century debates about connections between up-stream logging practices and in-stream flow dynamics, we first see the modernist separation of watershed science and watershed policy and the beginning of the “experimental turn” in US watershed hydrology<sup>48</sup>. It is here that long-term experimental catchment studies undertaken by public agencies on behalf of their publics become the standard for settling, once and for all, the question of forest influences on streamflow patterns and water quality. Ancient debates about the effects of deforestation on stream-flow, floods and desertification were to be put to rest through large-scale, long-term, well-instrumented and thoroughly documented experiments conducted in full view of the public. In Progressive approaches to watershed governance in the first two decades of the 20<sup>th</sup> century, we see an articulation of democracy and scientific environmental management that demands a strict separation of science and policy. Again, the relationship between science and democratic politics was worked out through watersheds, but this time through large-scale, long-term catchment experiments designed to settle matters of public policy. This model persisted and resulted not just in new understandings of watershed systems, but new ways of working out the proper relationships between science, democracy, economic development and public interests.

A decade later, in the depths of the depression we see the discourse of watershed democracy revived by Arthur Morgan and David Lilienthal in a vast experiment to develop the entire Tennessee valley watershed<sup>49</sup>. In this pilot experiment, expert watershed science, river basin economics and engineering were set to work to develop the South to bring it out of the depression as a model of “grass-roots democracy”<sup>50</sup>. In this era of watershed governance, scientists and engineers were recruited to enable the full development and use of river basins, as well as engineer a new form of liberal “participatory” democracy and open up

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<sup>47</sup> On debates between McKee and Pinchot about watershed management during the Inland Waterways committee sessions, see Donald J. Pisani, *Water Planning in the Progressive Era: The Inland Waterways Commission Reconsidered*, *Journal of Policy History* 18.4 (2006) pp.389-418. McGee was also in charge of the Bureau of American Ethnology (1893-1903); acting president of the American Association for the Advancement of Science (1897-1898); president of the American Anthropological Association (1902-1912) and president of the National Geographic Society (1904-1905).

<sup>48</sup> See e.g. Andréassian, Vazken. *Waters and forests: from historical controversy to scientific debate*. *Journal of Hydrology* 291 (2004) 1-27.

<sup>49</sup> Lilienthal, David. 1944. *TVA: Democracy on the March*.

<sup>50</sup> See Selznick, Philip. *TVA and the Grass Roots; A Study in the Sociology of Formal Organization*. (1949) for a critical read of the TVA’s “grassroots democracy”.



regional market economies<sup>51</sup>. This version of watershed democracy was exported around the world to align economies during and after world war II and set to work engineering democracy by developing river-basins to their maximum economic potential<sup>52</sup>. Here, a cold-war articulation of militant liberal democracy, market capitalism and a developmental imperative took hold of the watershed. The watershed became a vehicle for taking “democracy on the march”: exporting TVA-style “grass roots” river basin development and liberal market economies around the globe.

Also in the post-war period, when the experimental catchment studies model begun in the 1920s converged with developing cybernetics theory and interdisciplinary applied systems research, a new ecological understanding of the watershed emerged. For post-war systems theorists, the watershed enabled interdisciplinary research on coupled social, ecological, hydrological biogeochemical systems. These interdisciplinary experiments resulted in new understandings of complex adaptive systems and a new language for describing the non-linear dynamics, emergent properties, and multiple stable states of coupled social, ecological and hydrologic systems. This cybernetic turn in watershed science overlapped with the bioregional movement in the 1960s and 1970s and set the stage for the so-called “third wave” of watershed democracy in which the watershed became primary grounds for experimentation in deliberative democracy, social learning and ecosystem restoration.

In Chapters 3-6, I analyze the ways in which theories and practices of democracy are worked out through experiments in collaborative watershed-based governance in the Klamath. As explained in the Introduction, the cultural politics of environmental knowledge in the Klamath have deep roots in war, genocide, resource conflict and dispossession. The watershed became a unit of conflict resolution, collective learning and democratic governance in the 1980s, after nearly a century of resource disputes had peripherally engaged the watershed. In chapter 4, I demonstrate how the watershed was put to work in the Klamath beginning in the late 19<sup>th</sup> century to guide treaty settlements, set county boundaries, apportion resources, adjudicate water rights, cite hydropower dams and set board-foot targets in the Klamath. Only in the mid-1980s, after hippie back-to-the-land movements, herbicide wars, “fish-ins”, armed occupation of sacred sites, political theatre and an elementary school “watershed education” program did the watershed begin to take center stage in Klamath environmental politics.

Scientific understanding of watersheds and the uptake of watershed knowledge into policy *did not* follow a neat linear progression through successive phases, with more accurate scientific representations of Klamath biophysical

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<sup>51</sup> Ekbladh, David. 2002. 'Mr. TVA': Grass-Roots Development, David Lilienthal, and the Rise and Fall of the Tennessee Valley Authority as a Symbol for U.S. Overseas Development, 1933–1973. *Diplomatic History*, 26(3), 335–374.

<sup>52</sup> Ekbladh 2002.

processes gradually aligning resource management institutions with the watershed as the primary scale of collaborative resource governance.

Each time the watershed was recruited to guide resource management it was both leveraged and contested as a space of knowledge-making and a scale of governance by numerous coalitions of actors attempting to access resources and influence the distribution of resource benefits and burdens. Each wave of resource conflict activated the watershed as an arena of political deliberation as it sought closure to knowledge and resource conflict through collaboration in knowledge production and decision-making at the watershed scale. Numerous factors forced federal and local priorities to converge on the watershed in the Klamath beginning in the mid-1980s. The watershed then emerged as the primary unit of conflict resolution, ecosystem restoration, integrated water management and social learning. Numerous resource management institutions then engaged the watershed as they attempted to resolve issues such as depletion of fisheries, spotted owl habitat degradation, dam removal and water quality issues. The nature of the watershed was seen in this era as suggesting a more direct and inclusive mode of democratic environmental governance.

#### **4. The “third waves” of democracy and watershed governance**

In wake of critiques against expert-driven multi-purpose river basin development, beginning in the 1980s, Powell’s vision of watershed democracy was dusted off and reinvented yet again by scholars hailing from numerous disciplines. In contrast to previous imaginaries of watershed democracy, matters related to knowledge, expertise and epistemology were foregrounded in this wave of watershed democracy. This has been termed the “third wave” of watershed governance, the first wave being the first basin-wide engineering projects at the turn of the 20<sup>th</sup> century and the second being the TVA-inspired river basin development projects in the mid-20<sup>th</sup> century<sup>53</sup>. The so-called “third-wave” of watershed democracy began in the late 1960s and crested around the turn of the century. The “third wave” of watershed democracy articulated with “third wave” democratic discourses such as “deliberative democracy” and “direct democracy” with their emphases on direct “participation/inclusion” in governance, development, knowledge production and resource management<sup>54</sup>. Amidst the deliberative turn, we see watershed democracy articulated in such as way as to

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<sup>53</sup> Warner, Jeroen. Philippus Wester and Alex Bolding. Going with the flow: river basins as the natural units for water management? *Water Policy Supplement* 2008. 121-138. P 122. See also Sabatier, Paul, Chris Weible and Jared Ficker, “Eras of Water Management in the United States: Implications for Collaborative Watershed Approaches” in Sabatier, Paul, Will Foct, Mark Lubell, Zev Trachten berg, Arnold Vedliz and Marty Matlock. *Swimming Upstream: Collaborative Approaches to Watershed Management*. MIT Press: 2006.

<sup>54</sup> Warner 2008; see also Molle, Francois. River basin planning and Management: the Social Life of a Concept. *Geoforum* (2009); Molle, Francois. *Planning and managing water resources at the river-basin level: emergence and evolution of a concept*. (2006).

bring broad citizen inclusion in both knowledge-making and governance directly into the center of approaches to managing watersheds.

Participatory democracy began as a slogan of the “new left” movements of the 1960s, which advocated direct citizen participation in broad areas of political and social life<sup>55</sup>. Democracy was seen as having failed to live up to its promise, leading to elitist policies with benefits for the few. Participatory democracy advocated resistance against the unquestioned authority of experts in politics, governance, regulatory policy, science and technology. In democratic political theory, there was a major shift from seeing the legitimacy of democratic processes as grounded in regimes of representation to seeing legitimacy as grounded in direct citizen participation. In “true democracy,” deliberative democrats argued, legitimate decisions are made by the people through participatory processes rather than through traditional decision making channels by elected representatives<sup>56</sup>. This call for participation and inclusion was felt in all areas of social life, from academic researchers to indigenous groups, movements for worker control of industry, development, health policy, consumer protection and natural resource management. Inflected with the “deliberative turn”, the focus in “third wave” watershed democracy is on bottom-up science, social learning and epistemic diversity in collective action and decision-making. In this era, hydrologists, environmental historians, ecologists and commons theorists all interpret the nature of the watershed as suggesting or even demanding a participatory or deliberative mode of democratic governance.

For example, water historian and moralist Donald Worster ends his treatise on western water governance, “Rivers of Empire”, with a vision of a democratic social order grounded in watershed institutions as an antidote to what he sees as the “hydraulic civilization” of the American West<sup>57</sup>. Rather than technocratic water governance anchored in unsustainable dam and canal infrastructure, Worster argues that “real democracy” requires a solid grounding in hydrologic, ecological, economic and political bases. For Worster, the watershed supplies precisely that solid foundation for democratic resource management in the American West. Worster exhumes Powell’s river basin commonwealths and sets them to task reinventing democratic water governance for the age of direct democracy and ecological restoration<sup>58</sup>. He argues that those seeking to revitalize democratic traditions in the West should look to Powell’s teachings, which can train Americans to truly “see” the watershed. Worster argues that if we learn to see America for its watersheds, “we might begin to see America as John Wesley Powell saw it, as a

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<sup>55</sup> MacPherson, C.B. 1977. *The Life and Times of Liberal Democracy*. Oxford: 1977, p 93.

<sup>56</sup> Bohman, James. The Coming of Age of Deliberative Democracy. *The Journal of Political Philosophy*: Vol 6, No 4, 1998; Scharpf, F.W. 1999. *Governing in Europe: Effective and democratic?*, Oxford: Oxford University Press.

<sup>57</sup> Worster, Donald. *Rivers of Empire: Waters, Aridity and the Growth of the American West*. 1986. See esp. p 332 and “Conclusion: Nature, Freedom and the West”.

<sup>58</sup> Worster, Donald. 2003. Watershed Democracy: Recovering the Lost Vision of John Wesley Powell. *23 J. Land Resources & Env'tl. L.* 57.

mosaic of rivers and basins, through which people move and dream, struggle and fail, or prosper”<sup>59</sup>.

Worster found Powell’s vision compelling in “insisting that nature follows its own logic” and suggesting “that the very shape of a human community, the shape of its rights and rules, should be tailored to some extent to that logic.”<sup>60</sup> The natural order of the watershed suggested a social order grounded in the particulars of place and demanded a democratic political system that enabled all land and water resources within a particular watershed to be managed directly by those inhabiting that watershed. In contrast to the technocracy of the west’s “hydraulic civilization” (see Ch 2), watersheds would be governed by those who possessed intimate knowledge of local hydrologic and ecological dynamics and whose lives and livelihoods depended on that particular watershed’s land and water resources. Powell’s watershed democracies would allow people to “use their own heads instead of those of outside experts”, thus preventing technocratic rule from distant, calculating centers.<sup>61</sup> Watershed-based democracy is at once more ecologically and socially just for Worster, as a “social condition of diffused power is more likely to be ecologically sensitive”, with watershed boundaries anchoring political and regulatory institutions to the particulars of place<sup>62</sup>. According to Worster, if governed through Powell’s watershed democracies, the desert can incubate freedom rather than authoritarian hydraulic civilization and support an “environment latent with possibilities of freedom and democracy rather than wealth and empire”. In Worster’s words:

“The watershed is the place we inhabit on earth. It is the place we need to learn to live within and where we learn to live with each other. *The watershed is the natural home of democracy.*”<sup>63</sup>

In this quote from Worster, I see a clear articulation of what I am terming the “imaginary of watershed democracy” in this dissertation- the idea that the watershed is the optimal and even natural unit for environmental knowledge production, integrated resource management and democratic governance. This chapter critically analyzes Worster’s claim that the watershed is the “natural home of democracy”. Next section looks in detail at what exactly it is about the nature of watershed that makes it well-suited for democratic governance according to proponents of watershed democracy. The following section lays out a range of critiques of collaborative watershed-based governance from the political science, ecosystem management and geography literature. I then describe the uniqueness of Klamath experiments in collaborative watershed democracy and outline three distinct but related bodies of theory on scale, knowledge and democratic environmental governance that I both draw from and contribute to in my research.

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<sup>59</sup> Worster. 2003, p. 64..

<sup>60</sup> *Ibid*, p. 60.

<sup>61</sup> Worster 1985, p. 332.

<sup>62</sup> *Ibid*.

<sup>63</sup> Worster 2003, p. 65.

## 5. The nature of the watershed, the nature of democracy

Around the turn of the 21<sup>st</sup> century, numerous hydrologists, ecologists, resource managers, legal scholars, bioregionalists, commons theorists, political scientists and environmentalists echoed Worsters' assertion that there were inherent, "natural" links between the watershed and democratic forms of resource governance.

For ecologists, complex systems theorists and proponents of adaptive management, the watershed harbors a democratic nature due to its particular brand of inherent complexity, the interdependence of its multiple social, biotic and abiotic components and the uncertainties that riddle our understandings of its processes and dynamics. Watersheds are composed of dynamic meshworks of active elements including sediment, solutes, microorganisms, flora, fauna and stream and channel networks, whose patterns of interactions are characterized by high levels of complexity, non-linear relationships, and emergent properties that can't be predicted by analyzing system components separately<sup>64</sup>. For example, in reference to their watershed restoration work in Redwood Creek, the National Park Service remarked, "Healthy watersheds support a rich diversity of species, including humans, whose lives depend on the complex interactions between water, geology, soils, vegetation, and wildlife"<sup>65</sup>.

In addition to their biophysical complexity, watersheds also typically harbor an intricate collection of institutions that influence how humans make decisions about how to manage land and water resources. Resource management institutions from local watershed councils to federal agencies are forced to make decisions in "far-from-equilibrium" conditions in the face of high levels of complexity and stochasticity and lacking reliable long-term data. Water and ecosystem management theorists therefore propose that the appropriate institutional form for addressing such ecological, hydrologic and social complexity requires a strong deliberative component and that the watershed provides the best scale for institutional cooperation on knowledge sharing and policy making as well as for citizen participation and democratic deliberation.

Research in the ecosystem management literature has shown that resilient social and political orders tend to be more polycentric, more inclusive of diverse knowledges and more deliberative, with feedback loops and shared learning

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<sup>64</sup> Escobar (2008) draws on Manuel de Landa's (1997) theory of self-organizing formations of matter and energy to develop the concept of "meshworks" as opposed to "networks" as a social topology. Whereas networks are oriented from one person or actant outward, the concept of the meshwork attempts to understand interlinked networks, heterogeneous compositions, non-hierarchical and decentralized decision-making structures and the total effect they can produce as a system, see Escobar, Arturo. *Territories of Difference: Place, Movements, Life*. Duke University Press: 2008.

<sup>65</sup> National Park Service, Redwood Creek Watershed Restoration pamphlet. NPS: 2007.

opportunities built procedurally into institutions<sup>66</sup>. A premium is put on “epistemic diversity” in this literature, as multiple pathways to arriving at understandings of watersheds and multiple mediums for communicating and debating knowledges are seen as features of resilient social-ecological systems<sup>67</sup>. Indigenous, traditional, local, farmer and citizen science is seen as having epistemic value in much of this literature<sup>68</sup>. Watershed collaboration is seen as an attribute of resilience in building communities of trust through social learning processes that bring watershed communities together through research and experimentation.

In the commons literature, the watershed is also depicted as a common-pool resource that is best governed through decentralized collective action institutions with multiple channels for producing, sharing, debating and acting on information. Watersheds are characterized by two important features of “common pool” resources: *high exclusion costs*, meaning it is difficult to exclude people from using and benefiting from watershed resources, and *subtractability*, which means that one resource user’s welfare is affected by the resource uses of others<sup>69</sup>. Watersheds typically contain a mixture of individually propertized resources such as land, timber, and even water, as well as other resources held in common such as grazing pastures or ground water bodies and other resources managed on behalf of variously scaled publics such as national or state parks, forests, roads or endangered species.

All resources within a watershed, however are linked hydrologically, which leads commons theorists to propose that collective action among all resource users within a watershed is needed to manage hydrological processes for the optimal functioning or maximum utility of the whole watershed system. However, the costs and benefits of collective action at the watershed scale, as well as the costs and benefits of not setting up watershed-based institutions, are always unevenly

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<sup>66</sup> Olsson et al 2004; Berkes, F. and C. Folke 2002. Back to the future: Ecosystem dynamics and local knowledge. In: *Panarchy: Understanding Transformations in Human and Natural Systems* (L.H. Gunderson and C.S. Holling, eds.) Island Press, Washington, DC, pp. 121-146.

<sup>67</sup> Berkes 2000; Olsson et al 2004; Berkes, F. and D. Jolly 2001. Adapting to climate change: Social-ecological resilience in a Canadian western Arctic community. *Conservation Ecology* 5 (2): 18; Riedlinger, D. and F. Berkes 2001. Contributions of traditional knowledge to understanding climate change in the Canadian Arctic. *Polar Record* 37: 315-328.

<sup>68</sup> Klubkikin, Kheryn et al. 2000. The Sacred and the Scientific: Traditional Ecological Knowledge in Siberian River Conservation. *Ecological Applications*; Sluter, Maja et al. 2007. Mechanisms of Resilience in Common-pool Resource Management Systems. *Ecology and Society*; Liu, Jianguo et al. 2007. Coupled Human and Natural Systems. *Ambio* Vol 36, no 8; Holling and Gunderson 2002. Berkes 2000; Olsson et al 2004; Berkes, F. and D. Jolly 2001. Adapting to climate change: Social-ecological resilience in a Canadian western Arctic community. *Conservation Ecology* 5 (2): 18; Riedlinger, D. and F. Berkes 2001. Contributions of traditional knowledge to understanding climate change in the Canadian Arctic. *Polar Record* 37: 315-328.

<sup>69</sup> See e.g. Ostrom, Eleanor. Governing the Commons. 1990; Kerr, John. Watershed Management: Lessons from Common Property Theory. *International Journal of the Commons*, 2007.

distributed<sup>70</sup>. The great problem for commons theorists attempting to design institutions at the watershed scale becomes “how to overcome uneven distributions of cost and benefits in the face of poorly understood, often invisible hydrological linkages”<sup>71</sup>. Institutional mechanisms for pooling diverse understandings from the most remote parts of watersheds from those who know them most intimately are therefore seen as necessary ingredients of resilient social and political orders. Commons theorists have collated lessons learned from thousands of successful common-pool resource management institutions and have pointed out “design features” of successful collective action institutions<sup>72</sup>. As with adaptive management, especially important for commons institutional design is developing shared epistemologies, as collective learning is seen as leading to an awareness of “hydrologic interdependence” and leading to a sense of common purpose and eventually institutions for collective action at the watershed scale.

## 6. The watershed as social and cultural formation

The “bioregional movement” that began in the late 1960s also decided that the watershed was good for thinking and acting collectively with, but in a very different way than for ecologists and hydrologists. A bioregion is defined by bioregionalism’s high priest Peter Berg in terms of “the unique overall pattern of natural characteristics that are found in a specific ‘life-place’ - the drainages, landforms, soils, climate, flora and fauna as well as the adaptive human relationship to living in that particular place”<sup>73</sup>. According to Berg, the concept of a bioregion as the basic location where people live is meant to direct a practice of re-habitation of that “life-place” by its inhabitants, by which process human beings are reintegrated into the “web-of-life”, the intricate patterns of relationships between biotic communities and the abiotic components that support them<sup>74</sup>. The watershed played a seminal role in bioregionalist thinking, as both a working example of a bioregion (“life-place”) and a vehicle for rehabilitation of that “life-place”. According to Berg, “watersheds are the organizing principals of bioregions” which, through the process of rehabilitation, become the basis of political boundaries<sup>75</sup>.

For example, bioregionalist, poet and environmental activist Gary Snyder holds that “the watershed is the first and last nation”<sup>76</sup>. Watershed citizenship for Snyder initiates a movement towards a “profound citizenship in both the natural

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<sup>70</sup>Romm, Jeff and Mark Baker. *Emerging Institutional Linkages between Land and Water: Opportunities for State Involvement in Watershed Management Institutions*. UC Berkeley Department of Forestry. August 1990.

<sup>71</sup> Kerr, John. Watershed Management: Lessons from Common Property Theory. *International Journal of the Commons*. Vol 1, no 1 October 2007, pp. 89-109.

<sup>72</sup> e.g. mechanisms to facilitate cross-scale interactions, nested governance platforms, collectively generated rules with graduated sanctions and arrangements for sharing upstream-downstream benefits.

<sup>73</sup> Berg, Peter. *Bioregionalism*. 2002.

<sup>74</sup> Berg, Peter. Learning to Partner with a Life-Place. *Ecuador Dispatch #1*, June 12, 2004.

<sup>75</sup> Berg, Peter. Bioregion and Human Location. *All Area #2*, Spring 1983.

<sup>76</sup> Snyder, Gary. *A Place in Space: Ethics, Aesthetics and Watersheds*. City Lights: 1995, pg. 229.

and the social worlds". Bioregionalists argued that community boundaries should mimic ecological boundaries in order for citizens to gain a new sense of "belonging" within their ecosystem or "*watershed community*"<sup>77</sup>. As with Powell's imaginary, each watershed bioregion binds its land and water users to each other as well as to the non-human inhabitants and abiotic dynamics of the watershed, generating a new form of collective belonging in a polity whose boundaries coincide with the watershed-ecosystem that sustains it. The watershed for bioregionalists is both a global, even universal pattern and yet each watershed remains a unique and singular expression of that pattern in a particular place, "its forms are free, but somehow inevitable"<sup>78</sup>. As watersheds were seen to harmonize the particulars of specific "life-places" into a global political culture scaled to the biosphere, they "enable appropriate locations for decentralization"<sup>79</sup>.

A watershed as a bioregion is as much a cultural concept as a scientific concept. Bioregionalists such as Loeffler, Snyder and Berg have advocated "thinking like a watershed" by combining scientific understandings of watershed-ecosystem processes and indigenous cultural concepts in order to approach the watershed as "a geographic terrain and a terrain of consciousness"<sup>80</sup>. Such culturally specific understandings of watershed processes are seen by bioregionalists as enabling fuller understandings of watershed ecosystems and providing sustainable grounds for collective action on behalf of the social and ecological community. Rina Swentzell gives an example of watershed thinking by quoting a Tesque pueblo woman: "In the pueblo world- and in John Wesley Powell's thinking- community and watershed are synonymous. A watershed is an interwoven web of life...from clouds to rivers to streams, springs- and tears"<sup>81</sup>. For bioregionalists, the water draining through a watershed and the water flowing through the human body are "doing the same thing" <sup>82</sup>. Watersheds and bodies in bioregionalist thinking both define the life-place: "both are home, each is where we live"<sup>83</sup>. Thinking like a watershed in the bioregionalist mode goes so far as to figure the human body as a watershed itself, nested within a whole relational socio-ecosystem of interacting and interdependent watersheds- "if we do acknowledge that we are hydrologic systems ourselves, we have the hope of seeing and honoring our (personal) watersheds within the larger natural systems...that sustain us."<sup>84</sup>.

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<sup>77</sup> Barham, E. Ecological Boundaries as Community Boundaries: The Politics of Watersheds. *Society & Natural Resources* (2001); Berg, Peter. Bioregion and Human Location. *All Area* #2, Spring 1983.

<sup>78</sup> Snyder 1995, p. 230.

<sup>79</sup> Berg 2004

<sup>80</sup> Berg 2004.

<sup>81</sup> Loeffler & Loeffler 2012, p29

<sup>82</sup> "We are like clouds. Our bodies are mostly water. So our human songs, dances and thoughts can communicate with the clouds because...water can talk with water". Loeffler, 2012 quoting a woman from San Felipe Pueblo, p. 29.

<sup>83</sup> Loeffler & Loeffler 2012, pgs 43-44.

<sup>84</sup> Loeffler & Loeffler 2012, p 44.



More than mere tree-hugging and dirt-worship, bioregionalist thinking and activism spawned an explosion of civil society organizations, such as Friends-of-the-River, River Keeper and other watershed NGOs which in turn inaugurated the so called “third wave” of watershed democracy. In California, the watershed council movement was in many ways an outgrowth of the bioregionalist movement towards “Rehabilitation” and the “Friends-of-the-River” organizations that sprouted out of it in the 1970s<sup>85</sup>. The grass-roots, bottom-up momentum coming from the bioregionalist and environmentalist movements converged with trends in ecology, law and governance. From this crucible of cultural politics, the watershed emerged as a primary locus of democratic governance. As I will explore in detail next chapter, this conjunctural moment in the 1990s and early 2000s laid the groundwork for the “third wave” of watershed democracy, in which collaborative watershed organizations gained formal recognition and patronage from government agencies and spread around the world.

## 7. Watershed democracy and its critics

To many natural resource scientists and administrators at the turn of this century, it appeared as though the watershed was truly the “natural home of democracy”. Though they articulate it through different disciplinary tongues and in very different epistemological contexts, hydrologists, environmental historians, ecologists, complex systems scholars and commons theorists all interpret the nature of the watershed as suggesting or even demanding a democratic mode of governance. The proliferation of collaborative watershed organizations around the world in the 1990s served scholars with further evidence that verified the theory of watershed democracy, even signaling of its coming to fruition in practice. Based on the critiques of “actually existing” watershed democracy in the political science, water governance and ecosystem management literature, however, the links between watersheds and democracy are much more tenuous in practice than in abstract theory.

Alongside the proliferation of collaborative watershed management institutions around the globe in the 1990s came a barrage of research on this “new” form of democratic environmental governance<sup>86</sup>. Political scientists and environmental policy analysts developed methods for evaluating how watershed collaboratives performed according to specified standards of deliberative process

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<sup>85</sup> Woolley, John T., Michael McGinnis and Julie Kellner. The California Watershed Movement: Science and the Politics of Place. *Natural Resources Journal*. Winter 2002.

<sup>86</sup> See ch 2; Kenney, Douglas. "Historical and Sociopolitical Context of the Western Watersheds Movement". *Journal of the American Water Resources Association*. June 1999.; Griffin, C.B. "Watershed Councils: An Emerging Form of Public Participation in Natural Resource Management." *Journal of the American Water Resources Association*. June 1999; Bingham, Gail. *Resolving Environmental Disputes: A Decade of Experience*. Conservation Foundation: 1986; Calder, Ian R. *Blue revolution: integrated land and water resource management*. London ; Sterling, VA : Earthscan, 2005.

and democratic governance<sup>87</sup>. Methods for evaluating these new institutions vary from longitudinal studies of individual organizations to massive surveys of hundreds of watershed collaboratives and statistical analyses of their participants' responses<sup>88</sup>. Some literature identifies features of institutions likely to lead to success, failure or social-ecological resilience, and some develop complex adaptive systems models to simulate individual and collective decision-making processes and the social and ecological impacts of different management and biophysical condition scenarios<sup>89</sup>. A small sub-set of the literature evaluates procedures and outcomes of watershed collaborations according to specified standards of democracy<sup>90</sup>.

For example, political scientists Mark Lubell and William Leach (2004) surveyed a random sample of 76 watershed partnerships in California and Washington and evaluated them in terms of "inclusiveness, representativeness, procedural fairness, lawfulness, deliberativeness, and empowerment". While they found "deliberativeness" to be high among most watershed groups, representation was unbalanced overall, revealing exclusionary practices that systematically prevented certain groups such as Native American Tribes and undocumented workers from participating in watershed collaborations. Other studies similarly found watershed collaboratives deficient according to specified standards of democratic governance. Watershed collaborations were found to involve a substantial amount of uncompensated time and effort, placing de-facto limits on who is able to participate, even if membership is in principle open to all basin

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<sup>87</sup> Leach, William D. and Neil Pelkey. "Making Watershed Partnerships Work: A Review of the Empirical Literature". *Journal of Water Resources Planning and Management*. Nov/Dec 2001; Leach, William. Collaborative Public Management and Democracy: Evidence from Western Watershed Partnerships. *Public Administration Review*. December 2006.

<sup>88</sup> Lebel, Louis et al. "The Politics of Scale, Position, and Place in the Governance of Water Resources in the Mekong Region". *Ecology and Society* 10(2):18; Lubell, Mark et al. "Watershed Partnerships and the Emergence of Collective Action Institutions". *American Journal of Political Science*, Vol. 46, No. 1, January 2002.; Leach, William D. and Neil Pelkey. "Making Watershed Partnerships Work: A Review of the Empirical Literature". *Journal of Water Resources Planning and Management*. Nov/Dec 2001.

<sup>89</sup> Pahl-Wostl, C. 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19: 354-365; Sendzimir, J., Flachner, Z., Pahl-Wostl, C., Knieper, C. 2010. Stalled regime transition in the upper Tisza river basin: The dynamics of linked action situations. *Environmental Science & Policy*, 13: 604-619; Herrfahrtdt-Pähle, E. and Pahl-Wostl, C. 2012. Continuity and change in social-ecological systems: The role of institutional resilience. *Ecology and Society*, 2012.

<sup>90</sup> Leach, William. Collaborative Public Management and Democracy: Evidence from Western Watershed Partnerships. *Public Administration Review*. December 2006.; Ansell, Chris and Alison Gash. Collaborative Governance in Theory and Practice. *Journal of Public Administration Research and Theory* 18:543:-571; Lubell, Mark and William Leach. *Watershed Partnerships: Evaluating a Collaborative Form of Public Participation*. National Research Council's Panel on Public Participation in Environmental Assessment and Decision Making, February 3-4, 2005.; Leach, William. *Is Devolution Democratic? Assessing Collaborative Environmental Management*. Center for Collaborative Policy, August 2004.

inhabitants<sup>91</sup>. Within some watershed forums, more powerful actors were better able to mobilize resources, dominate discussion forums, and manipulate councils to their advantage<sup>92</sup>. Watershed groups with more homogenous interests tend to be more successful at achieving their objectives, while those that accommodate a diversity of values and interests are critiqued for their tendency towards “watered down” or “lowest common denominator” solutions. In some cases, watershed organizations organize in order to avoid more stringent regulations from federal or state authorities, providing shelter for an unexamined “*pernicious localism*” that produces externalities while preventing extra-basin stakeholders from participating in decisions that effect “national interests” in public land <sup>93</sup>.

According to such critiques, devolving authority to watershed collaboratives puts important environmental governance functions with far-reaching public consequences in the hands of voluntary and consensus-based bodies with no overarching accountability or liability mechanisms in place to safeguard the process<sup>94</sup>. Devolution of authority to local watershed groups is seen by some scholars as an “abdication of federal and state regulatory responsibility” that works against the federal government’s ability to prevent the tyranny of the majority in local watershed holdouts<sup>95</sup>. According to these critics, collaborative watershed approaches redistribute power from elected representatives and the variously scaled publics they represent to “self-appointed” local stakeholders<sup>96</sup>.

Baker and Kusel use the term “*the paradox of democracy*” to refer to processes operating under the label of “democracy” that are exclusionary in practice or “produce unjust or inequitable outcomes that undermine broader democratic values and goals”<sup>97</sup>. In a study of a collaborative watershed planning process in the Cache River watershed in southern Illinois, Adams et al. employ the term “*pseudo-democracy*” to cast doubt on the deliberativeness of the planning process and the legitimacy of its outcomes<sup>98</sup>. Barham (2001) argues that

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<sup>91</sup> Woolley et al 2002; Adams, Jane, Steven Kraft, J. B. Ruhl, Christopher Lant, Tim Loftus, Leslie Duram. Watershed Planning: Pseudo-democracy and its Alternatives – The Case of the Cache River Watershed, Illinois. *Agriculture and Human Values*. Fall 2005, Volume 22, Issue 3, pp 327-338.

<sup>92</sup> Griffin, Carol B. Watershed Councils: an emerging form of public participation in natural resource management. *Journal of American Water Resources Association*. 1999: 505-518

<sup>93</sup> eg Coggins, George C. 1999. Regulating federal natural resources: a summary case against devolved collaboration. *Ecology Law Quarterly* 25 (4):602-610.

<sup>94</sup> Leach’s (2006) response to the “abdication” argument is that environmental statutes are ambiguous and contradictory and must be applied to new problems not contemplated at the time of the original drafting. Environmental laws never come with a complete set of instructions, so the discretion given to public administrators to apply them requires some form of public input to tailor federal and state policy to local conditions.

<sup>95</sup> See Coggins 1999.

<sup>96</sup> Farber, Daniel A. 2000. “Models of reinvention”. In *Beyond Backyard Environmentalism*, edited by C. Sabel, A. Fung and B. Karkkainen. Boston: Beacon Press.

<sup>97</sup> Baker, Mark and Jonathan Kusel. *Community Forestry in the United States: Learning from the Past, Crafting the Future*. Island Press: 2013, p. 103.

<sup>98</sup> Adams et al 2005. Watershed collaboration in their case lacked credibility for many of the farmers involved due to lack of participation of non-landowners or locally elected officials and a

enthusiasm for watershed democracy must be tempered with awareness that watershed collaborations also have tendencies towards forms of “*watershed rule*”- “nondemocratic, authoritarian and exclusionary processes of social control, exercised to meet a perceived need to address environmental sustainability”<sup>99</sup>. Watershed collaboratives have the “potential to sap the effectiveness of exiting democratic channels of communication and social organizations” by imposing arbitrary political forms from the outside, overlaying “natural” or “apolitical” boundaries on top of existing social and political boundaries and glossing over difficult questions of scale, citizenship, rights and responsibilities<sup>100</sup>. These examples of watershed rule, pseudo-democracy and paradoxes of democracy provide provocative labels for instances where undemocratic practices masquerade underneath the rhetorical flare of watershed democracy.

In the political ecology and geography literature, some scholars pointed specifically to the “naturalization” of the watershed as the primary unit of democratic environmental governance as a factor in shutting down important democratic debates about scale and self-determination. As Warner (2008) put it, seeing the watershed as a unit “mandated by nature” allows it to acquire an “untouchable legitimacy” as the seat of democratic governance<sup>101</sup>. Naturalizing the watershed as the home of democracy “prematurely closes” debates on appropriate scales and institutional arrangements for resource governance<sup>102</sup>. This naturalization of the watershed scale forecloses important political choices and democratic debates about what scales best represent people and place, which social and ecological processes matter most and whose voices are heard loudest in setting policy and planning ecosystem management and restoration<sup>103</sup>. In Warner’s words:

“The delineation of river basin boundaries, the structuring of stakeholder representation, and the creation of institutional arrangements for river basin management are political processes that revolve around matters of choice, and hence require democratic debate.”<sup>104</sup>

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narrow hydrologic framing of common problems around wetland restoration, at the expense of other important local issues such as poverty, depopulation, drug use, and education.

<sup>99</sup> Barham 2001, p. 189.

<sup>100</sup> Barham 2001, p. 190.

<sup>101</sup> Warner, Jeroen. Philippus Wester and Alex Bolding. Going with the flow: river basins as the natural units for water management? *Water Policy Supplement* 2008. 121-138, p. 133.

<sup>102</sup> Warner 2008, p. 123. As Vogel (2012) puts it “Organizing management in a river basin territory did not mean the creation of a natural and therefore holistic space, nor did it lead to holistic, balanced management and well-rounded positive social, environmental, economic and democratic outcomes. Instead, management has long been one-sided, disproportionately focused on hydropower production, while responsibilities, benefits and influence have been doled out in pork-barrel fashions”. Vogel, Eve. Parceling out the Watershed: The Recurring Consequences of Organising Columbia River Management within a Basin-Based Territory . *Water Alternatives* 5(1): 161-190 (2012), p 180.

<sup>103</sup> Warner et al 2008.

<sup>104</sup> Warner et al 2008, p 123.

Following Warner, I do not take issue with the watershed as a *potential* site of democratic deliberation, but with its “non-negotiable status” as the *sole* site of ecologically or even hydrologically-grounded democratic governance<sup>105</sup>. I argue throughout this dissertation that the watershed is *not* the natural home of democracy- that there is nothing inevitable or natural about river basins as units of democratic governance- in order to reopen the debate around scale and democratic environmental governance. Rather than assuming democracy flows naturally with water, “serious thought needs to be given to how hard-won democratic rights in conventional social and political domains are assured in the river basin domain” and whether or not other scales of knowledge-making, collective action and environmental governance might be more appropriate for people and place<sup>106</sup>.

This dissertation follows the ways democracy is actually articulated and implemented through watershed-based governance in the Klamath and with what effects. On one hand, I ask whether watersheds good for thinking with- for thinking collectively with other humans and the more-than-human world and for representing the nature of linked social-ecological-hydrologic systems. On the other, I ask whether watersheds make good units with which to make decisions and act collectively, as a networked political and eco-hydrologic unit. Do the experiments in collaborative environmental governance at the watershed scale in the Klamath fall victim to the degenerate forms such as “watershed rule”, “pernicious localism” or “pseudo-democracy” that have befallen other attempts at watershed democracy? In the next section, I make the claim that Klamath experiments in collaborative watershed governance provide a unique opportunity to study how ideals of “watershed democracy” are actually put into practice and with what social and ecological effects. However, the complexities of Klamath watershed-ecosystems and socio-cultural dynamics present difficulties to methods that have been used to study the processes and outcomes of both democratic governance and ecosystem restoration. Therefore, in the section after next, I propose an analytical and theoretical framework oriented around three interrelated sets of issues: expertise and democracy, indigenous peoples’ self-determination and the cultural politics of scale.

## **8. Klamath experiments in democratic governance at the watershed scale**

In this dissertation, I demonstrate how imaginaries, meanings and practices of democracy have been worked out over the past three decades through collective knowledge making and deliberation at the watershed scale in the Klamath. I follow numerous State, Federal, Tribal and local government institutions negotiate sovereignty, jurisdictions and territories through debates over watershed science

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<sup>105</sup> Warner et al 2008, p. 134: “We are not suggesting that we prefer water not to be managed at river basin level but rather that this choice is political and that river basins are thus as much political units as they are natural units. Reconceived as political units, river basins become territories of governance, immediately raising the question who will make decisions, and how.”

<sup>106</sup> Warner 2008.

and governance as they claim authority to act on behalf of Klamath watershed communities. In this section, I argue that Klamath experiments in collaborative watershed governance provide an ideal opportunity to study the processes and outcomes of “actually existing” watershed democracy as it is put into practice in a complex social and ecological system<sup>107</sup>.

In Chapter 3, I make and substantiate the claim that the era of “watershed democracy” dawned in the Klamath in 1986 when congress chartered the Klamath Fisheries Task Force, an advisory body made up of representatives of the many resource user communities in the Klamath. I argue that the watershed scale then guided collaborative knowledge-making and shared governance through the USFS Pacific Northwest Forest Plan in the 1990s, the State and Regional Water Board’s TMDL development and implementation process in the early 2000s and FERC’s dam relicensing and removal negotiations over the last decade. The watershed became a primary arena for sorting out matters of cultural difference and resolving resource conflict, pooling diverse knowledges and coordinating policy at bioregional scales. I demonstrate in chapters 3-6 how numerous facets of democratic governance such as relationships among public agencies and between representatives and citizens, the terms and conditions of sovereignty and self-determination, modes of inclusion and participation, the boundaries of jurisdictions and the extent of public reach in private property were all negotiated through the watershed.

Numerous factors combine to make Klamath experiments in collaborative watershed governance unique. First of all, about 62 % of the land in the Klamath Basin is held by public agencies<sup>108</sup>. Multiple State, Federal, County, Tribal and non-government institutions attempt to manage the resources of the Klamath on behalf of their heterogeneously-composed and differentially-scaled publics. Just how this public is composed, who is included, how to articulate their knowledges and define their values is in part determined through collaborative watershed governance in the Klamath. The complex mix of sovereignties, jurisdictions and territories in the Klamath makes it difficult to demarcate Public versus Tribal versus private property and resources. Through decades of experimental social learning processes, many of the resource agencies of the Klamath see Tribes as important partners in accomplishing their restoration goals. However, just what sovereignty means and how it is articulated in relation to watershed knowledge and governance is contested. Another unique aspect of Klamath watershed democracy is the engaged citizenry and their diverse socio-economic, political and cultural backgrounds. Fishermen, tribal members, environmentalists, ranchers, recreationalists and loggers all know their surrounding ecosystems and watersheds intimately, but through different ways of living and working in them

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<sup>107</sup> Fraser, Nancy. Rethinking the Public Sphere: A Contribution to the Critique of Actually Existing Democracy. *Social Text*. (1990), p.56-80.

<sup>108</sup> United States Department of Agriculture Natural Resources Conservation Service. 2004. *Work Plan for Adaptive Management, Klamath River Basin*. Pg 2, Table 1.

and engaging them everyday through embodied livelihood practices. This citizenry has been actively engaged in public debates, participating in knowledge production and decision-making, showing up at public meetings, commenting on policy, organizing protests and performing political theatre when the formal institutional channels become non-navigable.

The Klamath also has a long history of environmentalism dating back to the turn of the 20<sup>th</sup> century and continuing through recreational fishermen's activism in the 1920s, back-to-lander hippie communes in the 1960s, debates over aerial herbicide spraying in the 1980s, the spotted-owl crisis in the 1990s and the water wars of the early 2000s. The incredible biodiversity and ecological complexity of the Klamath has drawn attention from environmentalists, ecologists and wildlife biologists all over the world and attracted non-government environmental organizations, both large and small, who are passionate about protecting the biological and ecological diversity of the Klamath. In particular, there is also a long history of watershed-based activism in the Klamath. The watershed movement was in a large part pioneered in the Klamath. The Klamath has thus become a training ground for experimenting with watershed democracy, from the early days of Black Bear commune and the anti-herbicide protests in the late-1970s to the experimental congressional Fisheries Task Force in the mid-1980s, the watershed analyses of the Pacific Northwest Forest Plan in the 1990s, early adoption of civil society organizations such as watershed councils and leading potentially one of the largest dam removal processes in US history over the last decade. Unique coalitions between Tribes, environmentalists and local NGOs have formed through watershed collaborations in order to share data, jointly file lawsuits, lobby policy makers, monitor management outcomes and conduct ecosystem restoration.

Due to its central role in the long history of environmental activism, the watershed is now deeply embedded in social and political life in the Klamath. From watershed education programs in local schools to summer camps, community restoration planning, fish counts and noxious weed pulling, the watershed has anchored a process of community-building in the Klamath. At the same time, numerous groups, tribes, environmental activists and agency representatives have voiced critiques of watershed-centric governance. By 2005 in the Klamath, as I describe in chapter 5, a diverse but committed group of scientists, activists, Tribal representatives and cultural practitioners began searching out alternatives to the watershed as scales of democratic resource governance. As we will see, coalitions of scientists, environmentalists and tribal representatives have begun mobilizing around other scales of collaborative resource governance such as firesheds, foodsheds and landscapes over the last decade. All of these reasons combine to make the Klamath an ideal place to study the life and times of watershed democracy, *in situ* as it unfolds in the watershed ecosystems and human communities of the Klamath.

However, given the high social and ecological stakes of these experiments in watershed democracy for those who make their living in the Klamath as well for as

the various publics with interests and values vested in its watershed ecosystems, how can I go about producing credible knowledge and how am I to evaluate or measure the outcomes of collaborative watershed governance? Most importantly, how can I evaluate the practices and outcomes of collaborative watershed governance according to the experiences of those who actually live and make their living in the Klamath?

Democracy is a notoriously slippery term. Its Greek roots *demos* and *kratos* translate to “people” and “rule”, respectively, implying an equivalence between rulers and ruled. At its core, democracy means government of the people, by the people and for the people<sup>109</sup>. However, deciding just which people to include in governance processes, how to represent their knowledges, values and interests or define the procedures and institutional mechanisms through which they will rule has proven a sharply contested endeavor in the Klamath. Democracy was offered by political philosopher WB Gallie as a primary example of an “essentially contested concept”. According to Gallie, the use of an essentially contested concept like democracy will “inevitably involve endless disputes about their proper uses on the part of their users”<sup>110</sup>. I argue that standard frameworks used to evaluate and measure democracy in general and watershed democracy in particular are not well equipped to understand the complex role of science in democratic governance on one hand and in representing/performing nature in a post-colonial context on the other.

Given that watershed science, institutions of governance and the norms and values of democracy are all up for grabs in Klamath experiments in watershed democracy, where can I find stable ground from which to launch an analysis of the processes and outcomes of watershed democracy? On this shifting ground of new institutional configurations, new democratic procedures, new understandings of watershed-ecosystem processes and the human role in maintaining them, there is no stable ground from which to analyze and evaluate the processes and outcomes of Klamath collaborative watershed governance. In realm of Klamath environmental politics, where knowledge, nature and democracy are all essentially contested concepts whose meanings are constantly shifting, there is no apolitical definition of democracy that can guide environmental governance processes and serve as a standard with which to evaluate the outcomes of those governance processes. There is also no neutral science with which one can objectively evaluate the social and ecological impacts of democratic watershed governance. I therefore need a more nuanced theoretical framework to help understand and analyze the complex, dynamic and mutually constitutive relationships between science, nature and democracy at play in imaginaries and practices of watershed governance in the

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<sup>109</sup> from Abraham Lincoln, Gettysburg Address, November 19, 1863: “It is rather for us to be here dedicated to the great task remaining before us ... that government of the people, by the people, for the people, shall not perish from the earth”.

<sup>110</sup>W.B.Gallie. Essentially contested concepts,*Proceedings of the Aristotelian Society*. 1956, pp.167–198.



Klamath. In addition, the politics of knowledge within this context makes the process of doing research a contentious and potentially divisive endeavor.

I argue that a participatory research approach grounded in a co-productionist framework attentive to mutually constitutive relations between knowledge, nature and governance institutions is the best way to study the processes and outcomes of watershed democracy in the Klamath. I was fortunate enough to have been welcomed into a community of scientists and activists who helped steer my research questions and approaches through the contested waters of Klamath knowledge politics and environmental conflict. As I explain later in this chapter, a participatory research approach and on-going relationships with the Karuk Tribe's Department of Natural Resources anchored my research questions, methods and analysis in the concerns of the local community. Co-productionist frameworks from science and technology studies and political ecology helped me analyze the dynamic and mutually constitutive relations between knowledge practices, governance institutions and the complex materialities of Klamath naturecultures. Combining a participatory research approach with theoretical insights from political ecology, science and technology studies and indigenous studies scholarship allows me to both descriptively analyze and normatively evaluate the processes and outcomes of watershed democracy according to their impacts on local watershed ecosystems and communities. In the final three sections of this chapter, I explain how my research attempts to fill gaps in the literature on watershed democracy by targeting three clusters of issues related to watershed democracy and environmental governance:

*I. The role of knowledge and expertise in democratic environmental governance*

*II. The effects of watershed democracy on indigenous peoples' political, cultural and ecological self-determination*

*III. The cultural politics of scale in democratic environmental governance*

These three clusters of issues gather together the main sets of theories, debates and bodies of literature that I draw from and that I hope to contribute to in this research. In order to theorize and analyze the Klamath experiments in collaborative watershed governance, these three bodies of literature and theory related to scale, expertise, democracy and indigenous peoples' sovereignty must be brought together. After synthesizing these three areas of theory in order to fill in gaps in the literature on indigenous peoples' knowledge and sovereignty in watershed governance, I argue that attempts at collaborative resource governance in the Klamath need to explicitly politicize issues of scale in order to find ways of democratically designing spaces of political and eco-hydrologic engagement that are appropriate for people and place.

## I. Knowledge, expertise and democratic environmental governance

This section lays out the theoretical framework I use to investigate the role that science plays in grounding democratic governance of watersheds and society. In particular, I take up the framework of co-production to understand the mutually constitutive relationships between knowledge, nature and institutions in Klamath watershed governance. This framework allows me to analyze the watershed as a set of knowledge practices, a way of seeing and living in nature and a way of ordering and governing both nature and society. In this section, I discuss the genealogy of the concept of “co-production” in the context of theoretical debates in the history, philosophy and sociology of science.

The proper relationship between science and democratic governance has long been debated in academic and policy circles. Scholars of science, technology and society have interrogated the historical relationships between science and democracy going back to the twin birth of liberal democratic thought and modern science in the English enlightenment<sup>111</sup>. Science then as now provides liberal democracy with an idealized model of a community composed of free yet rational individuals capable of cooperating around a common goal, in their case, the collective pursuit of truth<sup>112</sup>. Just as the free, open and public activity among scientists was seen as leading over time to more accurate representations of nature, free, transparent and rational activity among political actors is assumed to result over time in truer political representation of the demos<sup>113</sup>. For example, early on in the life of American democracy, Thomas Jefferson remarked on parallels between the scientific pursuit of truth and the political pursuit of freedom and self-governance: “the freedom which permits a true knowledge of facts allows in return the kind of action which- insofar as it is based on knowledge rather than on command- is grounded in liberty”<sup>114</sup>.

I demonstrate in chapter 2 how this idea of democratic environmental governance as social-ecological experiment persists strongly into the 21<sup>st</sup> century in language about adaptive environmental governance and knowledge-driven democracy. I then demonstrate in chapters 3-6 how science continues to serve as resource for the construction of liberal democratic politics and as a strategic means for shaping and legitimating the uses of political power in Klamath watershed governance. One body of theory I hope to draw from and contribute to deals with a longstanding paradox related to the proper role for experts and their expertise in democratic governance. Experts are afforded a certain amount of power and a privileged social and political position based on the assumption that they possess

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<sup>111</sup> See e.g. Shapin, Steven and Simon Schaffer. *The Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*. Princeton University Press: 1986.

<sup>112</sup> Ezrahi, Yaron. *The Descent of Icarus*. Harvard University Press: 1990. p 13.

<sup>113</sup> Ezrahi 1990 p 19. Ezrahi draws attention to the ideological and political role of science in directing individual and collective action and upholding liberal-democratic notions of authority, legitimacy and accountability (p 1, 3).

<sup>114</sup> *Ibid* p 106.

specialized knowledge that ordinary citizens do not have. Experts are seen as uniquely possessing technical knowledge and competence considered necessary for rational, disinterested and objective decision-making<sup>115</sup>. Therefore, experts are often allowed to sidestep typical democratic procedures in order to formulate policy on behalf of the public with no public oversight<sup>116</sup>. When political issues are framed in technical terms, it limits who is able to take part in political debate. Science can work to “paralyze democracy” or “abort democratic politics” when it is leveraged by experts to close-off democratic discussion<sup>117</sup>. Therefore, questions around the role of experts in democratic governance brings up questions related to who is allowed to speak on behalf of nature and society and direct governance based on claims to authoritative knowledge. In this section, I explore theory that attempts to “bring the sciences into democracy” or integrate expertise into policymaking while avoiding technocracy, or in other words, leveraging modes of knowledge-making that will work in support of modes of democratic decision-making for environmental governance<sup>118</sup>.

As we saw earlier this chapter in the “waves” of watershed democracy, different deployments of the watershed as a unit of democratic environmental governance articulate very different relationships between State agencies, scientists, publics and material watershed ecosystems. Each configuration of watershed democracy structures a range of inclusions and exclusions that determine who is allowed to influence knowledge production, decision-making and policy-making. These strategic exclusions/inclusions are both socially and ecologically constitutive- in determining whose knowledge and values matter in designing environmental policy, they embed particular sets of values and politics in the material conditions and dynamics of watershed ecosystems, which in turn shapes patterns of resource access and the distribution of resource benefits and burdens. One influence on the shifting role of science in directing watershed governance relates to the cultural and political meanings of expertise in different historical periods.

Different waves of watershed democracy were inflected with very different ideas about what watershed scientists should do to maintain their neutrality and objectivity, what privileges they should be afforded in front of legislatures, executives or judges and how scientists and engineers should be positioned in directing society’s water use and managing watersheds. I briefly explore the tensions between expert science and democratic governance in American science policy as background to understanding the politics of knowledge in Klamath watershed governance.

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<sup>115</sup> Mitchell, Timothy. *Rule of Experts: Egypt, Techno-Politics, Modernity*. University of California Press. 2002.

<sup>116</sup> Fischer, Frank. *Citizens, Experts and the Environment: the Politics of Local Knowledge*. Duke: 2000.

<sup>117</sup> Latour, Bruno. *Politics of Nature: How to Bring the Sciences into Democracy*. Harvard: 2004.

<sup>118</sup> See Latour 2004.

## *The “Republic of Science”: Science and Democracy 1900-1970*

Despite the ideology of science and the privileged role of cartographers and statisticians in early democracies, it wasn't until the mid-19<sup>th</sup> century that the professionalization of science and development of government science bureaus began to recruit science in the task of democratic governance in the United States<sup>119</sup>. In the first decades of the 20<sup>th</sup> century, in the Progressive era, expert scientists and engineers were given wide clearance to engineer society at safe distance from the “demos”, but on their behalf. Progressivists believed that the objectivity of science could transcend political disagreement and provide a rational basis for democratic governance<sup>120</sup>. In fields as disparate as economics, natural resource management, public health, sanitation, immigration, irrigation and even watershed management, experts took control of human and natural systems in the name of the public welfare<sup>121</sup>. Scholars of democracy in this era debated whether democracy would be able to hold in the face of such a complex social, scientific and technologically-mediated world<sup>122</sup>. Dewey famously searched for a democratic public amidst concerns that a society held together through complex and vast technological infrastructures was incapable of the kind of face-to-face townhall democracy of revolutionary New England or the yeoman agrarian democracy of Jefferson's age<sup>123</sup>. He found the democratic polity of the age of technocracy in the complex webs of relations between those indirectly implicated in the consequences of an action or the reach of an issue. According to Wang (2002), Dewey posed a question in 1927 that was to become *the* central problem of democracy in 20<sup>th</sup> century America- *could democracy survive in an age of experts?*<sup>124</sup> Dewey answered

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<sup>119</sup> Buisseret, David. *Monarchs, Ministers and Maps: the Emergence of Cartography as a Tool of Government in Early Modern Europe*. University of Chicago, 1992. The term scientist didn't appear until 1834, when it was coined by Cambridge historian and philosopher of science William Whewell.

<sup>120</sup> Jordan, J.M. 1994. *Machine-Age Ideology: Social Engineering and American Liberalism, 1911-1939*. Chapel Hill, NC: University of North Carolina Press. Beginning around the turn of the century and accelerating through the first World War, the application of scientific reasoning and engineering principles to social and political problems spawned an array of new disciplines. Scientific management, public administration, social engineering, and managerial economics became cutting edge fields. As Herbert Croly, editor of the reform journal *New Republic*, put it "society is an organism, controlled by laws of development which when discovered can be modified by man himself", Jordan 1994 pg. 69. Governance became a science while engineering became a "myth, method, and metaphor for reform". See also: Wang, Jessica. *Science and the Problem of the Public in Cold War America, 1945-1960*. *Osiris*. 2002, "Politics based on disinterested, neutral expertise applied to the public good became the rational base for popular power".

<sup>121</sup> While scientific managers such as Frederick Taylor re-conceptualized production systems in scientific terms, eugenicists such as Charles Davenport and Harry Laughlin attempted to improve society through manipulating its hereditary traits and hydraulic engineers such as Eugene Mead attempted to manufacture democracy through public irrigation works see e.g. Frederick Winslow Taylor. *The Principles of Scientific Management*. 1911; Stern, Alexandra Minna. *Eugenic Nation: Faults and Frontiers of Better Breeding in Modern America*. University of California Press, 2005.

<sup>122</sup> See Wang 2002

<sup>123</sup> Dewey, John. *The Public and its Problems*. 1927.

<sup>124</sup> As Wang (2002, pgs 323-324) put it: "could the democratic ideal of an informed and active citizenry engaged in reasoned debate and decision making survive the rise of an increasingly technological and bureaucratic society?"

in the affirmative, inspiring hope that popular participation in science and technology could reinvigorate American democracy.

Leading up to, during and after World War II, the power of science and technology to influence political matters was widely disputed. The role of science and technology in warfare, the curative powers of new drugs like penicillin, new pesticides like DDT and new fertilizers for crops held promises for post-war society. However, the dawn of the nuclear age and the specter of Nazi prison experiments, massive bureaucracies, eugenics and social engineering prompted social anxiety and widespread debate in academic and policy circles about the proper relationship between science and democracy. Prominent European and American scholars such as Robert Merton, Michael Polanyi and Vannevar Bush argued that not only were science and democracy compatible in the new world order, but that science provided a working model for the *ideal* liberal democratic polity<sup>125</sup>. Against the twin specters of Nazi science and the impending cold war with the Soviet Union, the nascent fields of science policy and sociology of science championed the congruity between science and democracy and came to view “scientific freedom as a measure of political freedom in a given society”<sup>126</sup>. Robert Merton articulated this “new consensus” first in his (1942, repub 1973) essay “a note on science and democracy” which famously identified the core norms that defined the uniqueness of scientific practice and kept it compatible with a liberal democratic society<sup>127</sup>. Picking up on Merton’s work, numerous other scholars advocated for a simultaneous commitment to value-free science as the key to global liberal democracy.

### *The “Old Constitution”: Bi-Cameralism and the Republic of Science*

For example, Michael Polanyi famously argued for seeing scientific practice as a “republic of science”<sup>128</sup>. He held that a “community of scientists is organized in a way which resembles certain features of a body politic” and that “in the free cooperation of independent scientists we shall find a highly simplified model of a

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<sup>125</sup> See Guston, David. *Between Politics and Science: Assuring the Integrity and Productivity of Research*. Cambridge University Press: 2007, p 3: Vannevar Bush proclaimed science as “the endless Frontier” in 1945. He tried to demonstrate how the relationship between government and science had grown due to War-time necessity and infer how that relation should be modified for times of peace. The notion of the “social contract for science” advocates institutional arrangements for enforcing a clear separation of politics and science.

<sup>126</sup> Wang 2002; Jasanoff, Sheila. *States of Knowledge: The Co-Production of Science and the Social Order*. Routledge: 2004.

<sup>127</sup> Merton, Robert K. “Note on Science and Democracy, A.” *J. Legal & Pol. Soc.* 1 (1942): 115. Merton’s four norms were: Communalism, Universalism, Disinterestedness and Organized Skepticism. According to the scientific standard of universalism, the truths of science hold everywhere, they are public truths, not to be hidden in secret, behind the iron curtain, but made available for all rational creatures to access. His standard of disinterestedness emphasized commitment to truth above loyalty to country or ideology.

<sup>128</sup> Polanyi, Michael. The Republic of Science: Its Political and Economic Theory. *Minerva* 1:54-74, 1962.

free society”<sup>129</sup>. In Polanyi’s idealized republic of science, knowledge progressed according to its own rules or internal logic, “uncontaminated by power or politics”<sup>130</sup>. Scientific coordination is figured by Polanyi as guided ‘by an invisible hand’ towards the “joint discovery of a hidden system of things”<sup>131</sup>. Scholars attempted to identify science with the liberal values that had been abandoned by totalitarian regimes leading up to, during and after the War and portray scientific activity as guided by “principles well suited to the demands of an open, inclusive democratic discourse”<sup>132</sup>. More than mere academic debates, this theory grounded the formulation of policy and the founding of big public research centers such as the National Science Foundation and the National Institutes of Health. To question science’s compatibility with democracy during this period was considered blasphemy<sup>133</sup>.

This claim to neutrality, objectivity and disinterestedness allowed experts to maintain privileged positions as advisors in governance, law and policy<sup>134</sup>. Experts’ apparent separation from society, its politics, values and economic struggles, allows them to re-enter society in a privileged position, as “objective” policy advisors, expert witnesses or “neutral” purveyors of facts. Therefore, in an important sense, science plays an important role in the constitution of American democracy in the post-war era<sup>135</sup>. This model of the relationship between science and democracy can be described as what science studies scholar Bruno Latour terms the “*old constitution*”<sup>136</sup>. In his account, “notions of nature and politics had been developed over centuries in such a way as to make any juxtaposition, any synthesis, any combination of the two terms impossible.”

In this split, the representation of nature through the intermediary of the laboratory is forever separated from the representation of citizens through the

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<sup>129</sup> Polanyi 1962, p. 3.

<sup>130</sup> Jasanoff, *States of Knowledge*, 2007 p 61

<sup>131</sup> Polanyi 1962, p. 3. The republic of science, Polanyi suggested, is well suited to democratic governance because it denies any authority except that which is constituted “from below by the self critical and equally positioned ‘peers’ of the scientific polity”.

<sup>132</sup> Jasanoff, Sheila. *Designs on Nature: Science and Democracy in Europe and the United States*. Princeton University Press: 2007, p 30.

<sup>133</sup> Wang 2002.

<sup>134</sup> According to Jasanoff (1987, p 196) “much of the authority of science in the 20th century rests on its success in persuading decision-makers and the public that the Mertonian norms present an accurate picture of the way science really works”. Jasanoff, Sheila. *Contested Boundaries in Policy-Relevant Science*. *Social Studies of Science*. 1987.

<sup>135</sup> Don Price figured this relationship in the “The Scientific estate” (1965) as a “political-scientific constitution” which accommodated a free yet accountable science and a pluralistic and representative democracy (see Guston 2007, p 1). The scientific estate pursues knowledge and truth, constrained only by the norms of the scientific community, while the political estate pursues collective action, apportionment of power, constrained by checks and balances and periodic democratic elections.

<sup>136</sup> See “Constitution” in Latour 2004 glossary, Jasanoff 2007, P 239; developed at length in Latour, Bruno. *We Have Never Been Modern*. Harvard: 1993.

mediation of the social contract<sup>137</sup>. This is what Latour terms a “*bicameralism*” in the organization of public life: a division of powers into two assemblies, with science and the facts of nature on one side and culture, value and politics on the other<sup>138</sup>. This “bicameralist constitution” forbids mixing “sublime epistemological questions on the nature of things” with the “lowly political questions on values and difficulties of living together”<sup>139</sup>.

This bicameralism has influenced and continues to influence Klamath experiments in ecological democracy. Boundaries between science and policy and the role of experts in political decision-making are negotiated through collaborative watershed governance in the Klamath. These boundaries have been complicated recently by the attempts of resource management agencies to actively seek out “post-normal” forms of knowledge such as indigenous, traditional, farmer, local and citizen sciences<sup>140</sup>. While the boundaries between expert and lay knowledges is rendered more porous and complex, it is still being drawn and re-drawn in different ways by coalitions of actors attempting to gain legitimacy for their environmental knowledge and values.

*The “New Constitution”: science and democratic governance 1970-today*

In the theory on science and democracy the old ‘bicameralist’ constitution began to unravel in the late 1960s<sup>141</sup>. Numerous social movements also began to explicitly question the power imbalances science authorizes by giving a certain elite segment of the population a greater voice in directing governance. This dependence on experts began to be seen as a threat to democracy rather than a key

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<sup>137</sup> See Latour 2004, ft nt 11, p. 8, p. 13 ft nt 6, p. 253. This unwritten “constitution” structures a whole range of binaries, Nature/culture; Facts/values; Science/politics.

<sup>138</sup> Latour 2004, p 13 and ft nt 6.

<sup>139</sup> Latour 2004, p 15.

<sup>140</sup> Citizen Science (wiki): “the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists”. On “Post-normal science” see e.g. Funtowitz, SO and JR Ravetz. “Science for the post-normal age”. *Futures*, 1993.

<sup>141</sup> The ideology of open democratic science was quickly curtailed by cold war commitments to secrecy, political-economic ideologies and loyalty oaths (See e.g. Wang 2002). Public debates about the atomic age begun in the late 1940s were shut down and scientists largely retreated from public life. In addition, a new understanding of the messiness of scientific practice began to emerge, first in academic circles, then diffusing into popular political culture and eventually resulting in a re-positioning of experts in democratic society. Beginning with Kuhn’s *Structure of Scientific Revolutions* in 1962, scholars began following the everyday lives and practices of scientists, rather than merely the “externalist” institutional dimensions that support their work, and looking in depth into social and political sources of credibility and authority in science. Kuhn’s model portrayed scientists as operating within certain paradigms, which provided basic sets of shared principles, metaphysical assumptions, techniques, methodologies and instruments and made possible certain ways of generating credible knowledge about the world along narrow, prescribed lines.

feature of it<sup>142</sup>. In public deliberations concerning technical and scientific issues, scientific experts can invoke “objectivity” to prematurely foreclose democratic debate<sup>143</sup>. Experts were therefore seen as constituting a non-democratic element in democratic governance, especially when experts were not democratically elected and when their decisions seemed to shortcut democratic deliberation. Expert decision-making and expert-driven governance had produced environmental degradation and toxic environments for humans to live in<sup>144</sup>. Therefore, a number of dissatisfied scholars left the ivory tower in the late 1960s to engage with social movements in the field, spawning the “participatory research” movement<sup>145</sup>.

The distrust of western-style science and formal learning compelled many academics to abandon the universities in search of a more humane and critical form of knowledge that could be produced and shared in less formal settings. For Orlando Fals-Borda, the Colombian sociologist, activist, and one of the seminal leaders of "Participatory Action Research", the year 1970 was a crucial turning point in the global movement towards popular inclusion in research<sup>146</sup>. The movement to forge a "science of the people" sprang up simultaneously in numerous places around the world, notably in Colombia, India, Brazil, Canada and Tanzania<sup>147</sup>. While the movements were in many ways independent and unaware of one another, they emerged in the face of similar issues with the way knowledge was being produced in universities and government agencies, "like telepathy induced

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<sup>142</sup> Fischer, Frank. *Democracy and Expertise: Reorienting Policy Inquiry*. Oxford University Press: 2009; Habermas, Jürgen. *Toward a Rational Society: Student Protest, Science, and Politics*. Boston: Beacon Press: 1970 and *The Theory of Communicative Action* Beacon Press: 1987.

<sup>143</sup> Latour 2004.

<sup>144</sup> Carson, Rachel. *Silent Spring*. 1962

<sup>145</sup> See e.g. Fals-Borda, Orlando. The Application of Participatory Action-Research in Latin America. *International Sociology*, Vol 2. No 4. Pp.329-347. Dec 1987; Freire, Paulo. *Pedagogy of the Oppressed*. 1970.

<sup>146</sup> Fals-Borda, Orlando. The North-South convergence: A 30-year first-person assessment of PAR. *Action Research*. Volume 4(3): 351–358. 2006.

<sup>147</sup> Colombia's first NGO, the Rosca Foundation for Research and Social Action, was founded by a group of sociologists who left their universities to cooperate with peasants and indigenous activists on issues related to land rights and agriculture. (see e.g. Fals-Borda, Orlando. "Participatory action research." *Development: Seeds of change* 2 (1984): 18-20). In a similar movement in Maharashtra, India, the Bhoomi Sena (Land Army) was initiated by a group of landless peasants in cooperation with a group social scientists who helped organize their agricultural credit programs (see e.g. De Silva, G. V. S., et al. "Bhoomi Sena: A." *Studies in Rural Participation*. New Delhi, India: Oxford & IBH Pub. Co (1982): 151-169). In the same year, Marja-Liisa Swantz, a Finnish scholar, completed a five-year participatory social research project in a Bunju village in Tanzania, and in Mexico a group of scholars at the National Autonomous University led a movement to "decolonize" the social sciences (See e.g. Swantz, Marja Liisa. "Participatory action research as practice." *The SAGE handbook of action research: Participative inquiry and practice* (2008): 31-48). In addition, two books that would prove to be essential to the philosophy of the participatory research project, Paulo Freire's *"Pedagogy of the Oppressed"* (1970) and Pail K. Feyerabend's *"Against Method"* (1970), were published.



by the urgency of understanding the tragic, unbalanced world"<sup>148</sup>. In addition to dismantling science's monopolistic claim to truth, the participatory research movement also sought out alternative modes of learning and rendering knowledge credible. Expressive forms such as art, oral traditions, music, dance, and theatre were cultivated in an attempt to recover a "subaltern" sense of history, nature and culture<sup>149</sup>.

In the same tumultuous period of the 1960s and 70s, the sociology and philosophy of science was adopting a new understanding of science and expertise based on scholarship on the actual practices and cultures of knowledge making. The sociology of scientific knowledge program begun in Edinburg in the 1970s and Actor-Network approaches that came out of Paris and in the 1980s sought to understand and explain the actual content of scientific knowledge by focusing in detail on the mundane everyday social relations, politics, economics, instruments and power-inflected practices that go into specific knowledge making processes. This approach inspired a whole slew of research on science *in action*<sup>150</sup>. Science studies scholars followed scientists and engineers through society-into the lab and the field, through courts and advisory committees, into public debates about the risks of technologies and the design of infrastructure. Of central importance to my theoretical framing is the way these approaches were taken up in detailed studies of regulatory science, environmental policy and law.

### *Co-production of science, nature and social order*

To understand the complex relationships between watershed science and watershed governance, I draw on Sheila Jasanoff's research on the interface between science and the law, the role of scientific advisory committees in setting regulatory policy and the ways different democratic political cultures assess and deal with the risks posed by science and technology<sup>151</sup>. Her work explicitly looks at the ways science and law coproduce each other's legitimacy and authority as they order natural and social worlds. Her work shows how democratic engagement with science and technology is shaped and constrained by different approaches to representation, participation and deliberation in different political cultures<sup>152</sup>. Jasanoff develops the idiom of "co-production" to view the mutually constitutive relations between knowledge, nature and society. For Jasanoff, "knowledge and its

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<sup>148</sup> Fals-Borda, Orlando. "Participatory (Action) Research in Social Theory: Origins and Challenges" in *Handbook of action research: participative inquiry and practice*. P. Reason and H. Bradbury eds. 2001.

<sup>149</sup> Hall, Budd. From margins to center? The development and purpose of participatory research. *The American Sociologist*. Winter 1992, Volume 23, Issue 4, pp 15-28 1982; Hall, Budd. In *From the Cold? Reflections on Participatory Research From 1970-2005*. *Convergence*. 2005.

<sup>150</sup> Latour, Bruno. *Science in action: How to follow scientists and engineers through society*. Harvard: 1987. For a social and intellectual history of early science studies see e.g. Sismondo, Sergio. *An introduction to science and technology studies*. John Wiley & Sons, 2011.

<sup>151</sup> Jasanoff 1987; Jasanoff, Sheila. *Science at the Bar: Law, Science and Technology in America*. Harvard: 1997; Jasanoff, Sheila. *The Fifth Branch: Science Advisers as Policy Makers*. Harvard: 1998.

<sup>152</sup> Jasanoff 2007, p 287.

material embodiments are at once products of social work and constitutive of forms of social life”<sup>153</sup>. Co-production proposes that “the ways in which we know and represent the world are inseparable from the ways in which we choose to live in it”<sup>154</sup>. Jasanoff portrays “co-production” as an “Archimedean point” from which she can symmetrically view the stabilization of new knowledges and technologies, ethical and moral framings, and regulatory policies<sup>155</sup>. This strain of Science and Technology studies, with its focus on the connections between knowledge practices, governance institutions, regulatory policy and actually existing democracy is the most relevant theoretical framing for looking at complex relations between science and democratic decision-making in Klamath watershed governance.

This dissertation takes up the idiom of co-production to depict and analyze the relationships between watershed knowledge, institutions of watershed governance and the materialities of Klamath watershed ecosystems<sup>156</sup>. Simply put, a co-productionist framework allows me to see how democracy and watersheds are co-produced. Chapters 2-6 describe in detail how theories and practices of democracy are articulated through political and scientific experiments at the watershed scale. The main tenets of democratic governance such as modes of deliberation, relationships between representatives and citizens, the relative roles of experts and citizens in knowledge production and decision-making, relationships between individual citizens and political collectives, tensions between individual rights and property, Tribal sovereignty and the rights and property of the public are all worked out through experiments in watershed democracy. Similarly, what reliable knowledge looks like- what methods, procedures and techniques are relied upon to produce and circulate credible knowledge - is also negotiated through experiments in watershed democracy.

In a co-productionist framework, science, nature and society are NOT separate domains that influence one another in any sort of mechanical or linear way, but are rather *mutually constitutive*, meaning internally related and built into one another. Knowledge nature and society through a co-productionist perspective are entangled, imbricated and interdependent. Debates about how to generate accurate watershed knowledge are also debates about appropriate forms of

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<sup>153</sup> Jasanoff 2004, p 2.

<sup>154</sup> Jasanoff 2004, p. 2.

<sup>155</sup> Jasanoff 2007, P 43: “co-production does not seek to foreclose competing explanations by laying claim to one dominant and all-powerful truth. It offers instead a new way of exploring the waters of human history, where politics, knowledge and invention are continually in flux”.

<sup>156</sup> I follow the co-production of knowledge, nature and society in three separate but inter-related domains: 1. *Watershed knowledges* (e.g. watershed hydrology, biogeochemistry, ecology, geomorphology, geohydrology, hydrometeorology, climatology, water chemistry, water economics, and indigenous/local/farmer/citizen knowledges) 2. *Watershed governance institutions* (e.g. Federal and State water law and regulatory policy, water and irrigation districts, NGOs, collective action institutions, discourses, narratives) and 3. *Watershed materialities* (e.g. watershed form and function, flow regimes, biogeochemical and ecological dynamics, water quantity and quality, access to water and watershed resources, water-based livelihoods).

sociality and democratic political culture. We will see in chapters 2 and 3 how the concept of co-production has been put to work by water scholars attempting to understand how “water’s materiality and its social relations constitute and express each other”<sup>157</sup>. For example, in Budd’s application of co-production to water governance, “redefining water as coproduced enables us to think about not only the social processes that shape water but also the ways in which water shapes social relations”<sup>158</sup>. In Tim Forsyth’s application of co-production to watershed governance, hydro-narratives about forest-flood interactions and social narratives about indigenous forest guardians and destroyers come together in complex ways to shape understandings of watershed processes and management of watershed systems<sup>159</sup>.

Recent political ecology, STS and geography literature has paid particular attention to the constitutive relationships between water, techno-scientific practices and institutions of water governance. For example Patrick Carroll (2012) examines how water became the principle object through which governance and science became networked in early Californian government agencies<sup>160</sup>. Waters’ multiple uses in hydraulic mining, ranch and crop irrigation, navigation, and eventually hydropower generation made it a source of conflict and a specific object of State knowledge production and governance<sup>161</sup>. The Californian state in Carroll’s account is figured as a complex assemblage of humans and non-humans. The demos seen through this lens is a discursive, organizational and material formation embodied in natural/cultural materialities and networked across “engineered techno-natures” such as flood control and irrigation infrastructures. The demos or public is not an abstract entity set apart from nature, “because it is critically built into and out of the environment”<sup>162</sup>.

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<sup>157</sup> Budds, J. and Hinojosa, L. 2012. Restructuring and rescaling water governance in mining contexts: The co-production of waterscapes in Peru. *Water Alternatives* 5(1): 119-137 see also Linton, J. and Budds, J. 2013. The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water. *Geoforum*; Swyngedouw, E. 2004. *Social power and the urbanization of water*. New York: Oxford University Press; Swyngedouw, E. 2009. The political economy and political ecology of the hydro-social cycle. *Journal of Contemporary Water Research & Education* 142(1): 56-60.

<sup>158</sup> Budds 2012.

<sup>159</sup> Forsyth, Tim and Andrew Walker. *Forest Guardians, Forest Destroyers: The Politics of Environmental Knowledge in Northern Thailand*. University of Washington: 2008.

<sup>160</sup> Patrick Carroll, Water and Technoscientific State Formation in California. *Social Studies of Science* 42-4 (2012), 489-516.

<sup>161</sup> Carroll (2012) focuses on the role of the early State institutions such as Reclamation Boards, Drainage Districts, and Debris Commissions in reclaiming nearly two million acres of Sacramento valley swamplands and then constructing vast systems of levies and dykes to protect it from persistent flooding.

<sup>162</sup> However, the very multiplicity and complexity of water necessitates a “discursive singularization” through State knowledge and an “obligatory passage point” through the early State governance institutions. Water thus emerged a source of State power as its materiality was interpreted as necessitating a centralized, powerful state to tame and know it.

## *Due-process under the “New Constitution”*

Bringing the concept of co-production to bear on the constitutional question, Latour asks how we can “bring the sciences of nature into democracy” and simultaneously “ecologize” democratic governance and orient it around a politics of nature<sup>163</sup>? Latour advocates weaving political processes directly into our understandings and valuations of nature through a “*new constitution*”. Whereas under the “old constitution”, political questions related to the common good were separated from epistemological questions related to the common world, Latour holds that the “*new constitution*” must bring political and ecological questions together so that the “question of the good common world, of the cosmos, can be raised again from scratch”<sup>164</sup>. He asks how we can obtain the reality and unity of this new collective through a “*due process*” that actively invites politics into representations of nature, rather than rigorously separating politics from science and nature, thus “offering the production of the common world the equivalent of a state of law”<sup>165</sup>.

The concept of “*due process*” is mentioned in the US constitution twice, in the 5<sup>th</sup> and 14<sup>th</sup> amendments, promising its citizens that no one shall be “deprived of life, liberty or property without due process of law”. These amendments ensure a fair procedure in the application of the law and equal protection against the arbitrary use of power<sup>166</sup>. By invoking “due-process”, Latour meant to advocate building deliberative democratic processes directly into the simultaneous production of knowledge, nature’s materialities *and* institutions that distribute

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<sup>163</sup> Latour 2004, p. 18.

<sup>164</sup> The old constitution claimed to “unify the common world once and for all, without discussion and without due process, by a metaphysics of nature already composed, already totalized, already instituted to neutralize politics”. Latour 2004, p. 93. Latour therefore links his project of “political ecology” to that of Stengers’ “cosmopolitics” (2001), which looks after the right way to compose a common world, politically as well as scientifically and materially. See e.g. Stengers, Isabelle. *Cosmopolitics*. Vol. 1. Minneapolis: University of Minnesota Press, 2010.

<sup>165</sup> Latour 2004, p 91. Latour’s call for a reinvigorated politics of nature and thorough attention to the materiality of democracy has been repeated numerous times in STS, political ecology and geography over the last five years. Braun and Whatmore’s (2010) collection specifically highlights the role nature, science, technology play in the fabric of democratic political association and public life.

<sup>166</sup> The “due-process” clause of the US Constitution goes back to the “Magna Carta”, King John’s 13<sup>th</sup> century promise to noblemen that he would act in accordance with law and that all would receive the ordinary or “due” process of law. Legal scholars have written about “intellectual due process” to refer to the bodies of case law and jurisprudence regarding the role of judges in sifting through expert testimony and determining the standards of admissibility based on methodological or scientific judgment. “Intellectual due process” based on the *Daubert* standard (*Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579, 1993) and administrative case law implies that judges can take a “hard look” into the procedures through which knowledge was generated to make a decision about whether or not it is sound or relevant to the case at hand. It also implies that, once due process has been followed, testimony can be thrown out as biased, partial or simply as “bad science”. See e.g. Beecher-Monas, Erica. “Heuristics of Intellectual Due Process: A Primer for Triers of Science”. *NYU Law Review*, 2000; Beecher-Monas, Erica. *Evaluating Scientific Evidence: An Interdisciplinary Framework for Intellectual Due Process*. Cambridge: 2006.

rights and resources. As we will see in the Klamath, there was not much agreement around what that “due process” should look like, who it should involve or benefit and in particular at what scale it should take place.

### *“Due-process” for Klamath watershed democracy*

The Klamath experiments in democracy at the watershed scale offer almost three decades of attempts to work out a “due process” for composing a common world. Klamath experiments collaborative watershed governance present an important case-study of co-production, but not only as a typical case of the constitutive co-production of knowledge, nature and society. Klamath experiments in watershed democracy are deliberate attempts to “bring the sciences into democracy” and figure out ways of democratically and sustainably co-producing a common-world. Collaborative watershed governance in the Klamath provides an opportunity to follow nearly 30 years of actual experiments in democratic world-making through collaboratively knowing and managing watersheds. Through collaborative watershed forums, Klamath inhabitants explored ways of democratically producing knowledge, rendering management plans and carrying out restoration initiatives. However, just providing political forums that support open debate on the science of Klamath watershed processes does not automatically lead to either democratic knowledge production or to democratic governance.

I demonstrate in chapters 3-6 that, while watershed forums were supposed to provide “neutral and “apolitical” grounds for assembling diverse knowledges, debates regarding watershed processes resulted in epistemic factions along cultural, economic, bureaucratic and political lines. Despite a commitment to “epistemic diversity”, watershed forums have struggled to harmonize different types of indigenous, traditional, local, and scientific knowledge and have provoked debates about what constitutes credible knowledge of watershed processes and who has authority to represent the array of values and interests attached to watershed resources. As the next section shows, differences in epistemological and ontological approaches to understanding and relating to watersheds did not harmonize or converge the Klamath communities around a “good common world”. Rather, it led to political mobilization around other scales of governance that were more suitable to the perspectives, values and needs of local resource-dependent communities.

### *“Due-process”, Democracy and the Pluriverse*

Mario Blaser (2012) critiques the Latourian notion of “due process” by arguing that “indigeneity” troubles the notion of ‘a common world’ because it signals that “ways of worlding do not get constituted in a vacuum but rather in relation with each other”<sup>167</sup>. In this case, conflicts in epistemologies and ontologies

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<sup>167</sup> Blaser, Mario. Ontology and indigeneity: on the political ontology of heterogeneous assemblages. *Cultural Geographies*, 2012, p. 55- 56. In light of the fact that indigenous peoples

of the watershed point to the fact that there are “multiple ways of worlding” or many ways of elucidating a common world and many processes through which collectives can and do order nature and social life. I argue that the Latourian idea of one common world that unfolds through one due process actually works against democracy. As we will see in this dissertation (esp Ch 3, 4, 5) the indigenous critique of both western science and democratic governance is a critique of ways of universalizing, or moving from the particular to the general, the individual to the collective, the local to the global or universal. Indigenous epistemologies, ontologies and political processes therefore offer ecological democracy a model of universality as openness rather than sameness, “a pluriversal” mode of democracy that connects a plurality of partial perspectives through the unfolding of multiple interacting worlds<sup>168</sup>.

In the next section, I argue that a participatory research approach makes an important compliment to research on the co-production of science and society in the Klamath. I describe how my approach to studying watershed democracy in the Klamath was shaped through conversations with community partners and participatory research through the Karuk Tribe-UC Berkeley Collaborative. Epistemologically and ontologically, an engaged scholarship approach affords a better picture of how people make knowledge and how they use knowledge on an everyday basis to make decisions and manage resources collectively. A commitment to working with local people also provided me with an opportunity to view first hand the hard work entailed in configuring and maintaining collective knowledge systems across diverse social worlds through our ongoing attempts to create a shared epistemic culture.

In particular, I describe the ways engaged research collaborations with the Karuk Tribe’s Department of Natural Resources drew my attention to the implications of the cultural politics of scale for tribal self-determination in environmental governance. This in turn forced me to look more broadly at issues related to scale and democracy in order to examine how spatial formations shape understandings and explanations of social and environmental processes as well as regimes of environmental governance. I discuss in the concluding section of this chapter (III) how, through attempts to democratize science while studying watershed democracy in action, I realized the importance of “democratizing scale” in both knowledge-production and resource management in the Klamath. In attempting to ask whether watersheds were good spatial units for thinking and acting collectively with in the Klamath, I found myself embroiled in conversations

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present conflicting epistemologies and ontologies of nature, he asks “what procedures are deemed acceptable to rule in or to rule out the kind of entities that make up the collective”?

<sup>168</sup> On the concept of the “pluriverse” see Blaser 2012; see also Mignolo, Walter. “The Zapatista’s Theoretical Revolution: Its Historical, Ethical and Political Consequences.” *Review* (Fernand Braudel Center), Vol. 25, No. 3 Utopian Thinking, 2002. See also Mignolo, Walter. “Epistemic Disobedience and the Decolonial Option: A Manifesto”. *Transmodernity*: 2011. Grosfoguel, Ramón. “Decolonizing Post-Colonial Studies and Paradigms of Political-Economy: Transmodernity, Decolonial Thinking, and Global Coloniality”. *Transmodernity*. 2011.

with community partners about whether watersheds were even the most appropriate scale with which to approach ecological democracy in the Klamath in the first place. I soon found out through participating in experiments in eco-cultural revitalization that watershed-centric approaches to democratic environmental governance don't capture important biophysical features of the landscape such as fire movement, wildlife habitat or soil and vegetation associations that are important both ecologically and to the local community.

## **II. Indigenous Peoples' Self-determination and Democratic Environmental Governance**

### *Democracy and Indigeneity*

American Democracy has long been confronted with the question of how the cultural and political self-determination of indigenous peoples relate to the rights and sovereignty of the general public and their many representative institutions<sup>169</sup>. In this section, I review debates about the relationship between indigenous peoples' knowledge and sovereignty and the knowledge and sovereignty of the "people" of the United States. This section first examines contemporary debates about the historical origins of American Indian sovereignty and law protecting American Indian nations' unique political status and rights to natural resources. I then describe the important connections between indigenous knowledge systems and indigenous people's sovereignty over natural resources. I discuss links between what the Karuk Tribe describes as "knowledge sovereignty", or sovereignty over representations of Karuk knowledge and culture in natural resource management arenas and "eco-cultural revitalization", or restoration of the watershed and ecosystem processes that support Karuk cultural and political self-determination. I consider the implications of the politics of indigenous ecological knowledge for researchers attempting to work with indigenous communities.

American democracy was from the beginning a syncretic concept that combined indigenous and European political theory and practice. American ideas of democracy took shape around examples provided by the American Indian confederacies that bordered European colonies and provided settlers with real working examples of representative democratic governance<sup>170</sup>. The League of the Iroquois predated the US Constitution and significantly influenced the development of principles that shaped the US Constitution such as the balance between individual freedom and collective unity, self-governance at multiple nested scales, territorial division of jurisdiction, the grounding of sovereignty in the people,

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<sup>169</sup> Deloria, Vine and David Wilkins. *Tribes, Treaties and Constitutional Tribulations*. University of University of Texas Press: 2000.

<sup>170</sup> In the late 1980s and early 1990s, historians began publishing evidence that demonstrated the many influences of Native American political theory and practice on first the Albany Plan of Union, then the Articles of Confederation and finally the US Constitution. See e.g. Grinde, Donald and Bruce Johansen. *Exemplars of Liberty: Native America and the Evolution of Democracy*. UCLA: 1991, esp p. xviii.

equality and universal suffrage<sup>171</sup>. The Federalist approach to democracy borrowed heavily from indigenous techniques for allowing autonomy and self-governance of sub-units while subsuming them into a larger collective entity that could act as one diplomatically and militarily and which could support deliberative processes and equitable rule across a broad geographic expanse. Ben Franklin, James Wilson, John Adams, John Rutledge and Charles Pickney all remarked on the effectiveness of the Iroquois model in coordinating political order on a vast scale while maintaining individual freedoms and self-governance at a local level.

Phillip Deloria similarly writes about how European perceptions of indigenous identity played a significant role in the founding of American democracy. “Playing Indian” is a persistent tradition in American culture, a practice that “clings tightly to the contours of power”<sup>172</sup>. To European colonists in North America, Indians represented instinct and natural freedom, whereas Europeans were imprisoned in the cage of civilization and the social order. Numerous theorists and proponents of democracy drew from the image of the “noble savage” as an emblem of natural freedom and rebellion and an alternative to European cultural and political models.

Deloria claims that US democracy was created around collisions between individual liberty, nature and the social order and that “Playing Indian” offered a powerful tool for holding this dissonance in abeyance<sup>173</sup>. For Deloria, settler conceptions of indigeneity offered an authentic, aboriginal Americanness that, despite the constantly shifting nature of individual, social, and national identities, made the political identity of American democracy seem fixed and natural. For numerous generations of Americans, invoking Indianness “made one a citizen, not of an impermanent government, but of the land itself”<sup>174</sup>. For Deloria, it is in this particular historical relation between immigrants, natives, nature and the quest for political freedom that American democracy began to acquire its critical meanings<sup>175</sup>. Importantly, Deloria reminds us that ‘Playing Indian’ “rested fundamentally on asymmetrical relations of power” and provided a foundation for imagining, performing and materializing power and domination in America<sup>176</sup>. Playing Indian has helped create a form of power which has been turned back on

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<sup>171</sup> Grinde (1991) and others have noted how the Albany Plan, which formed the basis of first the Articles of Confederation and then the US constitution was modeled after the Great Law of the Iroquois. During the framing and ratification process of the US constitution, Iroquois political leaders lectured to colonial and revolutionary leaders on the virtues of the balance between autonomy and unity and served as an example of democracy for Europeans and colonial Americans. See Grinde and Johansen 1991, Ch 1 ft nt 18.

<sup>172</sup> Deloria, Philip. *Playing Indian*. Yale: 1999.

<sup>173</sup> Deloria 1999, p. 183.

<sup>174</sup> *Ibid*, p 183: “for those who came here from other countries, the ultimate truths of America’s physical nature- rocks, water, sky- were intimately linked to a metaphysical American nature that would always be bound up with mythic national identities”. For generations of Americans, the key to unlocking this natural political democracy of the country consisted in “playing Indian”.

<sup>175</sup> Deloria 1999, p. 183.

<sup>176</sup> Deloria 1999, p. 191.



native people. For Deloria, the ultimate irony of American democracy is that “American freedom rests on the ability to wield power against Indians- social, military, economically and politically while simultaneously drawing power from them”<sup>177</sup>. This contested relationship between indigenous sovereignty, political freedom, nature and American democracy remains a generative force in both contemporary political theory as well as in shaping Klamath watershed democracy.

### *Hybrid democracy and “post-sovereign” political orders*

Reflecting on the implications of the Iroquois influence on American democracy, political philosopher Iris Marion Young coined the concept of “hybrid democracy”. She argued that the fact of Iroquois influence on early American political theory “hybridizes the idea of democracy” and works to “pluralise our possible understandings of democracy”<sup>178</sup>. Through this evidence, the “very meaning of democracy, of being American becomes decentered” and provides “new resources for thinking democracy in the postcolonial age”<sup>179</sup>. She uses the concept of “hybrid democracy” to decenter political subjectivities and polities and re-conceptualize *sovereignty as self-determination*, a core principle to guide a “postcolonial global federated democracy”. She and many other political theorists and political ecologists have written against a “Westphalian” model of sovereignty whereby a centralized sovereign state wields final authority over all legal and political matters within a bounded territory. This mode of sovereignty entails a clear distinction between inside and outside and portrays the State as an independent, bounded jurisdiction with sole authority over matters within its territory<sup>180</sup>. She argues that most visions of decentralized or radical democracy implicitly transfer this model of nation states to its smaller subsidiaries and counter-publics.

Young draws on feminist and post-colonial theories that question the “sovereign” conception of self and polity and instead substitutes a “relational” conception of self and polity that recognizes that individuals and collectives are constituted through relations of interdependency. She argues that the postcolonial project entails envisioning governance without sovereignty and instead demands a form of global self-determination as “decentered diverse democratic federalism”<sup>181</sup>. This decentered federalism “allows sovereignty at no level” (p. 256), instead “regions, peoples even non-government organizations can each be thought of as having claims to self-determination, but none ought to be sovereign”<sup>182</sup>. Rather than sovereignty as “non-interference”, she argues for a model of “self-

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<sup>177</sup> *Ibid.*

<sup>178</sup> Iris Marion Young. “Hybrid Democracy: Iroquois Federalism and the Postcolonial Project” In *Global Challenges: War, Self-Determination and Responsibility for Justice*. Polity Press: 2007.

<sup>179</sup> Young 2007, p 245.

<sup>180</sup> *Ibid*, p 247.

<sup>181</sup> *Ibid*, p 253.

<sup>182</sup> *Ibid*, p 254. She continues: “This means rejecting a conception of self-government as non-interference, clearly separating a realm of our business from a realm that is none of our business”.

determination as non-denomination”, or political relations in which “distinct peoples engage one another as equals on an ongoing basis”<sup>183</sup>.

On one hand, I agree with Young that the Westphalian conception of sovereignty as “non-interference” or absolute authority over a bounded space is no longer viable, especially when dealing with subjects such as tribal rights in natural resources, which are alive, mobile, fluid or in flux. In this dissertation, I extend her critique and try to bring new theory on space and scale from geography, political ecology and science and technology studies to bear on the question of indigenous peoples’ self-determination within democratic governance regimes. However, I also argue that the concept of sovereignty and its associated legal doctrine, while steeped in colonial history, is still an important resource for empowering tribes that we cannot afford to toss away at this moment. While Young’s model of “decentered self-determination” is appealing conceptually, it may actually work against important rights of Tribes to represent the best interests of their constituents and protect their languages, cultures, world views and cultural and natural resources.

Young glosses over the important fact that Tribes have put the concept and legal doctrine of sovereignty to work in creative ways to support cultural, political, economic and ecological self-determination. Barker (2005), for example, shows the ways in which sovereignty has been redefined and articulated in multiple ways that are meaningful to Indigenous peoples, despite of the colonial legacy associated with the term<sup>184</sup>. Simpson (2011) emphasizes the strategic value of sovereignty in supporting Indigenous people’s self-determination: “Indian sovereignty is real; it is not a moral language game or a matter to be debated in ahistorical terms...thus it should be upheld and understood robustly- especially as Indians work within, against, and beyond these existing frameworks”<sup>185</sup>. Young’s “post-colonial federated global polity” therefore ignores the specificities of colonial and de-colonial processes. Abstracted from historical and political contexts, her notion of self-determination is distant from the actual attempts of tribes to regain land, access resources and protect culture, which are grounded in colonial discourses in order to affect change within colonial systems. Therefore, while heeding Young’s call to bring new perspectives on space and scale to bear on questions of democracy and self-determination, it cannot be at the expense of hard-fought rights of indigenous peoples in established legal doctrines.

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<sup>183</sup> From this point, she developed an *self-determination as non-domination* opposed to the “*self-determination as non-interference*” in that it allows affected outsiders to have a voice in the decisions of a self-governing group. This principle of self-determination for peoples, she argues, should be interpreted along the lines of relational autonomy or non-domination, rather than simply as independence or non-interference. She envisioned a system of multiple, overlapping sovereignties, each of which is open to others, and in which people can appeal to redress injustice.

<sup>184</sup> Barker, J. *Sovereignty matters: Locations of contestation and possibility in indigenous struggles for self-determination*. University of Nebraska Press: 2005.

<sup>185</sup> Simpson, Audra. "Settlement's Secret." *Cultural Anthropology* 26, no. 2 (2011): 205–217, p. 211.

My interest in Tribal sovereignty in this dissertation is in the ways in which sovereignty is defined, contested and redefined in the context of democratic environmental governance. We will see in this section that Tribal sovereignty, while flawed and in some ways a tool for continuation of colonial relations between the US and Tribal nations, is also an important way for tribes to maintain aboriginal land bases, steward resources and perpetuate culture in the Klamath. Seeing how sovereignty is articulated both with and against the grain in the context of collaborative knowledge-production and natural resource management gives me an opportunity to see how indigenous peoples are able to carve out space for unique epistemologies, ontologies and cultural practices in emerging democratic governance spaces. Seeing sovereignty as relational, instead of looking for sovereignty before empire, sees sovereignty take on different meanings in particular historical, cultural and political conditions and amidst different environmental conflicts and clashes of cultures. In this dissertation, I am interested in the ways indigenous self-determination is articulated in the context of collaborative watershed governance. Conversations with members of the Karuk tribe have highlighted the importance of sovereignty over cultural and ecological knowledge as well as sovereignty over aboriginal lands and resources as crucial components of cultural, political, ecological self-determination.

This is important for tribes interested in actualizing sovereignty on the ground as well as advocates of deliberative democracy interested in the ability of democratic regimes to incorporate diverse epistemologies, ontologies, cosmologies and ways of living in nature. Below, I provide historical background on debates about the colonial legacy of sovereignty in the context of natural resource management and specifically Federal Indian water rights. In the following section, I examine debates about the politics of indigenous ecological knowledge and how they relate to decolonization, self-determination, natural resource rights and watershed governance in the Klamath. Given the central role of the sciences in colonial regimes of resource governance, I argue that community-based participatory research provides a helpful framework for understanding watershed governance in a postcolonial context. I explain how my relationship with the Karuk tribe shaped the way I researched Klamath watershed governance, in particular drawing my attention to the question of scale in ecological democracy.

### *Sovereignty and "Discourses of Conquest"*

As the concepts and legal doctrine associated with sovereignty are bound up with European colonial history, so too are the rights and sovereignty of indigenous peoples grounded in colonial languages and legal discourse. American Indians are mentioned in the US constitution only three times, twice to exempt them, ("except Indians not taxed") and the third in the context of granting Congress the sole right to regulate commerce "with the Indian tribes" along with foreign nations and

among the several states<sup>186</sup>. According to Deloria and Wilkins (1999), the original exemption of indigenous political communities from the US constitution was due to the fact that Indian groups were seen as sovereign nations with their own laws as well as potential commercial partners and military allies<sup>187</sup>. Giving Congress the exclusive privilege of dealing with them commercially, however, was intended to expedite the buying, selling and settlement of Indian lands. Once America's position was secured in North America after the revolution, its Indian policy generally wavered between forced removal, extermination and assimilation<sup>188</sup>.

US Indian Policy in the 19<sup>th</sup> century pushed remaining tribes further and further west, first beyond the Appalachians, then beyond the Mississippi, then to reservations on some of the most marginal land in the US West in order to make *lebensraum* for democracy<sup>189</sup>. However, at the same time, the distinct political status of Indian tribes was affirmed through legal doctrine developed during the ante-bellum era, in which intense conflicts between state rights and federal authority forced the Supreme Court to clarify the federal relationship with Indian tribes. The Court dealt with the issue of Indian sovereignty in three cases between 1823 and 1832, known now as the Marshall trilogy, which have set precedent for Tribal sovereignty in this country<sup>190</sup>. Though decided during one of the worst for cultural and political climates for tribal relations in the US, the legal dilemma over Tribal sovereignty forced the Supreme Court to cede a distinct political status to tribes in order to justify federal authority and preempt state authority over tribes. The three Marshall opinions gave rise to a complex yet strategic legal doctrine portraying tribes as retaining inherent "nation" status, but as "domestic" rather than foreign nations. This unique status as "domestic dependent nations" ensured that relations with these "nations" were solely within the purview of the federal government, decidedly not within State jurisdiction and not an independently sovereign nation either, though this later position has been challenged and "inherent tribal sovereignty" is currently recognized in US and international law. This mix of three cases laid an ambiguous and shaky ground for Indian sovereignty and Federal, State and Tribal governments and courts have been debating it since.

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<sup>186</sup> "To regulate commerce with foreign nations, and among the several states, and with the Indian tribes" US Const, art 1, sec 8, cl 3; US Const art 1, sec 2 cl 3; 14th amendment, Section 2.

Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed.

<sup>187</sup> Deloria and Wilkins 1999, p 26, 32-33: "There is no mention of France or Spain in the Constitution either, but that does not deprive them of the power to make treaties with the United States and have their provisions enforced. Tribes are preexisting sovereigns whose existence is not beholden to the Constitution or to the federal or state governments." p. 26

<sup>188</sup> See e.g. Williams, Robert A. *Like a Loaded Weapon: The Rehnquist Court, Indian Rights, and the Legal History of Racism in America*. University of Minnesota Press. 2005, p 42.

<sup>189</sup> translation "living space"- used to make racial claims to territory, see Moore, Donald S, Anand Panadian and Jake Kosek, "Introduction: The Cultural Politics of Race and Nature: Terrains of Power and Practice" in Moore, Kosek and Pandian (eds) *Race, Nature and the Politics of Difference*. Duke: 2003.

<sup>190</sup> Marshall trilogy: *Johnson v. M'Intosh*, 21 U.S (8 Wheat) 543 (1823); *Cherokee Nation V. Georgia*, 30 U.S. (5 Pet.) 1 (1831); *Worcester v. Georgia*, 31 U.S. 515, 8 L.Ed. 483 (1832).

Even the Supreme Court itself has described the relationship between states, tribes, and the federal government that has resulted from the Marshall trilogy as “an anomalous one and of a complex character”<sup>191</sup>.

The sovereignty grounded in this doctrine is both a blessing and a curse for tribes, as it awards distinct political status and special rights status yet is also a highly circumscribed vision of Indian sovereignty that *de facto* remains subordinate to the sovereignty of the “People” of the United States<sup>192</sup>. In principle, Tribal sovereignty means that Tribes are sovereign political entities with authority over territory and members, retaining special legal and political privileges distinct from those of the general public.

According to indigenous studies scholar Les Field, “sovereignty means that federally recognized peoples hold onto a sharply circumscribed but nevertheless always potentially valuable set of properties which include land and resources, as well as collective and individualized claims upon various parts of the US federal bureaucracy”<sup>193</sup>. Tribal sovereignty has been maintained by Courts and States into the 21<sup>st</sup> century and Indian peoples are engaged in struggles to achieve political self-determination, economic viability, ecological restoration and cultural revitalization with what legal, political, economic and natural resources they have available. For these reasons, “being an Indian in the US has become an identity which is closely policed”<sup>194</sup>. While non-Indians have consistently attempted to erode tribal sovereignty and dismantle indigenous peoples’ distinct political and legal status since before the Marshall decisions, indigenous scholars and advocates have also critiqued the adequacy of sovereignty in protecting tribal cultural and political self-determination. The ambiguous role of sovereignty in post-colonial theory and decolonial practice has been much debated in policy, legal and academic circles<sup>195</sup>. Because American Indian tribes’ “domestic dependent” status subjects tribal sovereignty to the overriding sovereignty of the federal government, numerous scholars call for abandoning sovereignty entirely, as it is a European concept, rooted in an “adversarial and coercive notion of power” that depends on continual recognition from colonial states<sup>196</sup>.

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<sup>191</sup> US v Kagama 1886 375m, 381.

<sup>192</sup> Goodman, EJ. “Indian tribal sovereignty and water resources: Watersheds, ecosystems and tribal co-management”, *J. Land Resources & Envntl. L.*, 2000.

<sup>193</sup> Field, Les. *Abalone Tales: Collaborative Explorations of Sovereignty and Identity in Native California*. Duke: 2008, p 8 and 9; Field, Les. “Blood and Traits: Preliminary Observations on the Analysis of Mestizo and Indigenous Identities in Latin vs. North America” *Journal of Latin American Anthropology* 7, 1: 2-33, 2002, p 10.

<sup>194</sup> Pielf 2002 p 10, 2008 p 9. See also TallBear, Kim. “Genomic articulations of indigeneity.” *Social Studies of Science* (2013).

<sup>195</sup> See e.g. Field 2008, Deloria and Wilkins 2005, Williams 2005, Goodman 2000, McCool, Daniel. *Iron Triangles, Federal Water Development, and Indian Water*. University of Arizona Press: 1994; Von der Porten, S., Loë, R. de, 2013. Water governance and Indigenous governance: towards a synthesis. *Indig. Policy J.* 23.

<sup>196</sup> See e.g. Alfred, T., 2001. “From sovereignty to freedom: towards an indigenous political discourse”. *Indigenous Affairs.* 3, 22–34; Wilson, Nicole. “Indigenous water governance: Insights

For example, legal scholar Robert Williams situates the origins of federal Indian law and legal discourse in the West's "will to empire in the new world"<sup>197</sup>. He traces specific language from legal doctrines underpinning American Indian's legal status all the way back to Medieval papal bulls justifying the Crusades and continuing through the Spanish, British and French colonization of North America. For example, the "doctrine of discovery" phrase drawn on by Marshall in the *Johnson v M'Intosh (1823)* case originates in Pope Alexander's first papal bull in which medieval church doctrine was adapted to provide legal and moral legitimation for Spain to carry out its papal mandate to colonize, civilize and Christianize the new world, a world of "unknown distant lands and peoples"<sup>198</sup>. This same doctrine was adapted by Justice Marshall to define Indian sovereignty for the Court.

According to Williams, Federal Indian law rests on a "discourse of conquest", which has served to legitimate and justify the exercise of colonial power<sup>199</sup>. In other work, Williams has shown the persistence throughout the 19<sup>th</sup> and 20<sup>th</sup> century, of the Supreme Court relying on racist language to define American Indian rights<sup>200</sup>. Williams argues that enshrining Indian rights in a "discourse of conquest" is like carrying around a "loaded weapon": "it's that unthinking, unconscious and unreflective state of mind and belief embedded in the American racial imagination that determines and defines what most Americans care to think about Indians and Indian rights". Therefore, according to Williams, the legal language that enshrines American Indian rights works to organize our law and culture around "rehabilitated versions of long-established negative racial stereotypes and imagery" and thus perpetuates racism and power imbalances<sup>201</sup>. These same tensions between colonial legacies and contemporary decolonial praxis play out in

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from the hydrosocial relations of the Koyukon Athabascan village of Ruby, Alaska. *Geoforum* 57 (2014) 1–11; Shaw, K. *Indigeneity and Political Theory: Sovereignty and the Limits of the Political*. Taylor & Francis. 2008.

<sup>197</sup> Williams Jr., Robert. *The American Indian in Western Legal Thought: The Discourses of Conquest*. Oxford: 1990, p 7

<sup>198</sup>See Williams 1990, p 80. The phrase "Doctrine of discovery" dates to a Spanish papal bull, dated May 1493, which stipulated that the Pope could place non-Christian peoples under the guardianship of the first Christian nation discovering their lands as long as those peoples were "well disposed" to embrace the Christian faith. This bull set the path for Spain to carry out its papal mandate to colonize, civilize and Christianize the "well-disposed" inhabitants of the new world. The new twist in the Doctrine of Discovery was in contrast to the medieval doctrine, which only allowed for colonization in the case that discovered peoples were *not* "well-disposed" to adopt Christianity.

<sup>199</sup> To Williams (1990, p. 6, p. xxvi), "law was the most vital and effective instrument of empire during its genocidal conquest and colonization of the western peoples of the new world... the vehicle through which racism/colonialism is perpetuated legally".

<sup>200</sup> Williams Jr, Robert A. "Like a Loaded Weapon: The Rehnquist Court." *Indian Rights, and the Legal History of Racism in America*. University of Minnesota Press: 2005.

<sup>201</sup> Williams 2005, p 15. Williams therefore advocates for decolonizing the language and discourse of US Federal Indian law "Indian rights will never be justly protected by any legal system or any civil society that continues to talk about Indians as if they are uncivilized."

Indian water rights, in which tribes are afforded special legal status, yet through language grounded in the “discourse of conquest” and its assimilationist motives.

*Federal Indian water rights and “discourses of conquest”*

Legal scholar Dana Smith shows how the same “doctrine of discovery” served as an implicit rationale for recognizing tribal water rights and continues to structure law around water rights today. Federally Reserved Indian Water rights originate in a 1908 Supreme Court case, *Winters v United States* (207 US 564) that ironically emerged out of the “Lochner-era” court, known for its harsh views on minority rights<sup>202</sup>. In determining whether or not the rights of upstream diversions of Montana’s Milk River were superior to those tribal members living on Fort Belknap reservation, the court had to decide whether the tribe’s right to use water from the Milk could be implied from the circumstances surrounding their treaty with the US. The court surprisingly ruled in favor of the tribe, holding that the tribe retained rights to water when it ceded its territory to the US government. The logic Justice McKenna relied upon was that the only way to ensure Indians would become a “pastoral and civilized people” was to ensure that they had enough water to irrigate their lands. If Indians were to learn agriculture and the “arts of civilization”, they needed water with which to irrigate their arid lands. Indians, as “nomadic infidels”, “needed to be civilized by their conqueror and, because they lacked the intelligence to demand water rights in treaty negotiations, a water right would be implied for them”<sup>203</sup>. Therefore federally reserved Indian water rights were recognized because they “furthered the goal of changing the habits and wants of a nomadic and uncivilized people”<sup>204</sup>.

The *Winters* case left the question of how much water tribes were entitled to undetermined until 1963. In *California v. Arizona*, the court determined that the quantity reserved to tribes was “enough to satisfy the future as well as the present needs of the Indian reservations”, which computed to enough water “to irrigate all the practicably irrigable acreage on the reservation”<sup>205</sup>. The “Practically Irrigable Acreage” (PIA) standard then became the mechanism through which courts quantified the water tribes are entitled to under federally reserved water rights. Smith argues that the PIA standard incorporates “doctrine of discovery” principles by suggesting that Indians have water rights only to the extent that they use them for agricultural purposes “to further the assimilationist goal of changing nomadic Indian tribes into civilized farmers”. Again, like tribal sovereignty, *Winters*’s rights prove to be a mixed blessing for tribes seeking rights to water.

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<sup>202</sup> Smith, Dana. 2005. Doctrinal Anachronism? Revisiting the Practicably Irrigable Acreage Standard in light of International Law for the Rights of Indigenous Peoples. 22 *Ariz. J. Int'l & Comp. Law* 691, see ft nt 80 p 699.

<sup>203</sup> Smith 2005, ft nt 321 p 723.

<sup>204</sup> *Ibid*, ft nt 315.

<sup>205</sup> *Ibid*, ft nt 130.

Tribes are given priority water rights that date to the day the reservation was created, yet the definition of those rights and how they can be actualized are constrained by colonial histories and their contemporary manifestations. Winters rights have proved important resources for some Tribes in some cases, but only for tribes who have ratified treaties and bona fide reservations. Those Tribes who are unrecognized, who don't have ratified treaties, or who lack a land base don't qualify for Winters rights. They therefore must resort to other means to protect tribal ecological and social values that depend on water. Even for many tribes that have been able to successfully claim Winters rights, "precious little water has actually reached tribes"<sup>206</sup>. For many tribes who would qualify for *Winters* rights, the complexities of Indian water rights lawsuits, which can take decades and cost millions of dollars, have encouraged them to quantify their water rights claims outside of courts through negotiated settlements. In the Klamath, Tribes with ratified treaties and reservations such as the Hoopa, Yurok and Klamath Tribes have been able to successfully argue for water and fishing rights whereas tribes such as the Karuk Tribe, who do not have a reservation or a ratified treaty, have been less successful in court cases related to Winters rights water quantity allocations. The Tribes without ratified treaties and reservations must shop for legal discourses other than federally reserved water rights in which to stake claims to political and cultural self-determination and frame attempts to restore the watersheds and ecosystems of their ancestral territories<sup>207</sup>.

### *Variegated Sovereignty and "Double-Voice"*

Tribes are strategically invoking the colonial discourse while actively attempting to decolonize the letter of the law and uproot its "loaded weapons". For example, in the area of water rights, tribes along the Gila in Arizona have advocated a "homeland standard" to quantify the water rights a Tribe is entitled to based on the current and future needs, geography and culture of a particular tribe<sup>208</sup>. Rosemary Coombe uses the concept of *double-voice* to describe the way indigenous actors use the language of the law "against the grain" to both contest its premises and use it to protect tribal cultural and intellectual property<sup>209</sup>. The letter of the law generates signs and symbols whose meanings are transformed and mobilized by those who wish to "inscribe their own signature" into the legal discourse. As the "official social text", the law provides the signifying forms around which action mobilizes, but it does not preclude alternative forms of textual practice. These negotiations around the signs and symbols that constitute the law reveal its "multi-vocality" - its dynamic, fragmented, and heterogeneous composition. However,

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<sup>206</sup> McCool 1994; Smith p. 691 ft nt 3; McCool, Daniel. *Native Waters: Contemporary Indian Water Settlements and the Second Treaty Era*. University of Arizona Press: 2006.

<sup>207</sup> Biezeveld, Renske. "Discourse Shopping in a Dispute over Land in Rural Indonesia". *Ethnology*, Vol. 43, No. 2 (Spring, 2004), pp. 137-154.

<sup>208</sup> Cosens, Barbara. "The Measure of Indian Water Rights: The Arizona Homeland Standard, Gila River Adjudication". *Natural Resources Journal* 2002, p. 837.

<sup>209</sup> Coombe, Rosemary. *The Cultural Life of Intellectual Property: Authorship, Appropriation, and the Law*. Duke: 1998.



Coombe is careful not to portray these negotiations of meaning as occurring in frictionless hyperspace, but as entangled with material practices and ridden through with power imbalances. In this way, Coombe ties the “poetics of identity to the materialities of power”<sup>210</sup>. This dissertation applies a similar theoretical angle to the ways in which indigenous communities leverage and contest the epistemologies, ontologies and geopolitical spatiality of the watershed as a way of conceptualizing and managing natural resources in their ancestral territory.

Biolsi similarly illustrates the multi-vocality of political space and the insufficiency of the Westphalian model for understanding the peculiar spatiality of Tribal sovereignty in the US. He instead elucidates four distinct kinds of indigenous space “imagined, fought for and, to a remarkable extent, achieved and lived by American Indian people in the US in the present”<sup>211</sup>. One level of indigenous space is associated with legally protected Tribal sovereignty associated with treaty lands, reservations, modern tribal governments and their tribal citizenry. The second level relates to territorially based rights to off-reservation resources, which implies co-management or at least a certain degree of power sharing between Tribes and State or Federal agencies. The third space of sovereignty includes statutory and generic supra-tribal indigenous rights within “an inclusive space that ultimately spans all of the territory of the contiguous us- national indigenous space”, such as the Indian Self-Education and Assistance Act. The final space is what Biolsi terms a “hybrid indigenous space” in which Indian people claim and exercise citizenship simultaneously in their native nations and in the United States. Since 1924, tribes have been considered “citizens” of the US, entitling them to the privileges and rights of all US citizens as well as their specialized rights as members of specific tribes. To describe the complicated spatial dimensions of tribal sovereignty, Biolsi draws on Aihwa Ong’s conception of “graduated sovereignty”, whereby zoning strategies prescribe categories of humans different sets of rights, duties and obligations and differentially articulate them to political economic processes<sup>212</sup>. These complex spatial arrangements result in “variegated citizenship” in which populations are subjected to different kinds of rights, discipline, caring and security<sup>213</sup>.

My research on Klamath watershed democracy focuses in particular on the central importance of both the politics of knowledge and the politics of scale in giving form to the gradations of citizenship and sovereignty in natural resource management. Knowledge politics and scalar politics shape the contours of governance and the boundaries of self-determination in Klamath resource management. Issues related to the epistemology and ontology of nature influence the construction of the scales of natural resource governance, which in turn

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<sup>210</sup> Coombe 1998 p 29.

<sup>211</sup> Biolsi, T. (2005), Imagined geographies: Sovereignty, indigenous space, and American Indian struggle. *American Ethnologist*, 32: 239–259, p 240.

<sup>212</sup> Ong, Aihwa. *Flexible Citizenship: The Cultural Logics of Transnationality*. Duke:1999. 215-216.

<sup>213</sup> Ong 1999, p. 217.

become the arenas through which the communities of the Klamath struggle for political, economic and ecological self-determination.

Tribes in the Klamath claim sovereignty and peruse self-determination and rights to natural and cultural resources in multiple scales, both in multiple political spaces of engagement- e.g. federal, state, regional and local scales, courts, international arenas and media outlets- as well as at multiple ecological or bioregional scales- e.g. watersheds, firesheds, foodsheds, habitats, road networks, forest patches and stands, landscapes and airsheds. Indigenous perspectives on place and polity are for the most part in-line with the post-Westphalian perspective on space in seeing “individuals and collectives as constituted through relations of interdependency”, yet also insist on recognition of their distinct sovereign political and legal status to protect their ability to resist domination and perpetuate their culture. Tribes in the Klamath furthermore argue that their cultural, political and economic self-determination depends on particular ecological and hydrologic conditions in the watersheds and ecosystems of their ancestral territory.

For example, we will see how the Karuk indigenous philosophy sees plants, animals, landforms and humans as linked in “relations of interdependency” through ceremonies and livelihood practices that connect people and place across multiple scales. When Karuk people talk about “taking care of their relations” in stewarding the watersheds and ecosystems of their ancestral territories, they mean simultaneously managing natural and cultural resources, supporting local economies and enabling cultural and political self-determination. However, in order to unravel the long history of colonialism and genocide and regain access to land and resources, Tribes in the Klamath need their sovereignty over knowledge, culture and territory to be recognized as distinct from that of the general public. In areas such as culturally sensitive information and sacred sites, the sovereign right of “non-interference” may even be necessary in order to prevent domination or exploitation by the majority culture.

I will argue in this section and throughout the dissertation that tribal sovereignty over knowledge, culture and place must be clearly delineated and recognized by agencies in order for decolonization in democratic environmental governance to proceed in the Klamath. The watershed, as a unit representing both nature and culture, provides one medium for tribes attempting to assert sovereignty over their members and territories in the Klamath. As discussed in chapter 4, the watershed sometimes acts as a “boundary object” which is able to translate across multiple social worlds and yet retain its essential shape and features to a certain extent<sup>214</sup>. However, whether or not the watershed appropriately represents tribal cultures, biophysical landscapes, values and

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<sup>214</sup> See Star, Susan Leig and James Griesemer. “Institutional Ecology, ‘Translations’ and Boundary Objects: Amateurs and Professionals in Berkeley’s Museum of Vertebrate Zoology, 1907-39”. *Social Studies of Science*, Vol 19, Issue 3, Aug 1989, 387-420; Bowker, G., & Star, S. L. (1999). *Sorting Things Out: Classification and Its Consequences*. Cambridge, MA: MIT Press.

knowledges is also called into question in collaborative watershed management forums. Therefore, I show how attention to the cultural politics of scale is important to see that ways scalar formations mediate the delicate balance between the sovereignty and territory of the public, the property and rights of individuals and the political, cultural and ecological self-determination of indigenous peoples.

The next section lays out debates related to the politics of traditional ecological knowledge as a component of indigenous peoples' self-determination and tribal sovereignty. It is crucial to consider how indigenous knowledge is defined and positioned in relation to dominant forms of knowledge production because it has consequences for who can speak with authority and whose knowledge of nature counts in natural resources management<sup>215</sup>. Representations of nature embed power dynamics that authorize certain ways of seeing the world and living in it while delegitimizing others. On one hand, I am interested in the constitutive role that knowledge of nature plays in delineating and defining tribal sovereignty. On the other, I am interested in how respecting knowledge sovereignty as a component of tribal self-determination can open up the range of approaches to post-normal knowledge generation in ecological democracy. I argue that new norms, concepts and practices of democracy emerge from this clash of epistemologies and ontologies of nature and debates over the proper scale for democratic environmental governance.

### *Indigenous ecological knowledge*

Though university researchers have long been fascinated with indigenous knowledge as an "object" of academic inquiry, it wasn't until the 1970s that academic researchers began seeing indigenous people as potential collaborators in research or their knowledges as valuable contributions to "scientific" representations of the world. According to legal scholar Rebecca Tsosie, "of all the groups that may have been disadvantaged within American society as a historical matter, indigenous peoples are the group that continues to be treated as 'objects' of scientific inquiry, rather than co-creators in the categories of knowledge that inform scientific inquiry"<sup>216</sup>.

From the turn of the 20<sup>th</sup> century until the late 1960s, researchers working in fields such as anthropology, cultural ecology, ethnobotany, ethnozoology, and folk biology aimed to "preserve" what they saw as rapidly and inevitably disappearing pockets of local knowledge<sup>217</sup>. While these endeavors were in many ways underwritten by racist, static and romanticized notion of primitive people

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<sup>215</sup> Weir, Jess. *Murray River country: an ecological dialogue with traditional owners*. Aboriginal Studies Press, Canberra: 2009, p 14.

<sup>216</sup> Tsosie, Rebecca. "Indigenous Peoples and Epistemic Injustice: Science, Ethics and Human Rights." *University of Washington Law Review*, 2012, p 15.

<sup>217</sup> See e.g. Kroeber, Alfred Louis. *Handbook of the Indians of California*. Vol. 78. Courier Corporation, 1925; ; Schenck, Sara M. and Edward Winslow Gifford. *Karok Ethnobotany*. University of California Anthropological Records: 1952.

living close to nature and without history, they afforded a certain amount of respect and recognition to subaltern knowledges. This research aimed to record and analyze indigenous methods of folk classification of plants and animals, identify lexical sets and semantic components in local languages, document cosmologies and record kinship patterns<sup>218</sup>. In fields such as folk biology, ethnobotany and ethnozoology, researchers looked into indigenous land-use patterns, property regimes, systems of soil identification, irrigation and meteorological knowledge<sup>219</sup>. The fields of ethnoecology, environmental anthropology and cultural ecology looked specifically at cultural complexes or wholes, composed of cosmologies, repertoires of knowledge and patterns of practices, that related indigenous groups to their environments<sup>220</sup>. Despite the attention paid to indigenous knowledge, nearly all of this research positions this knowledge as itself an object of knowledge, with little epistemic value outside of its own localized terms and which is better studied objectively and apolitically, from a distance.

This paradigm began to shift in the late 1970s as the relevance and importance of indigenous knowledge for conservation, adaptive management and sustainable development became apparent<sup>221</sup>. Momentum from the participatory research movement, the indigenous rights movement and the “local” turn in resource management led to a radical shift in rural development and conservation practice that began to treat indigenous technical and ecological knowledge as important resources in movements for social justice and ecological sustainability<sup>222</sup>. Another factor in the paradigm shift of the late 1970s was the success of the American Indian Movement and Indian civil rights legal and political campaigns in passing congressional legislation and instigating an official federal policy of “self-determination” and “government-to-government” relations with

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<sup>218</sup> Zent, Standford. “A Genealogy of Scientific Representations of Indigenous Knowledge” in *Landscape, Process and Power: Re-evaluating Traditional Ecological Knowledge*. Berghahan: 2012.

<sup>219</sup> See Zent 2012; Brockaway, Lucile H. Science and Colonial Expansion: the role of the British Royal Botanic Gardens. *American Ethnologist*. 1979; Conklin, H.C. 1954. “An Ethnoecological Approach to Shifting Agriculture”. *Transactions of the New York Academy of Sciences* vol. 17, no. 2; Conklin, H.C. 1961. “The Study of Shifting Cultivation”. *Current Anthropology* vol. 2, no. 1:27-61; Bulmer, R.N.H. 1974. “Karam Classification of Frogs”. *Journal of the Polynesian Society* vol. 77:333-385; for Karuk ethnographies see Kroeber 1925, Gifford 1944, Schenck and Gifford 1952.

<sup>220</sup> e.g. Toledo, V.M. 1992. “What is Ethnoecology? Origins, Scope and Implications of a Rising Discipline”. *Ethnoecologica* vol. 1, no.1:5-21; Berkes, F. and M. MacKenzie 1978. “Cree fish names from eastern James Bay, Quebec”. *Arctic* 31: 489-495.

<sup>221</sup> Zent 2012, p. 33; e.g. Brokensha, Warren and Werner (eds) 1980. *Indigenous Knowledge Systems and Development*. University Press of America: 1980; Sillitoe, Paul. 1998. “The Development of Indigenous Knowledge”. *Current Anthropology* vol. 39, no.2: 223-252; Thrupp, L.A. 1989. “Legitimizing Local Knowledge: From Displacement to Empowerment for Third World People”. *Agriculture and Human Values* vol. 6, no.3: 13-24.; Berkes, F. 1987. “Common property resource management and Cree Indian fisheries in subarctic Canada”. In: *The Question of the Commons*, B.J. McCay and J.M. Acheson (eds.), Univ. of Arizona Press, Tucson, pp. 66-91; Berkes, F. 1990. Native subsistence fisheries: A synthesis of harvest studies in Canada. *Arctic* 43: 35-42.

<sup>222</sup> See e.g. Richards, Paul *Indigenous Agricultural Revolution: Ecology and Food Production in West Africa*. Westview: 1985.

Federal and State agencies<sup>223</sup>. After a century and a half of extermination, removal, termination and assimilation as official federal Indian policies, seeing Indian nations again as equals, at least in principle, entailed taking their knowledges and practices seriously as well.

Indigenous knowledge gained popularity in the literature on bioregionalism, adaptive management and social-ecological resilience<sup>224</sup>. Indigenous societies seemed to line-up with ideals of community-based, participatory and decentralized approaches to resource governance, linking up with critiques of technocratic and economistic approaches to development and technology transfer. Indigenous practices are valued for their ecologically and culturally-situated approach to management that supports diverse habitats, flora and fauna<sup>225</sup>. In the face of climate change there has been a heightened awareness of the value of indigenous “traditional ecological knowledge” (TEK) by Western science practitioners, academic institutions and Federal and State land management agencies<sup>226</sup>. Over the last 20 years, and especially over the last decade, the many benefits of traditional ecological knowledge and management have begun to be recognized by Western scientists and ecosystem managers<sup>227</sup>.

As the popularity of indigenous/traditional ecological knowledge began to grow in policy and academic circles in the 1990s, it ignited fierce debates about its viability or credibility as a form of knowledge production. Attempts of both proponents as well as critics of indigenous knowledge sought to define and defend their knowledge systems against one another. Here I lay out a few strands of this

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<sup>223</sup> e.g. Indian Civil Rights Act of 1968, The Indian Self-Determination and Education Assistance Act of 1975, Indian Child Welfare Act of 1978, American Indian Religious Freedom Act of 1978, The Native American Graves Protection and Repatriation Act of 1990; The National Indian Forest Resource Management Act of 1990.

<sup>224</sup> E.g. Toledo 1992; Schultes, R.E. 1994. “The Importance of Ethnobotany in Environmental Conservation”. *American Journal of Economics and Sociology*; Berkes, F. and D. Jolly 2001. “Adapting to climate change: Social-ecological resilience in a Canadian western Arctic community”. *Conservation Ecology* 5 (2): 18.; Berkes, F. and C. Folke 2002. “Back to the future: Ecosystem dynamics and local knowledge”. In: *Panarchy: Understanding Transformations in Human and Natural Systems*. L.H. Gunderson and C.S. Holling. (eds.) Island Press, Washington, DC, pp. 121-146;

<sup>225</sup> see e.g. Berkes et al 2000, Noorgard, Kari. *Karuk Traditional Ecological Knowledge and the Need for Knowledge Sovereignty: Social, Cultural and Economic Impacts of Denied Access to Traditional Management*. Karuk Tribe: 2014.

<sup>226</sup> see e.g. Noorgard 2014, Vinyeta, Kirsten and Kathy Lynn. 2013. Exploring the Role of Traditional Ecological Knowledge in Climate Change Initiatives. Gen. Tech. Rep. PNW-GTR-879. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 37 p.

<sup>227</sup> West, Paige. Translation, Value, and Space: Theorizing an Ethnographic and Engaged Environmental Anthropology. *American Anthropologist*. 2005; Afiff, Suraya and Celia Lowe. Claiming Indigenous Community: Political Discourse and Natural Resource Rights in Indonesia. *Alternatives* 32 (2007); Barbour, Wayne and Christine Schlesinger. Who’s the boss? Post-colonialism, ecological research and conservation management on Australian Indigenous lands. *Ecological Management and Restoration* 2012; Lowe, Celia. Wild profusion: Biodiversity conservation in an Indonesian archipelago. Princeton University Press, 2006.

debate as background to my own experiments in democratizing science and attempting to bring diverse forms of scientific and indigenous knowledge together.

I'll start by emphasizing the sheer multiplicity of knowledge practices that fall under both assumed categories of "Western Science" on one hand and "Indigenous Knowledge" on the other. It is important to acknowledge upfront that "that there are no simple or universal criteria that can be deployed to separate indigenous knowledge from western or scientific knowledge"<sup>228</sup>. These binary oppositions often oversimplify epistemic heterogeneity and blur "the actual fluidity and permeability of knowledge and cultural boundaries"<sup>229</sup>. At the same time, it is important to examine the "boundary work" that actors employ to strategically erect boundaries around what they see as distinct ways of knowing the world<sup>230</sup>. As Agrawal puts it, "the critical difference between indigenous and scientific knowledge is not at an epistemological level: rather it lies in their relationship to power"<sup>231</sup>. Different communities draw boundaries around ways of knowing for different reasons. The way boundaries around knowledge communities are drawn determine who can or cannot speak authoritatively about nature. It is important to see how boundaries between knowledge systems are constructed and set to work by actors attempting to gain legitimacy for their distinct ways of knowing the world. I argue along with theorists of postcolonial technoscience that both recognizing difference among epistemic cultures and building bridges between them is important for democratic knowledge-making and environmental governance<sup>232</sup>. Equally important is avoiding hierarchizing among different cultures of knowledge-making, assimilating one within another or holding one as the standard with which to evaluate the other.

When the popularity of traditional ecological knowledge began to grow in the 1990s, scientists demanded greater clarity and definition regarding the epistemological, methodological and utilitarian status of indigenous knowledge as

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<sup>228</sup> Whitt, Laurelyn. *Science, colonialism, and indigenous peoples: The cultural politics of law and knowledge*. Cambridge University Press, 2009, ft nt 11 and 12; Stephen B. Brush and Doreen Stabinsky (eds.), *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights* Island Press: 1996, pg. 6.

<sup>229</sup> Whitt 2009, ft nt 12.

<sup>230</sup> Gieryn, Thomas F. 1983. "Boundary-work and the demarcation of science from non-science: Strains and interests in professional ideologies of scientists". *American sociological review* (1983): 781-795. Boundary-work refers to the ways in which certain characteristics are attributed to the institution of science for purposes of constructing social boundary that distinguishes some intellectual activities as "science" and others as "non-science."

<sup>231</sup> Agrawal, Arun. "Dismantling the Divide Between Indigenous and Scientific Knowledge". *Development and Change*. 1995. He continues: "Who has access to resource and can deploy them in order to disadvantage others? The criterion of power will triumph when local, traditional or practical knowledge is contrasted with global modern, or theoretical knowledge".

<sup>232</sup> See e.g. Watson-Verran, H., & Turnbull, D. (1995). "Science and other indigenous knowledge systems". In S. Jasanoff, G. Markle, J. Petersen, & T. Pinch (Eds.), *Handbook of science and technology studies*, revised edition. (pp. 115-140). Thousand Oaks, CA: SAGE Publications; Verran, Helen. "A postcolonial moment in science studies alternative firing regimes of environmental scientists and aboriginal landowners." *Social Studies of Science* 32.5-6 (2002): 729-762.

judged from a western scientific perspective<sup>233</sup>. The International Council of Scientific Unions (ICSU) for example contended that “Indigenous, traditional, local or place-based knowledge was not capable of rational evaluation, unification and assemblage” and, “most damningly, they claimed that it cannot be moved from its site of production”<sup>234</sup>. Indigenous knowledge, according to this account, cannot be rendered commensurable with other knowledge systems because it is “different in kind from the rational, objective, universal, tested and evaluated knowledge that the institution of science produces”<sup>235</sup>. Around the same time, critiques from indigenous communities and social scientists over the appropriation of TEK in bioprospecting brought up questions around who represents indigenous knowledge and practice in biomedical research and who benefits as a result of sharing and applying indigenous ethnobotanical and medicinal knowledge<sup>236</sup>.

Simultaneously, the “ecological” value of indigenous knowledge came into question on many sides. Some scholars pointed out that, historically images of indigenous peoples in America have been organized around ideas of primitivism, savagery and closeness to nature<sup>237</sup>. The concept and imagery of the “noble savage” living in harmony with the forest goes back to European political theorists such as Montaigne, Rousseau, Locke and Tocqueville. The *terra nullis* argument, equating indigenous peoples of the new world with nature and denying them history and politics, was used as the justification for conquest of Indian lands and domination of Indian people. Other scholars argued that all populations and cultures are to varying degrees “ecological” in that they display recurring, structured and interdependent relations with the natural world. These scholars set out to prove definitively whether indigenous knowledge was truly scientific according to

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<sup>233</sup> e.g. Nature 1999. US Keeps a Watchful Eye from the Sidelines. Nature, World Conference on Science News. June 1999, vol 401: 623, 631, p 49

<sup>234</sup> Turnbull, David. Maps Narratives and Trails: Performativity, Hodology and Distributed Knowledges in Complex Adaptive Systems – an Approach to Emergent Mapping. *Geographical Research*, June 2007. 45(2):140–149 2007, p 141; ICSU., 1999: Resolutions of the 26th General Assembly.

<sup>235</sup> Turnbull 2007, p 140-141, ICSU, 1999; Bowker, 2005a, p. 219.

<sup>236</sup> Shiva, V. 1996. Biopiracy: The Plunder of Nature and Knowledge. South End Press; Cunningham, A.B. 1991. Indigenous Knowledge and Biodiversity: Global Commons or Regional Heritage? *Cultural Survival Quarterly* vol. 15, no. 3:4-8; Brush, S. 1993. “Indigenous Knowledge of Biological Resources and Intellectual Property Rights: The Role of Anthropology. *American Anthropologist* vol 95:653-686; Kloppenburg, Jack. 1991. No Hunting! Biodiversity, Indigenous Rights and Scientific Poaching. *Cultural Survival Quarterly* vol 15, no. 3-14-18. Greene, Shane. Indigenous People Incorporated? *Current Anthropology*. Volume 45, Number 2, April 2004; Laveaga, Gabriela Soto. 2005. Uncommon trajectories: steroid hormones, Mexican peasants and the search for a wild yam. *Stud. Hist. Phil. Biol. And Biomed. Sci.* 36 (2005) 743-760; Hayden, Cori. *When nature goes public: The making and unmaking of bioprospecting in Mexico*. Princeton University Press, 2003.

<sup>237</sup> See e.g. Diamond, Jared. 1987. The Environmentalist Myth. *Nature* vol. 324:19-20. Redford, K.H. The Ecologically Noble Savage. *Cultural Survival Quarterly* vol 15, no. 1:46-48; Redford and Stearman 1993. Forest-Dwelling native Amazonians and the Conservation of Biodiversity: Interests in Common or in Collision? *Conservation Biology* vol 7, no 2: 248-255.; Whelan, R. 1999. *Wild in the Woods: The Myth of the Noble Eco-Savage*. IEA Studies on the Environment. 1999; Shepard Krech III. *The Ecological Indian: Myth and History*. New York and London: W.W. Norton, 1999.

methods and evidential standards of contemporary experimental science<sup>238</sup>. Most notoriously, anthropologist Sheppard Krech set out to prove “scientifically” that Native Americans have acted in ways directly violating this stereotype of “ecological primitivism”<sup>239</sup>. In the face of evidence such as “aboriginal overkill” or the use of modern weapons to hunt ceremonially, Krech argued that we should toss the stereotype of the ecological Indian “in the waste bin of colonial invention” because it “distorts pure native culture”<sup>240</sup>. In his opinion, indigenous peoples take on the “ecological indian” stereotype in order to further political goals. Krech’s critique ignited a fiery debate in the indigenous studies literature, with numerous scholars, activists and tribal representatives responding to and rejecting Krech’s claims on numerous fronts<sup>241</sup>.

As Darren Ranco (2007 p32) argues, such approaches to “scientifically” evaluating indigenous peoples environmental knowledge fail to understand the context of “ecocide”- the process of colonization and resource extraction- which left many Indian environments in disarray and against which Indians represent and perform their ecological knowledge, culture and management practices<sup>242</sup>. In the age of ecocide, “ecological self-representation is one of the few avenues for justice” for many indigenous peoples. It is critical social scientists such as Krech in this case who are perpetuating conceptual violence with stereotypes that ignore the empirical realities of how indigenous peoples represent nature and carve out many ways of living in it. Additionally, Krech assumes a “unified, ahistorical cultural identities and erases the logical and ontological continuities involved in current identity practices by colonized peoples”<sup>243</sup>. Indigenous peoples work across multiple forms of difference and cultural traditions, “taking on cultural forms such

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<sup>238</sup> e.g. Nadasdy, Paul. “We Don’t Harvest Animals; We Kill Them: Agricultural Metaphors and the Politics of Wildlife Management in the Yukon” in Goldman, Mara (ed) *Knowing Nature: Conversations at the Intersection between Political Ecology and Science Studies*. University of Chicago Press: 2011, pgs. 135-151; Nadasdy, Paul. 2003. *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal-State Relations in the Southwest Yukon*. Vancouver: University of British Columbia Press; Bovechop, Janine. “Contemporary Makah Whaling: A Northwest Coast tribe works toward reviving a core cultural tradition.” *Columbia: The Magazine of Northwest History*. 2010: 6-13; “Skull Valley Goshutes and the Politics of Nuclear Waste: Environment, Economic Development, and Tribal Sovereignty,” in *Native Americans and the Environment: Perspectives on the Ecological Indian*, edited by Michael E. Harkin and David Rich Lewis. University of Nebraska Press: 2007, pgs. 304-342.

<sup>239</sup> Krech 1999.

<sup>240</sup> Ibid. See Krech III, Shephard. 2007. “Beyond the Ecological Indian” in *Native Americans and the Environment: Perspectives on the Ecological Indian*, edited by Michael E. Harkin and David Rich Lewis. University of Nebraska Press: 2007, pgs 3-32.

<sup>241</sup> See e.g. Tallbear, Kim. “Shepard Krech’s The Ecological Indian: One Indian’s Perspective”. *The Ecological Indian Review*. IIIRM publications, September, 2000;

<sup>242</sup> Ranco, Darren J. “The Ecological Indian and the Politics of Representation: Critiquing the Ecological Indian in the Age of Ecocide” in *Native Americans and the Environment: Perspectives on the Ecological Indian*, edited by Michael E. Harkin and David Rich Lewis. University of Nebraska Press: 2007.

<sup>243</sup> Ranco 2007, p. 35-36.



as the 'ecological indian' as a way to combat colonizers hegemonic impositions"<sup>244</sup>. The practice of sharing out knowledge and representing ecological sensibilities must be understood as attempts to control their relationships with the dominant society, "including control of the technical and political means that up to now have been used to victimize them"<sup>245</sup>.

As Wier remarks, "when indigenous people undertake work that is supportive of ecological life, it is categorized as culture and thus separate from economy"<sup>246</sup>. Drawing on the "ecological Indian" is therefore a double-edged sword. If indigenous people appeal to conservation arguments to gain leverage in order to obtain rights or access to natural resources, they have to remain free of commercial aspirations and are subjected to standards of sustainability or ecological resilience set by outsiders<sup>247</sup>. Assumptions about appropriate cultural and political forms in which the dominant society recognizes indigeneity are inscribed into laws and policies that have everyday significance for how indigenous people are able to advance repatriation of traditional territories, restitution of tribal jurisdiction and co-management of resources. In the age of "ecocide", therefore, debates about appropriate relationships between indigenous ecological knowledge and other forms of knowledge in democratic environmental governance are incredibly important for issues of tribal self-determination and eco-cultural revitalization.

### *Science, colonialism and universality*

As Ranco says, "Objectivity is defined by a certain kind of distance that is not equally available to all of us involved in the Indian game"<sup>248</sup>. As many scholars of colonial and postcolonial technoscience have shown, the existence and value of indigenous knowledge systems have been systematically denied in the process of colonization<sup>249</sup>. This systematic denial of subaltern, indigenous, traditional or "other" knowledges has been central to the colonial project. As Whitt (2009) portrays it, the "imperialist pretension to universality made on behalf of the western knowledge system" resulted in the "total inability of its adherents to regard competing systems with anything but contempt"<sup>250</sup>. Juanita Sundberg (2014) has commented that "silence about location...enacts Eurocentric theory as

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<sup>244</sup> *Ibid*, pg 35, see also Deloria, Vine. *Red Earth, White Lies: Native Americans and the myth of scientific fact*. Fulcrum Publishing: 1995.

<sup>245</sup> Ranco 2007, p 36, see also Sahlins, Marshall. "Goodby to tristes tropes: Ethnography in the context of modern world history." *The Journal of Modern History* (1993): 1-25.

<sup>246</sup> Weir 2009, p 24-25.

<sup>247</sup> *Ibid*, p. 24.

<sup>248</sup> Ranco 2007, p..48.

<sup>249</sup> Deloria 1995; Whitt 2009; Wråkberg, Urban, and Karin Granqvist. "Decolonizing technoscience in northern Scandinavia: the role of scholarship in Sámi emancipation and the indigenization of Western science." *Journal of Historical Geography* 44 (2014): 81-92.

<sup>250</sup> Whitt 2009.

universal, the only body of knowledge that matters”<sup>251</sup>. As Sami scholar Kuokkanen (2007) has put it, the ‘western will to know implies an enclosure, a hegemonic monologue, and the colonial logic of domination’<sup>252</sup>. Anna Tsing (2005) demonstrates how universalisms are defined, maintained and deployed in ways that are never politically neutral, but rather always embed particular power geometries and cultural formations. Universalisms in her account are deeply implicated in the establishment of European colonial power: “in the context of colonial expansion, universalism was the framework for a faith in the traveling power of reason: only reason could gather up the knowledge and custom distributed around world to achieve progress, science, and good government”. Universal reason was an exclusive possession of the colonizers, whereas the colonized were characterized by their particularistic cultures and knowledges that “could not grow”<sup>253</sup>. Indigenous knowledge systems are reduced to myths, beliefs based on ignorance and superstition, “the very antithesis of knowledge” in colonial regimes<sup>254</sup>.

Whitt (2009, p. 32) argues for seeing indigenous knowledge as set in opposition not to “Scientific”, “Euroamerican” or even “Western/Northern” knowledge, but rather to the “*Dominant knowledge system*” to accurately reflect a historical and political rather than an epistemological boundary. The dominant knowledge system depends critically on an “anti-pluralism”, or a “lack of receptiveness to alternative epistemologies (and) other ways of knowing the world”<sup>255</sup>. Alternative epistemologies are systematically shut down by Dominant epistemologies. Dominant science aspires to be the only way of knowing, not one form of possible knowledge, but the exclusive form of credible knowledge of nature<sup>256</sup>. However, Anna Tsing reminds us that universals can never totally fulfill claims to universality, but require constant maintenance, “even in transcending localities, they don’t take over the world”. It is important to see how “universals are effective within particular historical conjunctures that give them content and force”. Tsing’s concept of “engaged universals” show how universals are built to travel across difference and hold their shape, but are charged and changed by their travels- “through friction, universals become practically effective”. She reminds us to see that “all universals are engaged when considered as practical projects accomplished in a heterogeneous world”<sup>257</sup>. Through this dissertation, I aim to

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<sup>251</sup> Sundberg, Juanita. 2014. "Decolonizing posthumanist geographies." *Cultural geographies* 21.1 (2014): 33-47.

<sup>252</sup> Kuokkanen, Rauna Johanna. *Reshaping the university: Responsibility, Indigenous epistemes, and the logic of the gift*. Vancouver: UBC Press: 2007.

<sup>253</sup> Tsing, Anna Lowenhaupt. *Friction: An ethnography of global connection*. Princeton University Press: 2005, p 8 and 9.

<sup>254</sup> Whitt 2009, p 5.

<sup>255</sup> Whitt 2009, p. 32.

<sup>256</sup> As Howitt (2006) exclaims “indeed it is in claims to universalism per se that we see the roots of injustice”, p. 324. Howitt, Richard, and Sandra Suchet-Pearson. "Rethinking the building blocks: ontological pluralism and the idea of ‘management’." *Geografiska Annaler: Series B, Human Geography* 88.3 (2006): 323-335.

<sup>257</sup> Tsing 2005, p 8.

uproot and challenge the uncritically assumed and taken-for-granted universalisms in both Dominant knowledge systems and regimes of democratic environmental governance.

### *Building Decolonial Universals*

On the long drives between UC Berkeley and the Klamath, I often thought about Elenor Ostrom's depiction of research as a process "moving back and forth from the world of theory to the world of action"<sup>258</sup>. On the way up, I would load up my car with books, articles, highlighted and underlined court-cases and regulatory documents and not look at them once while on the River. Coming home, my head would be full of conversations, quotes and vivid experiences of the people and the places, the details of which would soon wash out as soon as I was re-immersed in the academic literature. In Ostrom's view, "theoretical inquiry involves a search for regularities" that entails "abstraction from the complexity of a field setting"<sup>259</sup> such that the "power of theory is proportional to the number of situations it can explain". Though research in this mode moves back and forth between theory and the field, the traffic in knowledge always flows in the same direction: "raw data" flows from the field to the university, where data accumulates and "theory" is distilled and disseminated back to the field in the form of abstractions that apply universally<sup>260</sup>.

In contrast, feminist and post-colonial scholars have written about objectivity and universality as particular achievements or accomplishments that result from the multi-directional traffic between the particular social and ecological circumstances of knowledge production, the regional and global circulations of knowledge and the vast webs of humans and more-than-humans required to stabilize knowledge into facts that apply "universally"<sup>261</sup>. As David Turnbull has

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<sup>258</sup> Ostrom 1990, p. 45: "Understanding how individuals solve particular problems in field settings requires a strategy of moving back and forth from the world of theory to the world of action. Without theory, one can never understand the general underlying mechanisms that operate in many guises in different situations. If not harnessed to solving empirical puzzles, theoretical work can spin off under its own moment, reflecting little of the empirical world."

<sup>259</sup> "Theoretical inquiry involves a search for regularities. It involves abstraction from the complexity of a field setting, followed by the positing of theoretical variables that underlie observed complexities" (Ostrom 1990, p. 24; see also pp. 45-46).

<sup>260</sup> This seems to work against "Ostrom's law", which holds that "a resource arrangement that works in practice can work in theory." See e.g. Fennell, Lee Anne. "Ostrom's law: property rights in the commons." *International Journal of the Commons* 5.1 (2011): 9-27.

<sup>261</sup> See e.g. Harding, Sandra. *Sciences from below: Feminisms, postcolonialities, and modernities*. Duke University Press: 2008; Anderson, Warwick. "Introduction: postcolonial technoscience." *Social Studies of Science* (2002): 643-658; Anderson, Warwick. "From subjugated knowledge to conjugated subjects: science and globalisation, or postcolonial studies of science?." *Postcolonial Studies* 12.4 (2009): 389-400; McNeil, Maureen. "Introduction: postcolonial technoscience." *Science as Culture* 14.2 (2005): 105-112; Seth, Suman. "Putting knowledge in its place: science, colonialism, and the postcolonial." *Postcolonial studies* 12.4 (2009): 373-388; Watson, Annette, and Orville H. Huntington. "They're here—I can feel them: the epistemic spaces of Indigenous and Western Knowledges." *Social & Cultural Geography* 9.3 (2008): 257-281.

shown, all science is “local knowledge”, in that all knowledge traditions, “in assembling the heterogeneous components of people, practices and places, create knowledge spaces”<sup>262</sup>. By showing the diversity of pathways between the local circumstances of knowledge generation and their assemblage into mobile, generalizable knowledge spaces, Turnbull celebrates the creation knowledge as a process of “putting on the motley”. Turnbull has suggested that all knowledge systems can be regarded as “localized, situated ways of making coherent systems of meaning from an array of heterogeneous, disorganized, and fragmented elements”<sup>263</sup>. The differences that can be observed across knowledge systems arise from their power geometries, modes of social and political organization, and the particular ways in which they seek to organize coherent systems<sup>264</sup>.

Other feminist and post-colonial scholars of science and society have proposed alternative methods of achieving “objective” knowledge about the world. Berkeley cultural studies scholar Ramón Grosfoguel has opposed the abstract universals of Eurocentric epistemologies, which always subsume the particular within the general, with a “decolonial universal” that is built by “respecting the local particularities in the struggles against patriarchy, capitalism, coloniality and eurocentered modernity”. Feminist scholars of science Sandra Harding and Donna Haraway have both attempted to articulate notions of objectivity opposed to the idea that universality requires value-neutrality or that abandoning dominant conceptions of objectivity necessarily entails embracing “cultural relativism”, where all view-points are considered equal. For Harding, “strong objectivity” actually requires a more “scientific” account of the reciprocal relationships between the subjects and objects of knowledge<sup>265</sup>. For Haraway, “situated knowledges” requires coming to grips with the partiality of all perspectives and finding ways of bringing them together to build fuller and richer accounts of the world<sup>266</sup>. This notion of partial perspectives is in direct contrast to standard conceptions of objectivity as a social, epistemological, and ethical technique of distancing, where an objective view aspires to knowledge that bears no trace of the knower<sup>267</sup>.

I am particularly drawn to Helen Watson-Verran ‘s depiction of postcolonial knowledge production as a process of coming to terms with many ways of

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<sup>262</sup> Turnbull, David. *Masons, tricksters and cartographers: Comparative studies in the sociology of scientific and indigenous knowledge*. Taylor & Francis, 2000, p. 226

<sup>263</sup> Davis, Michael. 2006. "Bridging the Gap or Crossing a Bridge?." *Bridging scales and knowledge systems: Concepts and applications in ecosystem assessment*. 2006: 143-163, p 146.

<sup>264</sup> Turnbull 2000; also see Agrawal 1999.

<sup>265</sup> Harding, Sandra. Strong objectivity and socially situated knowledge in Harding, Sandra G. *Whose science? Whose knowledge?: Thinking from women's lives*. Cornell University Press, 1991; Harding, Sandra. 1992. "After the Neutrality Ideal: Science, Politics, and" Strong Objectivity"." *Social Research* (1992): 567-587.

<sup>266</sup> Haraway, Donna. "Situated knowledges: The science question in feminism and the privilege of partial perspective." *Feminist studies* (1988): 575-599.

<sup>267</sup> Daston, L., and P. Galison. *Objectivity*. Zone: 2007.

worlding<sup>268</sup>. In looking at similarities and differences between alternative forms of generalizing, postcolonial technoscience is “not about retrieving a lost purity by overthrowing and uprooting an alien knowledge tradition”, but about increasing possibilities for cooperation while respecting difference<sup>269</sup>. Verran develops a concept of “modest symmetry” or a “*local, particular and contingent symmetry*” between different knowledge systems while at the same time allowing for metaphysical differences and epistemic disjunctures to stand and be respected<sup>270</sup>. Rather than dissolve difference, positing a “modest symmetry” will actually strengthen important distinctions between epistemologies<sup>271</sup>.

All knowledge communities need ways of generalizing, embedding witnesses, building collective memory and projecting imaginary futures. However, as I will demonstrate in the next section and throughout the dissertation, it is also important to carve out space for difference and zones of “non-interference” or knowledge sovereignty over cultural and traditional knowledge. Coming to terms with the ways different knowledge traditions embody alternative forms of generalizing can promote a transformative moment in knowledge traditions. However, according to Holmes and Jampijinpa (2013) integrating Indigenous Ecological Knowledge and experimental science remains “one of the most difficult epistemological challenges for practitioners working cross-culturally in Natural Resource Management”<sup>272</sup>. Different ways of generalizing embed different cultural politics. The tensions and affinities that emerge from bringing different knowledge systems together must be explicitly and democratically addressed in order for postcolonial environmental governance to proceed.

Given the intensity and sensitivity of these debates and the high stakes involved in debates around indigenous ecological knowledge in general and in Klamath environmental politics in particular, my research on knowledge practices in collaborative watershed governance in the Klamath treads sensitive ground. The debates around authority and credibility in indigenous and scientific knowledge within this context makes the process of doing research a contentious and potentially divisive endeavor. I was fortunate enough to have been welcomed into a community of scientists, tribal representatives, cultural practitioners and students who helped steer my research questions and approaches through these contested waters. This dissertation is one product of an experiment in democratizing science undertaken with my very supportive and patient dissertation committee as well as

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<sup>268</sup> Verran, Helen. "A postcolonial moment in science studies alternative firing regimes of environmental scientists and aboriginal landowners." *Social Studies of Science* 32.5-6 (2002): 729-762.

<sup>269</sup> *Ibid* p 731.

<sup>270</sup> *Ibid*, p 748.

<sup>271</sup> In Verran's account, the “torque of the postcolonial moment began in acceptance of incommensurable difference” (p 750).

<sup>272</sup> Holmes and Jampijinpa. 2013. Law for country: the structure of Warlpiri ecological knowledge and its application to natural resource management and ecosystem stewardship." *Ecology and Society* 18.3: 19, p. 10.

a motley community of scientists, tribal representatives, professors and colleagues committed to building a shared knowledge culture that respected each of our situated approaches to making knowledge.

### *Participatory research with the Karuk Department of Natural Resources*

In Spring 2009, in my first year back in Graduate School, I was introduced to Ron Reed, the cultural biologist for the Karuk Tribe. I met Ron and his wife, Robyn with my colleague Sibyl Diver early one morning at Yali's Café in Berkeley. Ron laid out for us the long history of colonialism, eco-cultural genocide and the recent eco-cultural revitalization movement in the Klamath. He showed us film and historical photos of himself and his family dip-net fishing at the Karuk fishery at Ishi Pishi falls. He also laid out a vision he was developing with UC Berkeley faculty Jennifer Sowerwine and Thomas Carlson to develop a partnership between UC Berkeley student researchers and the Karuk Dept. of Natural Resources for conducting research related to Karuk eco-cultural revitalization. Ron kindly invited me, Dr. Diver and IB graduate student Arielle Halpern up to Karuk country that summer (2009) to meet other community partners and see the Klamath. After that first visit, I found myself immediately drawn into community research projects related to land and resource management planning, watershed restoration, community-based mapping and eventually fire ecology and food sovereignty projects.

The Karuk-UC Berkeley Research Collaborative (KBC) came to life through the efforts of Karuk scientists Ron Reed and Bill Tripp, United States Forest Service fire ecologist Frank Lake, UC Berkeley professors Tom Carlson and Jennifer Sowerwine, and Berkeley graduate students Sibyl Diver, Arielle Halpern, Carolyn Smith, myself and many others. The KBC has since become a laboratory for developing knowledge-sharing processes that bridge the various epistemic communities we bring together. In the remainder of this section, I reflect on how my experiences conducting participatory research through the Karuk-Berkeley collaborative significantly shaped my understanding of the relationships between ethics, epistemology and ontology in Klamath watershed governance.

The Karuk-Berkeley collaborative is a motley consortium of Berkeley students and faculty, our colleagues at the Karuk Department of Natural Resources and their network of allies in other Karuk departments (fisheries, WQ, self-governance) local NGOs (MKWC, SRRC), and even federal agencies (USFS). The aim of the KBC is to foster synergistic collaborations between the Karuk Tribe and UC Berkeley to “enhance the eco-cultural revitalization of the people and landscapes within the Karuk ancestral lands and territories”<sup>273</sup>. Through countless discussions ranging from formal focus groups and facilitated meetings to informal barbecues and after-hours conversations, we've developed a collective epistemology that attempts to bridge our many ways of producing knowledge about the world. In

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<sup>273</sup> Visit the Karuk Berkeley Collaborative website for more information: <http://nature.berkeley.edu/karuk-collaborative/>, l.v. 6/30/15.

addition to backgrounds in multiple knowledge fields such as fire ecology, geomorphology, information science, GIS, geography, law and environmental policy, the collaborative also attempts to bring together a diverse range of indigenous epistemologies, from youth groups to tribal employees, elders and cultural practitioners. Through attempts to build an approach to knowledge-making that was open to our diverse array of situated knowledges, we've been experimenting with ways of aligning science with social and environmental justice and in particular the Karuk project of eco-cultural revitalization.

As we will see in more detail in Chapter 4, UC Berkeley Anthropologists such as Alfred Kroeber and his graduate students collected language, stories, artifacts, ceremonial regalia and even human remains from Karuk territory and sent them to museums and collections at UC Berkeley, Stanford, the California academy of Sciences and even the Smithsonian in Washington DC. Kroeber and his students viewed California indigenous groups as inevitably disappearing cultures and were therefore determined to preserve material and textual records of them for and through the sciences of human culture. Berkeley and Stanford anthropologists such as Kroeber, Harrington, Gifford and Schenck were mainly interested in "salvaging" Karuk knowledge and practices as a source of data for testing abstract theories about universal laws of human civilization and spatial patterns of material culture. Simultaneously, the cultural demand for "authentic" indigenous "objects of curiosity" in the "curio trade" drove an extractive demand for Karuk baskets, ceremonial regalia, and other artifacts<sup>274</sup>. Privately owned "cabinets of curiosities" were taken into permanent collections of museums such as the British Museum, the Louvre, the Smithsonian and Berkeley's own Phoebe Hearst museum<sup>275</sup>. While many artifacts have been returned to the Tribe, many are still sitting in museum collections with thick pesticide residues on their surfaces, rendering them toxic if they are ever returned home<sup>276</sup>. The museumization of Karuk culture by UC Berkeley researchers has left a bitter taste in Karuk people's mouths regarding western science in general and UC Berkeley researchers in particular.

Relationships between UC Berkeley researchers and Karuk tribal members and cultural practitioners are as complicated as the individuals and institutions involved. My community partners have discussed with me the intricate dynamics of inclusion and exclusion in western science and resource management policy. Historically, management practices performed in the name of science excluded the Karuk people from decision-making arenas and criminalized their resource uses and ceremonial practices. "Best-available science" legitimized state authority over Karuk ancestral territory, supported criminalization of indigenous resource management practices and justified the exploitation of the timber, mineral, and

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<sup>274</sup> Cohodas, Marvin. *Basket Weavers for the California Curio Trade: Elizabeth and Louise Hickox*. University of Arizona Press, 1997.

<sup>275</sup> Rouvier, Hélène. 2010. *Integrating Culturally Sensitive and Best Museum Practices at Two Northern California Museums: The Phoebe Hearst Museum of Anthropology and the Karuk People's Center*. A Thesis Presented to the Faculty of California State University, Chico. Fall 2010.

<sup>276</sup> Rouvier 2010.

water resources of the Klamath. "Science" was in many ways the handmaiden of empire in the Klamath, as it was relied upon to extract minerals, cite dams, set board-foot targets, suppress fire and apply herbicides to timber plantations. As Linda Tuhiwai Smith remarks, "research is one of the ways in which the underlying code of imperialism and colonialism is both regulated and realized"<sup>277</sup>. However, some non-Karuk researchers like linguist William Bright and anthropologist John Salter are very well respected among the Tribe. Bright helped co-construct a Karuk-English dictionary and language revitalization program while Salter helped document continuing cultural practices to lend Karuk ecological knowledge and traditional management practices legitimacy in court cases and regulatory processes. In recent decades, Karuk officials, activists, and scientists have carved out space for indigenous voices in the ecological sciences and in Klamath resource management policy. Up until the 1970s, cultural knowledge and practice were not seen as having either any scientific value, except as data points in theories about cultural "belief systems", language material culture and the aerial extent of "culture areas".

Outside of UC Berkeley anthropologists, interest in the ecological dimensions of Karuk cultural practices began among hippie back-to-the-landers and environmental activists in the late 1960s. Shortly after, a few cultural ecologists and fire scientists began to take interest in the epistemic and ontological dimensions of indigenous ecological knowledge and resource management practices. Beginning with Lewis' 1973 publication "Indian Burning in California" and gaining more popular momentum in the 1990s as interest in indigenous among ecologists and botanists began to see indigenous ecological knowledge as having epistemic value on its own terms<sup>278</sup>. Traditional ecological knowledge and indigenous management practices became much more popular first in the counter-culture and early environmental movements in the 1960s and 1970s and then among academic circles in fields such as fire ecology, fisheries biology, watershed hydrology and complex adaptive systems research in the 1980s and 1990s. As we will see next chapter, collaborative watershed management forums provided a context in which Karuk actors have been able to leverage traditional ecological knowledge to gain political and cultural representation in policy arenas and make management practices more accountable to people and place. However, as Karuk colleagues have relayed, the benefits of sharing knowledge such as jobs, grants, or access to resources do not always accrue to either those who share their knowledge or to the communities implicated in the research. Historically, in relationships between UC Berkeley researchers and Karuk tribal members, material, knowledge and benefit flowed in one direction. Information, songs, stories, audio interviews, bones, plant specimens and regalia were taken out of the Klamath and hardly anything ever came back.

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<sup>277</sup> Smith, Linda Tuhiwai. *Decolonizing methodologies: Research and indigenous peoples*. Zed books, 1999, p 7.

<sup>278</sup> See e.g. Swezey, Sean L., and Robert F. Heizer. "Ritual management of salmonid fish resources in California." *Journal of California Anthropology*, The 4.1 (1977).



In chapter 4, I relay stories from community partners in which public agencies have cited, applied or sought out Karuk knowledge or management techniques, but without proper tribal oversight, authorial credit or benefits awarded to the Tribe. In other cases, the lack of clear protections and processes regarding the sharing of tribal knowledge has resulted in cultural appropriation or misuse of sensitive cultural information. To this day, Karuk tribal members are very suspicious of UC Berkeley researchers specifically and western science in general. While many see value in leveraging Berkeley's epistemic authority to lend legitimacy to their knowledge and management practices and rights claims, many are also hesitant due to the legacy of university exploitation and extraction. Recent histories of biocolonialism, museumization, resource extraction and associated impacts on Indigenous peoples demonstrate the risks at stake in purportedly "collaborative" research endeavors. For these reasons, the formation of the Karuk-Berkeley Collaborative has entailed an in-depth reflexive examination of our collective knowledge practices and an explicit attempt to decolonize the relationship between UC Berkeley and the Karuk tribe. We have worked towards building a post-colonial epistemology for engaged scholarship that explicitly attempts to "gives back" by contributing to Karuk eco-cultural revitalization. We have worked to create the conditions for authentic collaboration and transformative, community-driven research and a clear process for tribal oversight to protect tribal cultural, intellectual and material property.

A main focus of the KBC has been developing a research protocol that makes sure the research benefits flow both directions, simultaneously guarding against epistemic violence and misappropriation of tribal cultural and intellectual property and ensuring that outside research is directed at ecological restoration and community empowerment<sup>279</sup>. In attempting to design a consent and oversight process, we have found it difficult to anticipate exactly how certain research activities might distribute risks and benefits across the different individuals, families, communities, genders, age groups, and geographies they implicate<sup>280</sup>. The ethics and politics of knowledge shift depending on the type of knowledge and the context of knowledge production and dissemination. Intellectual property, authorship credit, and compensation for interview time cannot be specified ahead of time for all potential research engagements, as each research project brings into play a unique range of ethical, cultural, and political issues depending on the resources, individuals, and families involved. As stated in the protocol: "The Karuk Tribe is made up of a diverse set of families and individuals. Researchers or project leads must respect the resulting complexity of Karuk knowledge systems".<sup>281</sup>

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<sup>279</sup> Karuk-UC Berkeley Collaborative. *Practicing Pikyav: A Guiding Policy for Collaborative Projects and Research Initiatives with the Karuk Tribe*. Draft 2013.

<sup>280</sup> Sarna-Wojcicki, Daniel Reid. "Ethics and Epistemology: Giving Back in the Klamath." *Journal of Research Practice* 10.2 (2014): Article-N21.

<sup>281</sup> Karuk-Berkeley Collaborative 2013: "Sharing cultural knowledge is a complex endeavor for most Indigenous communities. This includes complexities of how permission may be granted to share an individual's knowledge, since knowledge also belongs to the collective group. Even when one

Though we have attempted to make “giving back” a principal condition of doing research through the KBC, it has been difficult to specify what “giving back” through research actually entails and for whom. We have found that research can decolonize and give back in multiple ways- returning physical artifacts and ceremonial regalia, copying ethnographies from the Bancroft library or Aerial photos and plat surveys from the Earth Sciences library, contributing to land and resource management planning processes, organizing legal research for court cases, writing grants, supporting youth education and empowerment, and helping facilitate educational workshops and events in the community. Along with students at the Berkeley Law School and Karuk representatives, we have organized “Student Initiated Legal Services Projects” (SLPs) where groups of law students work with attorneys and tribal representatives on court cases related to important Karuk social and environmental justice issues such as suction dredge mining, water rights adjudications, fisheries protection, cultural property and sacred site protection<sup>282</sup>. While we have yet to solidify the final details of the protocol, we have at least put in place a set of expectations and principles to guide research collaborations. We have set-up a formal process for structured communication between researchers and a committee of Karuk tribal members, representatives and community members to ensure oversight and accountability for outside researchers and journalists. This approach is similar to what Kuokkanen calls ‘participatory reciprocity’, a collective striving for “multi-epistemic literacy” which fosters learning and dialogue between a diversity of epistemic/ethical/political approaches”<sup>283</sup>.

The primary project oversight body set-up through the research protocol is the Research Review Committee (RRC). Under the protocol, researchers wanting to work in Karuk aboriginal territory are required to convene a three-person “Research Review Committee” (RRC). The committee must include at least one local mentor/liason who knows the specific project topic and lives within Karuk territory, an employee of the Karuk Tribe who is in a leadership position within the Karuk Department of Natural Resources, the Karuk Tribal Council, or working within other Karuk Tribe programs or governance bodies, and one experienced researcher with prior experience successfully working with the Karuk Tribe on collaborative projects<sup>284</sup>. The research review committee then reviews research proposals, drafts and publication plans and recommends appropriate consent and oversight processes. While it doesn’t prescribe a methodology or set of research areas, the protocol puts into place a set of principles for doing collaborative research with the Karuk Tribe. The first principle is that, in collaborative research, community members are *research partners*: “Research questions are generated by or in collaboration with the Karuk

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individual chooses to share cultural knowledge, this decision may not reflect the collective interests of the larger family group or Tribe in maintaining intellectual property rights.”

<sup>282</sup> See [http://nature.berkeley.edu/karuk-collaborative/?page\\_id=267](http://nature.berkeley.edu/karuk-collaborative/?page_id=267) for info on KBC relationship with Berkeley Law

<sup>283</sup> Kuokkanen 2007.

<sup>284</sup> My RRC committee: Bill Tribe, KDNR, Ron Reed KDNR, Frank Lake USFS, Jennifer Sowerwine UCB.

Tribe to address the needs and priorities identified by community members. In contrast to top-down approaches, collaborative research strives for knowledge production through exchange<sup>285</sup>.

Through conversations about difficulties in specifying a one-size-fits all approach to research ethics under the protocol, we gravitated towards building a collective epistemology committed to both “knowledge sovereignty” and “*practicing pikyav*”. Recently, the Karuk tribe has called for “knowledge sovereignty” or control over the processes through which Karuk culture is represented and Karuk knowledge is produced, communicated and circulated through academic or policy networks<sup>286</sup>. Cross-cultural knowledge exchange, according to Noorgard (2014) requires an attempt to learn “how to communicate TEK and expand traditional management in a manner that simultaneously promotes knowledge sovereignty, Tribal self-determination and Tribal self-governance”.

The Karuk verb *pikyav*, meaning “to repair” or “to fix” has become a guiding principle for our collaborative research endeavors. The Karuk term “*pikyavish*” refers to the ceremonies of world-renewal that the Karuk and neighboring tribes have been practicing in the Klamath since time immemorial related to “fixing the world” or repairing relations among humans and between humans and the more-than-human world. As mentioned in the introduction and as we will see in detail next chapter, successive waves of colonialism, from fur trappers to gold miners, loggers and recreationalists wreaked havoc on Karuk watershed-ecosystems and the cultural resource practices associated with them. The process of eco-cultural restoration is oriented towards world-renewal, or repairing the complex socio-cultural and ecological systems in the Klamath. Engaging in collaborative research committed to Karuk eco-cultural restoration is also oriented at decolonizing and repairing the relationship between UC Berkeley and Karuk Tribe. As the protocol states:

“All proposed collaborative projects must incorporate the Karuk Tribe’s philosophy and practice of *pikyav*, including Karuk eco-cultural restoration and revitalization efforts that aim to ‘fix the world’”<sup>287</sup>

Though we have made strides through the KBC in building a collective epistemology that accommodates the diversity of our approaches to knowledge-making, we have struggled to articulate our perspectives and the knowledges and values of our indigenous colleagues through a situated and praxis-driven approach to knowledge generation in management forums that are driven by commitments to procedural neutrality, objectivity and “best available science”<sup>288</sup>. It has been difficult

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<sup>285</sup> Karuk-Berkeley Collaborative 2013.

<sup>286</sup> Noorgard, Kari. *Karuk Traditional Ecological Knowledge and the Need for Knowledge Sovereignty: Social, Cultural and Economic Impacts of Denied Access to Traditional Management*. Karuk Tribe: 2014.

<sup>287</sup> Karuk-Berkeley Collaborative 2013.

<sup>288</sup> See e.g. Doremus, Holly. “Purposes, Effects, and Future of the Endangered Species Act’s Best Available Science Mandate, The.” *Envtl. L.* 34 (2004): 397.

for me to position my research in a way that both responds to the demand for value-neutral objectivity in resource management forums and is critical of the exclusion and dispossession that occurs in the name of science. While the collaborative has structured the learning process so as not to reproduce the supremacy of Eurocentric modes of knowledge-production, as Harding puts it, “one cannot afford to ‘just say no’ to objectivity”<sup>289</sup>. To a certain extent, the practices and performances of “rendering technical”, or presenting indigenous knowledge in tables, graphs and models can enable their movement and help them gain traction among policy, legal and scientific audiences, but at always at a cost and accompanied by a certain amount of epistemic violence that contorts and simplifies these knowledges as we translate them. Even engaged in collaborative scholarship, as we order our relationships and experiences into narratives, trends and patterns, we perpetuate epistemic violences and produce certain inclusions and exclusions in our own research.

The epistemology of *practicing pikyav*, however, is not designed around a commitment to detached objectivity and “disinterestedness”, but rather turns on an ethical commitment to reciprocity in research relationships and a specific focus on eco-cultural revitalization of Karuk lands and culture. For our collective, this has entailed working thorough the difficult process of decolonizing knowledge relations between UC Berkeley and the Tribe and working towards a more dialogical and responsible mode of producing knowledge and working towards multi-epistemic literacy. The relationships we have built with community members and the formal processes put in place to facilitate dialogue between us will hopefully keep our research working towards local ecological restoration and community empowerment.

I cannot claim that this research is truly “community-based participatory research” based on the most stringent standards, as that would require full community control over the definition of research questions, methods, analysis and writing<sup>290</sup>. While that was the case with certain projects on which I collaborated, this particular research artifact is tailored to fit the requirements of my academic institution and the standards of my university department. I feel it is important to take responsibility for the theoretical framing and word-smithing of this particular document in order to not come across as “speaking for” or “on-behalf of” my Karuk colleagues. The ideas around the cultural politics of scale in Chapter 5 in particular are indebted to Bill Tripp, Ron Reed and Frank Lake, without whom I would not have paid close enough attention to the role of scale in determining whose knowledge counts in collaborative environmental governance.

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<sup>289</sup> Harding 1991, p. 160.

<sup>290</sup> Employing the much-cited “Biggs scale of participation” (1989, contractual, consultative, collaborative or collegial) to this particular text, I would submit that this research artifact should be considered “collaborative”- entailing some degrees of task sharing between researchers and community partners, along lines determined by the formal research program. See Biggs, S. D. 1989. *Resource-poor farmer participation in research: a synthesis of experiences from national agricultural research systems*. OFCOR, comparative Study No. 3. International Service for National Agricultural Research, The Hague, The Netherlands.

Acknowledging that this account is situated in partial perspectives, theoretical leanings, personal experiences and connections to particular individuals, institutions and political aspirations is not to abandon hopes for “objectivity” in research, but in line with Daston’s observation that “to embrace objectivity (is) not only to practice a science but also to pattern a self”<sup>291</sup>. In contrast to an approach to objectivity that maximizes abstraction, through the KBC I have come to see that, ultimately the legitimacy of my research ultimately depends on its ability to improve the lives of those who have shared their knowledge with me and welcomed me into their homes, communities and watershed-ecosystems. The “practicing pikyav” process has ensured that my research questions, methods and analysis have been developed in close conversation with my Research Review Committee. Through the practicing pikyav mode of knowledge production, I’ve had the opportunity to think through the ways scientific research can “give back” to the communities it takes place in and implicates<sup>292</sup>. Though this puts me in the problematic position of attempting to give back something that was never really mine to begin with, I’ve come to see the practices, performances and ethics of “giving back” as necessary epistemic ingredients in making something like shared knowledge possible. The next section will show how engaged scholarship through the Karuk-Berkeley collaborative encouraged me to think about the importance of scalar formations in structuring epistemologies, ontologies and political processes in Klamath environmental governance.

### **III. Scale and democratic environmental governance: Challenging scalar assumptions in democratic imaginaries**

I argue in this section that the cultural politics of scale are under-theorized in the literature on democracy in general and in particular in the literature on watershed governance and indigenous politics. The tension between the sovereignty of the people as represented by public institutions and the sovereignty and rights of indigenous peoples and their representative institutions requires renewed debate about the appropriate scales for knowledge production, deliberation and collective action. I argue that these debates could benefit from recent literature on the cultural politics of scale and more nuanced perspectives on the complex spatial dynamics of access to, use and distribution of natural resources. I attempt to fill this gap by relaying local debates on scale in ecosystem restoration and tribal community empowerment to global academic and policy debates on the politics of scale in democratic environmental governance. I use this literature to challenge the primacy of the watershed as the “natural home of democracy” and open up democratic environmental governance to multiscalar approaches to knowing and governing nature.

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<sup>291</sup> Daston, Lorraine and Peter Gallison. *Objectivity*. Zone: 2007: P 10.

<sup>292</sup> Sarna-Wojcicki 2014; Gupta, Clare, and Alice Bridget Kelly. "Social Relations of Fieldwork: Giving Back in a Research Setting." *Journal of Research Practice* 10.2 (2014): Article-E2; Diver, Sibyl Wentz and Margot Natalie Higgins. "Giving Back Through Collaborative Research: Towards a Practice of Dynamic Reciprocity." *Journal of Research Practice* 10.2 (2014): Article-M9; Fortmann, Louise. "Giving Back, Moving Forward." *Journal of Research Practice* 10.2 (2014): Article-M10.

In this dissertation, I am interested in the way the watershed scale provides a template for ordering the social and natural worlds. Scale provides a material-semiotic architecture that supports and frames the ways we see the world and seek-out credible knowledge about it. Scales provide means of segmenting space and time in particular ways, bounding off chunks of reality and selecting variables of interest from a multitude of data in order to focus on a particular range of phenomena and render relationships between them commensurate across time and space. Scales entail certain “ways of seeing” which embed particular ways of relating to humans and non-humans and are linked to ways of governing populations and territories. Each scale of knowledge production and resource governance focuses collective vision on particular aspects of social-ecological systems and filters out everything else.

I demonstrate in this dissertation how the watershed scale both reveals and conceals specific angles of Klamath natureculture, enabling a particular form of democratic engagement and collective action that in some instances includes and in others excludes certain indigenous voices, values and perspectives on place. I argue for rescaling institutions of democratic environmental governance away from the fixed scale of the drainage basin and instead around multiple nested socio-spatial formations, the contours and boundaries of which are themselves defined through democratic processes. In order to bring together multiple knowledges and accommodate diverse ways of knowing and living with nature, I argue for an ecologically and democratically-grounded politics able to find common ground among the diverse scales through which people make sense of nature and manage natural resources.

### *Scales of Democracy, Scales of Justice*

Debates over the appropriate spatiality of democratic polities, both imagined and actually existing, are as old and contested as the concept of democracy itself. According to political theorist Robert Dahl, the search for democratic political community inevitably raises questions around the appropriate size, shape and scale of the demos<sup>293</sup>. Debates around the proper composition of the democratic polity negotiate the unit best-suited for expressing individual and collective identities, structuring the boundaries of belonging, capturing the social, material, economic and ecological relations of the political community and patterning modes of political association and collective action<sup>294</sup>. Barnett and Low (2004) describe how relationships between democratic deliberation, representation and collective action turn on a paradox of scale –“on the problem of how to institutionalize effective citizen participation in functionally complex, socially differentiated, and spatially and numerically extensive societies”<sup>295</sup>.

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<sup>293</sup> Dahl, Robert Alan, and Edward R. Tufte. *Size and democracy*. Stanford University Press, 1973.

<sup>294</sup> Dahl 1973, p 3.

<sup>295</sup> Barnett, Clive, and Murray Low (eds). *Spaces of democracy: geographical perspectives on citizenship, participation and representation*. Sage: 2004.

Tensions between local and universal rights, individual freedoms and public goods, the organization of boundaries of self-governing polities and their relations to one another all play out around questions of scale. However, democratic imaginaries still rely heavily upon the Westphalian model which, as mentioned earlier, is based on an outmoded spatial imaginary of political scale as fixed and bounded containers of self-determination, positioned either side-by-side or nested neatly within one another<sup>296</sup>.

In her recent book (2013) political theorist Nancy Fraser draws on the idiom “scales of justice” to bring together two distinct problematics related to accounting for justice in post-Westphalian regimes of democratic governance. One image associated with the “scales of justice” invokes “the balance” and brings up issues related to the “what”, or the substance of justice, including issues around redistribution, recognition and representation<sup>297</sup>. The second problematic entailed in the “scales of justice” revolves around “the map” and brings up conflicting framings of the “who” of justice in post-Westphalian democracies- is the *demos* to be found in territorialized citizenries, private corporations, public institutions, global humanity, or transnational communities of risk<sup>298</sup>? Drawing a conceptual link between the two images of the “scales of justice” Fraser asks “who should count with respect to what in a post-Westphalian world”? This approach allows one to interrogate the framing and mapping of democratic political space from the standpoint of justice. Democratic theory similarly needs to rethink the relationship between the construction of spatial formations and the construction of democratic environmental governance bodies.

Bringing both concepts of “scales of justice” together, the term “scope of justice” has similarly been used by political theorists and environmental philosophers to describe the social and political “boundary for fairness” in environmental policy<sup>299</sup>. Political boundaries entail a scope of justice, which constructs boundaries of the “moral community”, and determines who or what matters in democratic environmental politics. For example, Opotow (2000) describes how the “scope of justice” includes norms, moral and rules about the boundaries of our concerns about the rights and fairness of our actions, which governs our conduct towards the “moral community” inside our scope of justice<sup>300</sup>. Our scope of justice is attuned to who and what counts or matters in our political and ethical considerations of justice and who and what simply does not matter?<sup>301</sup>

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<sup>296</sup> Howitt, Richard. "Scale." *A companion to political geography* (2003): 132-157.

<sup>297</sup> Fraser, Nancy. *Scales of justice: Reimagining political space in a globalizing world*. Columbia University Press, 2009.

<sup>298</sup> Put simply by Fraser, the scales of justice in the balance asks “what counts as a bonafide matter of justice?” while the scales of justice in the map asks “who counts as a bonafide subject of justice?”

<sup>299</sup> Opotow, Susan, and Leah Weiss. "New ways of thinking about environmentalism: Denial and the process of moral exclusion in environmental conflict." *Journal of Social Issues* 56.3 (2000): 475-490.

<sup>300</sup> Opotow 2000; Opotow, Susan. "Deterring moral exclusion." *Journal of Social Issues* 46.1 (1990): 173-182.

<sup>301</sup> Opotow 2000.

Outside of the “scope of justice” is a sphere of “moral exclusion” which rationalizes and justifies harm for those humans and non-humans outside of the moral community.

By invoking the phrase “Scales of Sovereignty” in my title, I aim to draw attention to the scalar dimensions of political rule in democratic environmental governance. In this dissertation, I explicitly politicize the issue of scale in representing both people and nature in collaborative resource governance regimes. I follow the ways different scalar formations structure flows of epistemic and political authority and set the boundaries of the “scope of justice”, or who and what matters or deserves moral and political consideration in collaborative environmental governance. In the following section, I outline recent debates on the epistemologies, ontologies and cultural politics of scale. Theorizing the watershed as a scalar formation draws attention to the ways different scale framings provide templates for the production of knowledge, allowing communication across epistemic cultures and determining which relationships, dynamics and variables of Klamath natureculture are important.

### *Scale as epistemological, ontological and political space*

According to Schneider (2001, pgs. 2-3), the English word “scale” connotes fifteen different meanings arising from two different etymological roots<sup>302</sup>. Definitions of scale abound in the political ecology, geography and ecosystem management literature. The Millennium Ecosystem Assessment 2003 defines scale as “the physical dimension of a phenomenon or process in space or time, expressed in physical units”<sup>303</sup>. Wiens defined scale as the “extent relative to the grain of a variable indexed by time or space”<sup>304</sup>, while Powell (1989) defined scale as the “distance before some quantity of interest changes”<sup>305</sup>. Cartographic scale refers simply to a ratio of distance on map to distance on ground. The concept of scale in ecology originates in Odum’s extension of the concept of organizational level in

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<sup>302</sup> Schneider, David C. The Rise of the Concept of Scale in Ecology. *BioScience* 51.7 (2001): 545-553. One root leads back to the Old English and Norse word *skal* which signified “bowl” and was used to refer to the “scales of justice”, or measurement by means of “pairwise comparison of objects”. At its root, we see a relational definition of scale- a comparison or weighing of two different entities or objects in order to learn more about them or distinguish more carefully the attributes of one or the other. The other Latin root, *scala* means “ladder” and was used to refer to a musical scale, scaling a wall or measuring a length by counting steps or subdivisions. Here is a familiar sense of scale as a means of comparison and measurement through segmenting increments or levels and relating them back to a common denominator.

<sup>303</sup> Berkes, Fikret, et al. "Bridging scales and knowledge systems." *Bridging scales and knowledge systems: Concepts and applications in ecosystem assessment* 315 (2006).

<sup>304</sup> Wiens J. A. 1989. Spatial scaling in ecology. *Functional Ecology* 3: 385-397.

<sup>305</sup> Schneider, David C. "The Rise of the Concept of Scale in Ecology *BioScience* 51.7 (2001): 545-553; Powell T. M. 1989. Physical and biological scales of variability in lakes, estuaries, and the coastal ocean. Pages 157-176 in Roughgarden J, May RM, Levin SA, eds. *Perspectives in Ecological Theory*. Princeton (NJ): Princeton University Press.



biology (cell, tissue, organ, organism) to populations and communities<sup>306</sup>. Geographer Nathan Sayer (2005) portrayed scale as involving simultaneously size or areal extent, level or position relative to a common range of variables and sets of relations between multiple phenomena<sup>307</sup>.

The epistemology entailed in a particular scalar formation- or, in Sayre's terms- "the grain and extent of observation suited to apprehending particular processes" – is tightly connected to the ontology of nature, or what comes to be seen as "a characteristic of objective relations among processes or among observable levels of organization"<sup>308</sup>. The epistemologies and ontologies contained in scalar formations both mediate understandings of the nature of Klamath watershed ecosystems and communities and orient real material or concrete relationships among human watershed inhabitants and their more-than-human surroundings. Attention to the politics of scale, which I will return to in the section after next, alternatively focuses on how scalar formations mediate processes of inclusion/participation, regimes of representation and modes of collective action in democratic politics and environmental governance.

### *The Watershed as biophysical and political scalar formation*

In this dissertation, I demonstrate how the watershed scale performs epistemological, ontological and political functions. In hydrology and biogeochemistry for example, the watershed scale enables a platform for data integration and a template for rendering heterogeneous meteorological, hydrologic, geomorphological, hydrogeologic, and biogeochemical phenomena commensurable. Watershed-scale sampling harmonizes locally generated data on processes occurring at local scales such as evapotranspiration in forest stands or Darcy flows through the subsurface with data gathered on larger scales such as hillslope processes, channel formations and in-stream aquatic ecosystem processes, as well as cumulative watershed-scale dynamics. Watershed scale sampling and modeling allows the analyst to link up local measurements of water quantity, quality, sediment loads, suspended and dissolved material with sub-basin

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<sup>306</sup> See Schneider 2001, citing Odum H. T. 1959. *Fundamentals of Ecology*. 2nd ed. W. B. Saunders: "Ecological scaling (Calder 1983, Peters 1983) refers to the use of power laws that scale a variable (eg respiration to body size), usually according to a non-integral exponent. In ecology, ecological scaling (Calder 1983, Peters 1983) refers primarily to the use of power laws that scale variables to one another, such as respiration rates to body size. The concept of scalar hierarchy in ecology (Allen and Starr 1982) refers to a focal level constrained by particular sets of biophysical dynamics". See Calder W. A. 1983. Ecological scaling: Mammals and birds. *Annual Review of Ecology and Systematics* 14: 213–230; Peters R. H. 1983. *The Ecological Implications of Body Size*. Cambridge (UK): Cambridge University Press. Allen T. F. H., Starr T. B. 1982. *Hierarchy*. Chicago: University of Chicago Press.

<sup>307</sup> Sayre, Nathan F. "Ecological and geographical scale: parallels and potential for integration." *Progress in human geography* 29.3 (2005): 276-290.

<sup>308</sup> Sayre 2005, p. 283.

and basin-wide dynamics and processes<sup>309</sup>. The watershed connects measurements of sediment, micro-organisms and nutrients at microscopic scales with those on massive basin-wide scales, ten million acres in the case of the Klamath or even the size of the Mississippi Basin, whose drainage system covers about 40% of the lower 48 States. However, only certain watershed processes are considered “scale-invariant”, meaning they apply across a range of scales or can be scaled-up or down with relative precision<sup>310</sup>. Other processes are “scale-dependent”, or confined to particular spatial or temporal limits that can’t be generalized.

Hydrologists and landscape ecologists attempt to discover whether hydrologic phenomena are dependent or independent of the scale at which they are observed- whether the phenomenon appears or applies across a broad range of scales, such as gravity, friction, or the ratio of channel branching, or whether the phenomena is limited to a narrow range of scales, such as patch-scale spatial patterns of evapo-transpiration or hillslope-scale rates of erosion<sup>311</sup>. Other processes that influence the movement of water through watersheds occur at multiple temporal and spatial scales, such as weather and climate, soil production, erosion and sediment transport processes, hydro-dynamic movement through various media, evapotranspiration through vegetation and human impacts. There are many “non-linear” and emergent dynamics that don’t scale up or down easily. Some components can’t be understood and analyzed separately and others are well understood separately but can’t be combined and understood with other processes with precision. The watershed scale therefore renders certain relationships, processes and dynamics visible, but always at the expense of making others invisible.

What are the political dynamics of inclusion and exclusion at the watershed scale? As a scale of political organization, the watershed attempts to synchronize distinct spheres of sovereignty, jurisdiction and territory. However, as we will see, the watershed is not always able to successfully harmonize the divergent political geographies of the multitudes of institutions involved in Klamath resource management. Epistemologically and politically, watersheds gather together and they also divide. In order to follow the journey of water over and through the ground, the watershed gathers together a host of heterogeneous elements and actors that had heretofore been separated into distinct domains in Western resource management. Humans, vegetation, animals, geology and water are all collected together through the movement of water down a drainage. However, as will be explored in Chapter 5, buried deep in the etymology of the word *shed* is a sense of separating or distinguishing, as in a hair parting or a sheep shearing.

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<sup>309</sup> See e.g. Leopold 1992; Sivapalan, Murugesu. "Pattern, process and function: elements of a unified theory of hydrology at the catchment scale." *Encyclopedia of hydrological sciences* (2005).

<sup>310</sup> Sposito, Garrison. *Scale dependence and Scale Invariance in Hydrology*. Cambridge University Press, 2008. See es.p ft nt 7, p xii.

<sup>311</sup> Sposito 1998, p98, p xixii.

Following the etymology, *shed* in old and middle English originally signified a general discrimination, both the act of separating and a noun standing between and two things, being applied first to hair, then to wool and land, and finally to flows of water in the 19<sup>th</sup> century.

The watershed separates the world along drainage divides, defining the geopolitical spatiality what matters or is material based upon the drainage network it belongs to. Water flows do contour biophysical and social landscapes and topography does influence the movement of water down a drainage basin, but in combination with numerous other actors and associated biophysical and social processes. In chapters 3-6, I show how the quantity, timing and quality of water flowing past a certain point is shaped by complex interactions of fire processes, road networks, climate systems and the use of water in trees, animals, microorganisms and humans, processes which do not typically obey the boundaries of the drainage basin. Similarly, the availability and distribution of water is only one of many influences on the arrangements of the human and other-than-human communities it flows through.

In the remainder of this chapter, I attempt to address the political, epistemological and ontological dynamics of inclusion and exclusion in collaborative watershed based governance. I first lay out debates on scale, democracy and indigenous people's sovereignty in natural resource management. I then discuss the process by which I began to question the primacy as the watershed as the unit of ecological democracy in the Klamath and pay attention to the cultural politics of scale in democratic resource governance.

### *Scale and democracy*

Debates over proper scale and spatiality of democracy go back centuries in political theory and practice. Arguing that a good self-governing polity had to be small in both territory and population, Plato calculated the optimal number of citizens of a self-governing polity at 5,040<sup>312</sup>. Aristotle maintained that the optimum size for a polity must lie somewhere between a population so small that the polis could not be self-sufficient and so large that the citizens couldn't know one another's characters. He argued that, because all citizens needed to be able to assemble at one place and hear the voice of a speaker, the range of the unamplified human voice set a kind of natural limit for the ideal size of a self-governing polity<sup>313</sup>. Aristotle's trope about the range of the Stentor's voice became a political maxim for nearly two-thousand years and until end of 18<sup>th</sup> century, there was little

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<sup>312</sup> Dahl and Tufte 1973, ft nt 1. See e.g. Plato's *Laws*, trans Benjamin Jowett. Columbia:1937, vol ii: V, 738, 742; VI, 771.

<sup>313</sup> Aristotle. *Politics*, trans by Ernest Barker Oxford, 1952 p. 292; Derthick, Martha. *Dilemmas of scale in America's federal democracy*. Cambridge University Press, 1999, p. 1. "A city-state should be no larger that that the voice of the Stentor, the herald or town crier could be heard from one side of the city to the other, nor larger. Greeks of the classical period seem to have agreed that an assembly was limited to the range of the human voice."

dissent among political philosophers that “small was beautiful” when it came to democracy and self-governance.

In classical western political theory, democracies had to be small and direct in order for all citizens to be able to share the duties of self-government, meet frequently in popular assembly and make decisions with input from the whole community<sup>314</sup>. In the 18<sup>th</sup> century, when democracy was no longer a dirty word, politicians and political theorists began devising modes of political representation that scaled democracy beyond the confines of the city-state and stretched it out across the vast borders of nation-states. According to Montesquieu, “representative democracy is democracy rendered practicable for a long time and over a great extent of territory”<sup>315</sup>. From small scale, direct democracy, predicated on face-to-face interactions in small assemblies, democratic theory and practice transitioned to modes of political engagement stretched across elections, parties, courts and representative and deliberative institutions<sup>316</sup>.

The question of the optimal scale at which to organize emerging democratic modes of governance in the newly forming nation-states occupied Britain, France, Prussia and the United States<sup>317</sup>. Debates at the American constitutional convention 1787 about the optimal size and scale for democracy in America resulted in the federated system between local, state and federal levels of representative and deliberative processes<sup>318</sup>. Many present were skeptical that democratic governance could operate across what they hoped would one day become a massive territory with millions of citizens. Madison’s tyranny of majority argument won the day for the Federalists, arguing that large scale and numbers were necessary in preventing the classical pathology of democracy: the tyranny of the majority<sup>319</sup>. Along with this new mechanism for implementing self-rule came a

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<sup>314</sup> Smallness made it possible for every citizen to know one another, develop intimate relations and analyze and discuss common problems facing the polity. However, to be autonomous, a democratic polity also needed to be free from domination by polities and natural forces deemed “external” to the body politic. For Dahl and Tufte (1973), there has long been theorized a central tension in democratic modes of governance between the autonomy and capacity of a democratic polity, and this tension in turn turns on the question of the appropriate size or scale for representing the demos.

<sup>315</sup> de Tracy, Destutt, and Antoine Louis Claude. *A commentary and review of Montesquieu's Spirit of Laws*. 1811, p 19.

<sup>316</sup> Derthick 1999, p 1: “As nation states rose, so too did the idea that democracy could be representative, that democracies could be re-publics- things *of* the public but not identical with it”. Instead of convened in public assemblies, the image of the demos became centered around aggregations of discrete and atomized individuals voting rationally and anonymously in a private booth.

<sup>317</sup> Derthick 1999.

<sup>318</sup> The constitutional framers had waged an intense theoretical debate over size, with the anti-federalists arguing the classical position that democracies had to be small and the federalists that it should be large to prevent the tyranny of the majority. See Dahl and Tufte 1973, ft nt 1. Federalist passages devoted to the problems of size, numbers: 10, 14, 55, 56, 58.

<sup>319</sup> Dahl and Tufte 1973, p. 1. The tyranny of the majority argument is essentially that a greater size of the polity allowed for diversity of opinions, preventing factions from taking over.

new spatiality of governance that solidified around the “bounded containers” of local, state and national political space.

According to scholars such as Dahl and Tufte (1973), Barnett and Low (2004), Swyngedouw (2011) and Howitt (2001, 2006), the spatial imaginary underlying democratic political theory has largely remained rooted to this image of bounded containers of political space, nested from the local to the States to the federal government like Russian dolls<sup>320</sup>. These federated containers of space still shape how most political theorists figure the scalar dynamics of democratic environmental governance in the academic literature, in policy and in practice. Over the last 20 years, debates in ecology, hydrology, political ecology and geography have all taken on the question of scale in collaborative environmental governance<sup>321</sup>. Here I examine how debates over the epistemology, ontology and politics of scale provide a useful theoretical framing for approaching the cultural politics of scale in Klamath watershed governance.

Beginning in the 1960s, as mentioned earlier, with the shift to deliberative democracy, inclusion and participation, the focus of democratic governance shifted back to the local scale. As we saw earlier this chapter, the bioregionalist movement attempted to bring democratic environmental governance back to place and align the boundaries of human institutions with natural forms and processes. In bioregionalist and environmentalist thinking, there was a search for both ecologically and locally appropriate scales of action. From the 1970s-1990s, there was an explicit focus on “the local” as a site of democratic engagement and ecological restoration, as exemplified in the phrase “think globally, act locally”. In deliberative democracy, community based natural resource management and participatory research, the local scale became the appropriate scale for ecological action and for democratic governance.

Beginning around the turn of the 21<sup>st</sup> Century, this perspective on scale was critiqued for “romanticizing the local”, ignoring global processes and leading researchers to assume that the silver bullet for issues of environmental sustainability, social justice, and democracy is devolution of power to local-scale actors and organizations. In 2005, Brown and Purcell called out political ecologists for falling victim to the “local trap” in which political ecologists assume that

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<sup>320</sup> Barnett, Clive, and Murray Low, eds. *Spaces of democracy: geographical perspectives on citizenship, participation and representation*. Sage, 2004; Swyngedouw, Erik. "Interrogating post-democratization: Reclaiming egalitarian political spaces." *Political Geography* 30.7 (2011): 370-380; Howitt, Richard. "Scale as relation: musical metaphors of geographical scale." *Area* 30.1 (1998): 49-58; Howitt, Richard. "Scale." *A companion to political geography* (2003): 132-157.

<sup>321</sup> See e.g. Neumann, Roderick P. "Political ecology: theorizing scale." *Progress in Human Geography* 33.3 (2009): 398; Brown, J. Christopher, and Mark Purcell. "There's nothing inherent about scale: political ecology, the local trap, and the politics of development in the Brazilian Amazon." *Geoforum* 36.5 (2005): 607-624; Purcell, Mark, and J. Christopher Brown. "Against the local trap: scale and the study of environment and development." *Progress in Development Studies* 5.4 (2005): 279-297; Born, Branden, and Mark Purcell. "Avoiding the local trap scale and food systems in planning research." *Journal of Planning Education and Research* 26.2 (2006): 195-207.

“organization, policies, and action at the local scale are inherently more likely to have desired social and ecological effects than activities organized at other scale”<sup>322</sup>. The distinction between global and local came under intense scrutiny on the literature on democracy and environmental governance. As Jonas (1994) put it “This binary conception of the relationship of scale and power, domination and resistance, represents an oversimplification of the complex, dynamic nature of the politics of scale and the social and political uses of scale”<sup>323</sup>. The local, regional and global scalar containers were “reifying scale politics into a rigid, timeless, and seemingly natural spatial- structural form” where as “forms of domination and resistance, contestation and co-operation often operate at multiple scales, simultaneously”<sup>324</sup>. Political ecologists came to their own rescue and pointed to early work in political ecology that explicitly politicized the scalar dimensions of environmental knowledge, degradation narratives, the formulation of environmental problems and issues and the legitimization of intervention through particular socio-spatial formations.

In the sections below and throughout the dissertation, I argue that debates in political ecology and geography regarding the politics, performativity and materialities of scalar processes provide a good starting point for understanding how scale effects the dynamics of inclusion and exclusion in deliberative processes, natural resource management and tribal sovereignty in the Klamath. Recent literature on scale portrays a conception of scale as epistemologically, ontologically and socially constructed through embodied and material everyday practices.

### *The Social Construction of Scale*

Beginning in the 1990s, debates in geography and political ecology sought to explicitly examine the political and social elements of the construction of scale. These studies drew on Gramsci and Lefebvre to draw explicit attention to the relationships between space and power, arguing that there is nothing ontologically or epistemologically given about geographical scale and understandings of social or natural processes<sup>325</sup>. Silvern (1999), for example remarked that “geographical scale is never constructed outside the field of power relations and is thus always

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<sup>322</sup> Brown and Purcell 2005 p 608

<sup>323</sup> Jonas A E G, 1994, "The scale politics of spatiality" *Environment and Planning D: Society and Space* 12(3) 257 – 264.

<sup>324</sup> Jonas 1994.

<sup>325</sup> e.g. Delaney, David, and Helga Leitner. "The political construction of scale." *Political geography* 16.2 (1997): 93-97; Brenner, Neil. "The urban question: reflections on Henri Lefebvre, urban theory and the politics of scale." *International journal of urban and regional research* 24.2 (2000): 361-378; Swyngedouw, Erik. "Scaled geographies: Nature, place, and the politics of scale." *Scale and geographic inquiry: Nature, society, and method* (2004): 129-153; Marston, Sallie A. "The social construction of scale." *Progress in human geography* 24.2 (2000): 219-242; Brenner, Neil. "The limits to scale? Methodological reflections on scalar structuration." *Progress in human geography* 25.4 (2001): 591-614.

the product of struggle, negotiation, compromise or co-operation"<sup>326</sup>. Resources and issues are framed, mobilized and organized according to particular scalar formations in order to legitimize certain perspectives or actions and reconfigure the contours of power and authority. Political ecologists have explored how power relations embedded in understandings and explanations of environmental change are organized around particular scalar frameworks<sup>327</sup>. Scalar narratives justify scales of decision-making, knowledge production and intervention in political and ecological processes.

In reaction to the debates on the social and political construction of scale, some political ecologists and geographers have warned against ignoring the materialities of scale, or what some termed the "ecological production of scale". Sayre (2005), Sneddon (2002) and McCarthy (2005) all emphasize attention to the forms of distributed agency and the role of specific materialities of natureculture in the construction of scalar formations in resource governance<sup>328</sup>. For example, McCarthy (2005) stresses the importance of understanding the production of social scales as inseparable from the production of nature. Sneddon (2003: 2245) calls for a 'symmetrical approach to the social and ecological production of scale'. As Harris and Alatout (2010), Budds (2012) and Norman et al (2012) have shown, scalar politics take shape around embodied and emplaced performances that materialize patterns of water, power and resource flows alongside state imaginaries and social formations<sup>329</sup>.

Scale is portrayed by some geographers as secreted through everyday practice and embedded deeply in the way people relate to their environment, conceptualize it, move through it and act collectively in managing it. For example,

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<sup>326</sup> Silvern, Steven E. "Scales of justice: law, American Indian treaty rights and the political construction of scale." *Political Geography* 18.6 (1999): 639-668.

<sup>327</sup> See e.g. Neumann, Roderick P. "Political ecology: theorizing scale." *Progress in Human Geography* 33.3 (2009): 398; Brown, J. Christopher, and Mark Purcell. "There's nothing inherent about scale: political ecology, the local trap, and the politics of development in the Brazilian Amazon." *Geoforum* 36.5 (2005): 607-624; Sneddon, Chris, et al. "Contested waters: Conflict, scale, and sustainability in aquatic socioecological systems." *Society & Natural Resources* 15.8 (2002): 663-675; Lebel, Louis, Po Garden, and Masao Imamura. "The politics of scale, position, and place in the governance of water resources in the Mekong region." *Ecology and society* 10.2 (2005): 18; Zimmerer, Karl S. "Rescaling irrigation in Latin America: the cultural images and political ecology of water resources." *Cultural Geographies* 7.2 (2000): 150-175.

<sup>328</sup> Sayre 2005; McCarthy, James. "Scale, sovereignty, and strategy in environmental governance." *Antipode* 37.4 (2005): 731-753; Sneddon, Chris, et al. "Contested waters: Conflict, scale, and sustainability in aquatic socioecological systems." *Society & Natural Resources* 15.8 (2002): 663-675; Sneddon, Chris. "Reconfiguring scale and power: the Khong-Chi-Mun project in northeast Thailand." *Environment and Planning A* 35.12 (2003): 2229-2250.

<sup>329</sup> See Ch 3. Harris, Leila M., and Samer Alatout. "Negotiating hydro-scales, forging states: Comparison of the upper Tigris/Euphrates and Jordan River basins." *Political Geography* 29.3 (2010): 148-156; Budds, Jessica, and Leonith Hinojosa-Valencia. "Restructuring and rescaling water governance in mining contexts: the co-production of waterscapes in Peru." *Water Alternatives* 5.1 (2012): 119-137; Norman, Emma, Karen Bakker, and Christina Cook. "Introduction to the themed section: Water governance and the politics of scale." *Water Alternatives* 5.1 (2012): 52-61.

Moore (2008) advocates examining scale as a category of practice, focusing on how political actors use scale and actively rescale the social and ecological units that mediate the connections between humans and nature<sup>330</sup>. Similarly, Jones (1998) concludes that "scale may be understood as situated relationally within a community of producers and readers who give the practice of scale meaning"<sup>331</sup>. Scales are performed by sets of actors through their engagements with the material world, the "scalar stances they take within particular sociospatial contexts as they engage in the politics of everyday life"<sup>332</sup>. I take up this perspective in my research to watch the way scales are secreted through mundane everyday practices and attempts of people to get along with each other and with the non-humans that populate the worlds they inhabit

While this view of scalar politics is helpful in framing Klamath struggles over the appropriate unit for knowledge-generation and environmental governance, the Klamath situation demands sensitive attention to indigenous people's perspectives on scalar processes and the right to what Castree (2004) terms "differential geographies", that is, "the right to make their own places, rather than have them made for them"<sup>333</sup>. In this section, I first describe how the participatory research process forced me to move beyond a watershed-centric scalar framing to acknowledge the multiple scales through which Klamath actors attempt to access resources and influence the management of natural and cultural resources on and near tribal territories. I describe how the cultural politics of scale simultaneously shapes knowledge politics, tribal sovereignty and integrated resource governance in the Klamath.

### *Sovereignty and Scale*

Tribal sovereignty related to natural resource rights is an incredibly complex matter. As mentioned earlier, US Indian policy had an explicitly spatial dimension to it - first in buying or conquering tribal land, then in moving tribes West and finally in containing them on bounded reservations. As Silvern (1999, p639) remarks, "the organization of political scale has served to facilitate the power of the dominant society to control, exclude and marginalize indigenous populations"<sup>334</sup>. From a legal perspective, tribal sovereignty is grounded in the reservation. Fishing and hunting rights, networks of recognized sacred sites and cultural management areas also have scalar or spatial dimensions to them, depending on the land base of the tribe and the resource in question. Natural and

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<sup>330</sup> Moore, Adam. "Rethinking scale as a geographical category: from analysis to practice." *Progress in human geography* 32.2 (2008): 203-225.

<sup>331</sup> Jones, Katherine T. "Scale as epistemology." *Political geography* 17.1 (1998): 25-28, p 26.

<sup>332</sup> Kaiser R, Nikiforova E, 2008, "The performativity of scale: the social construction of scale effects in Narva, Estonia" *Environment and Planning D: Society and Space* 26(3) 537 – 562.

<sup>333</sup> Castree, Noel. "Differential geographies: place, indigenous rights and 'local' resources." *Political Geography* 23.2 (2004): 133-167.

<sup>334</sup> Silvern, Steven E. "Scales of justice: law, American Indian treaty rights and the political construction of scale." *Political Geography* 18.6 (1999): 639-668.



cultural resources are alive, mobile and fluid. Therefore Tribal sovereignty has a relational, variegated and graduated spatial dimension that depends not only on the particular history and legal status of the Tribe and the spatiality of their reservation boundaries, trust lands and tribal properties, but also on the specific biophysical properties of the resource in question. For example, in the case of Winters rights, even those tribes whose winters rights have been clarified and perfected, it is not clear whether they maintain authority over waters upstream or downstream from their reservation or over non-tribal water users on or off the reservation<sup>335</sup>. A tribe's ability to enforce permitting, stop illegal diversions, stop water quality violations and curb poaching is severely undermined by the legal complexity and uncertainty around tribal criminal jurisdiction over non-tribal members both on and off reservation. A handful of geographers have drawn on the cultural politics of scale literature to describe indigenous groups use of scale in struggles for sovereignty.

For example, Silvern (1999, p 64) argued that "treaty rights conflicts and litigation are instances of the political construction of geographical scale". Conflicts over tribal sovereignty are simultaneously conflicts to define and fix the geographical scale at which deliberation, decision-making authority and natural resource management should be located. Silvern (1999) shows how both the courtroom and the map are means of "structuring and restructuring geographical scale and, thus, power relations between indigenous peoples and states"<sup>336</sup>. Spatial formations are not given by nature or fixed in the landscape. Geographical and political scales are constantly subjected to challenge, contest, and change. As Smith (1992) notes, organized efforts of political resistance often hinges on the strategic reorganization of geographical scale<sup>337</sup>. Swyngedouw (1997, p. 147) for example, observes that: "Scale reconfiguration, in turn, challenges existing power relations, questions the existing power geometry and, thus, expresses the effects of sociospatial struggles"<sup>338</sup>. Norman (2012) similarly writes about connections between the process of rescaling the boundaries of governance and attempts to shift power relations between indigenous groups and State agencies. She argues that "a critical discussion of the cultural politics of borders and border making helps to identify and thereby address more effectively, the power dynamics constituted through postcolonial constructions of space and hydrosocial networks"<sup>339</sup>. Norman (2012) and Silvern (1999) both present examples of

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<sup>335</sup> Goodman, Edmund J. "Indian tribal sovereignty and water resources: Watersheds, ecosystems and tribal co-management." *J. Land Resources & Envtl. L.* 20 (2000): 185.

<sup>336</sup> Silvern 1999, p 641.

<sup>337</sup> Smith, Neil. "Contours of a spatialized politics: homeless vehicles and the production of geographical scale." *Social text* (1992): 55-81. "Successful political resistance depends in many instances on denaturalizing established scales of political authority" Silvern, 199, p. 665.

<sup>338</sup> Empowerment of subordinated groups and their inclusion in the decision-making processes is facilitated by altering the configuration of existing scales or by "harnessing powers and instrumentalities at other scales" Jonas, 1994, p. 258.

<sup>339</sup> Norman, Emma. "Cultural politics and transboundary resource governance in the Salish Sea." *Water Alternatives* 5.1 (2012): 138-160.

Indigenous peoples successfully challenging the normative scale structures of political authority in order to regain control over political spaces and assert sovereignty over natural and cultural resources.

Indigenous peoples link scalar politics to the processes of social transformation and political empowerment – “to simultaneously pursue the economic politics of redistribution, the cultural politics of recognition, and the environmental politics of sustainability”<sup>340</sup>. Smith (1993, p. 95) calls this relationship between scale, social power, and resistance, “jumping scales”<sup>341</sup>. However, as I show in chapter 5, in the Klamath actors don’t simply jump scales from the watershed, but rather use other scales to relationally define the watershed- to bring out important dimensions within, across and beyond the watershed scale that actually helps make watershed management more appropriate for the local ecological dynamics and the local community’s values.

### *Karuk sovereignty and the cultural politics of scale*

In particular I am interested in how watershed democracy has opened up opportunities for representatives and members of the Karuk tribe to participate in knowledge production and decision-making processes affecting natural resource management in their ancestral territory in the middle Klamath. To begin with, ancestors of the Karuk have occupied the mid-Klamath region for thousands of years, with archaeological and linguistic evidence suggesting habitation as far back as 10,000 BP<sup>342</sup>. Karuk stories, ceremonies and cultural resource management practices connect them to the Klamath landscape across generations<sup>343</sup>. As we will

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<sup>340</sup> Howitt 2003 p 148

<sup>341</sup> Smith 1992, p. 66: “..the importance of “jumping scales” lies precisely in this active social and political connectedness of apparently different scales, their confusion and abrogation.”

<sup>342</sup> Salter, John. 2003. *The Effect of the Klamath Hydroelectric Project on Traditional Resource Uses and Cultural Patterns of the Karuk People Within the Klamath River Corridor*. Karuk Tribe: 2003, p 1. Natural Setting and Reconstruction of Early Patterns of Habitation of the Klamath Basin, p. 6: “While relatively little archaeological work has taken place within Karuk Ancestral Territory, sites in nearby Lake County are dated in excess of 10,000 B.P. (Kaufman 1980; Meighan and Haynes 1970). The marked differentiation of Karuk language from affiliate languages of the Hokan linguistic stock is another indication of the time that the Karuk have lived as a people with a common language and cultural identity long removed from its place of origin. “The language is not closely or obviously related to any other; its presumed Hokan affiliations are distant. There was no known dialect differentiation” (Shipley in Sturtevant ed. 1978 p. 84). Based upon linguistic evidence, K.W. Whistler (1979) has hypothesized that the Northwest Coast region of California was first occupied by the Paleo-Indian ancestors of the Karuk. Whistler’s reconstruction of a sequential inhabitation of aboriginal northern California places the ancestral Karuk as the first to arrive in the area”. See also Chartkoff, Joseph L., and Kerry K. Chartkoff. 1975 "Late Period Settlement of the Middle Klamath River of Northwest California." *American Antiquity*, vol. 40, no. 2 172-179; Lake, Frank. 2007. *Traditional Ecological Knowledge to Develop and Maintain Fire Regimes in Northwestern California, Klamath-Siskiyou Bioregion: Management and Restoration of Culturally Significant Habitats*. PhD diss., Oregon State University.

<sup>343</sup> See eg. Karuk Tribe Department of Natural Resources. *Eco-cultural Resource Management Plan*. Orleans: 2013.

see in Chapter 4, although the Karuk Tribe negotiated treaties with the US military in 1851, these treaties were never ratified by the U.S. Senate, due to reluctance of California Senators to cede valuable lands to tribes<sup>344</sup>. The eighteen treaties made with California Tribes in 1851-1852 were classified and buried deep in Senate files by California Senators who refused to let go of the ceded land, then estimated at over a hundred million dollars and assumed to harbor untold fortunes worth in gold and silver resources<sup>345</sup>. Unlike the other tribes of the Klamath Basin, such as the Yurok, Hoopa, Quartz Valley and Klamath Tribes who were later granted reservation or rancheria lands through subsequent treaties and legislative acts, the Karuk Tribe does not have a reservation to this day.

In principle, on technical legal grounds, since no valid treaty was ratified, the Karuk have also never ceded sovereignty or territory to the U.S. government. The Karuk Tribe continues to dispute federal ownership of its aboriginal territory<sup>346</sup>. In 1978, the Karuk Tribe gained formal federal recognition after a BIA field officer visited the Klamath and determined that, “based on the findings collected, the continued existence of the Karoks (sic) as a federally recognized tribe of Indians has been substantiated”<sup>347</sup>. The Assistant Secretary for Indian Affairs then notified the local offices of the Bureau of Indian Affairs on January 15, 1979, that: “In light of this finding, I am directing that the government-to-government relationship, with attendant Bureau services within available resources, be re-established”<sup>348</sup>. Based on this authority, the tribe then drew up a constitution, held elections and established a Tribal Council in 1985<sup>349</sup>. The Karuk Tribe’s Aboriginal Territory was then mapped by the BIA as part of the federal determination process for tribal recognition. It includes an estimated 1.38 million acres in the Middle stretch of the Klamath River Basin, nearly 95% of which is located concurrent to

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<sup>344</sup> Heizer, Robert. 1972. *The Eighteen Unratified Treaties of 1851-1852 Between the California Indians and the United States Government*. Archaeological Research Facility University of California (pp. 1-103). Berkeley, CA.; Hurtado, A. L. 1988. *Indian survival on the California frontier*. New Haven: Yale University Press.

<sup>345</sup> See Heizer, Robert. 1972. Intro to *George Gibbs Journal of Redick McKee’s Expedition through Northwestern California in 1851*. UCB Archaeological Research Facility; Arthur J Ray, Central Sites, *Peripheral Visions : Cultural and Institutional Crossings in the History of Anthropology* ed. Handler, Richard; Publisher: University of Wisconsin Press : 2006.

<sup>346</sup> Karuk Department of Natural Resources 2013.

<sup>347</sup> See 13 IBIA 76, 78; 1985 WL 69127 (I.B.I.A.)

<sup>348</sup> January 15, 1979 Memorandum entitled “Revitalization of the Government-to-Government Relationship Between the Karok (sic) Tribe of California and the Federal Government”. Letter from the United States Department of the Interior, Assistant Secretary of Indian Affairs, January 15, 1979. The Assistant Secretary writes that he is, “herby directing that the government-to-government relationship, with attendant Bureau services within available resources, be re-established. Accordingly, I am further directing that the tribe be added to all lists of federally recognized tribes maintained by the Bureau of Indian Affairs.”

<sup>349</sup> Constitution of the Karuk Tribe (formerly known as the “Karuk Tribe of California”) Original Constitution Adopted April 6, 1985; Amendments Adopted by Special Election July 19, 2008; 73 Fed. Reg. 18,535, 18, 544 (April 4, 2008)

lands administered by the USDA Forest Service's Klamath and Six Rivers National Forests<sup>350</sup>.

In 1905, multiple Forest Reserves were created in the Klamath-Siskiyou mountains of Northern California which eventually became Klamath National Forest. In 1947, Harry Truman set aside lands in the middle and lower-Klamath as Six-Rivers National Forest. As we will see, the US forest service managing its lands on behalf of the "public" has resulted in criminalization of Karuk resource management practices, suppression of prescribed fire, lack of access to cultural and subsistence resources and loss of knowledge, language and indigenous management techniques; in short, what the Karuk people term "eco-cultural genocide". As we will see in chapter 4, members of the Kaurk Tribe have contested US jurisdiction since the contact period, forcing concessions in land, water, fishing and resource rights. Beginning in the late 1970s, the Tribe began a process of "eco-cultural revitalization" - restoration of the watersheds and ecosystems upon which Karuk culture, community health and political self-determination depend. The California Department of Fish and Game, at the request of the BIA, began allocating a tribal harvest at Ishi Pishi falls in 1979, and by 1985, the California courts had recognized the Karuk's right to fish at Ishi Pishi falls for ceremonial and subsistence purposes.

However, the Karuk Tribe to this day does not have a reservation. As a result of Karuk efforts to regain tribal sovereignty and eco-cultural restoration, the Forest Service holds a number of Tribal lands, waterbodies, sacred sites, medicine trails, cultural management areas, and ceremonial districts in trust for the Karuk Tribe. In addition, the Tribe has numerous MOUs in place to direct management on federal lands in a manner consistent with Tribal values. A few ceremonial sites and dance grounds are registered or nominated as cultural historic properties in the state and national registers of historic places. Most Tribal housing, fee-trust property and administrative centers are located in the towns of Happy Camp, Orleans, Somes Bar, and Yreka. On paper, this amounts to about 827 acres of tribal trust lands (slightly over one square mile), held in trust on behalf of the Tribe by the U.S. federal government<sup>351</sup>. However, the Karuk Tribe claims jurisdiction over their nearly 4,000 members and their entire 1.38 million acre aboriginal territory<sup>352</sup>. For the remaining 1,379,173 acres the tribe does not hold formal

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<sup>350</sup> Tripp, Bill. Understanding the Indian Connection to Land and Place. *Evergreen Magazine*. Spring 2014. Pg. 12.

<sup>351</sup> Diver, Sibyl Wentz. *Negotiating knowledges, shifting access: Natural resource governance with Indigenous communities and state agencies in the Pacific Northwest*. PhD Dissertation. University of California, Berkeley: 2014, p 31. Karuk Tribe. (2007). "State reaches historic agreement on child welfare services with the Karuk Tribe of California." *Karuk Tribe Quarterly Newsletter*. (Spring)

<sup>352</sup> Mission and Values Statements: "The Karuk Tribe values the interests and wellbeing of the Karuk People. The values associated with this wellbeing are primarily health, justice, economic security, education, housing, self-governance, as well as the management and utilization of cultural/natural resources within and adjacent to the Karuk Aboriginal Territory now and forever. The mission of the Karuk Tribe is to promote the general welfare of all Karuk People, to establish equality and justice for our Tribe, to restore and preserve Tribal traditions, customs, language and ancestral

paper title to, the Karuk Department of Natural resources must attempt to negotiate its sovereignty over natural resources with the Forest Service, State and Federal Departments of Fish and Wildlife, the Department of the Interior, the US EPA, the State and Regional water boards, Humboldt and Siskiyou County governments, Cal Trans and countless other State, Federal, local and private agencies.

Because the Karuk tribe's political and cultural self-determination is tied to watershed and ecosystem restoration, it involves complex spatial strategies. In chapters 3-6, I show how struggles over political and cultural self determination take place at multiple scales other than watersheds such as around foodsheds, firesheds, airsheds, across landscapes, along road networks and at county, state, federal and global scales of knowledge production and policy making. Sovereignty is continually negotiated at multiple scales and self-determination happens in multiple arenas of governance. In the next section, I describe the need for multi-scalar perspectives to analyze knowledge production, deliberation and collective action in resource management in the Klamath.

#### *Reframing myopic scalar assumptions in Klamath environmental governance*

When I first ventured up to the Klamath in 2009, I was planning on studying conflicts over "indigenous water rights" and the use of science to determine whether or not Klamath dam removal was in the public's best interest. While the controversial nature of dam-removal made the research process difficult on one hand, I also began to realize through conversations with community partners that by expanding my focus to "collaborative watershed governance", I could analyze the linked processes of multi-perspectival inquiry and community-based natural resource management to observe the inclusions and exclusions structured by new modes of knowledge production and decision-making as they emerged and became institutionalized. Also, by focusing on the watershed scale, I thought I could better encompass the integrated nature of local resource concerns, from fire and forest management to healthy food access and in-stream fisheries habitat and water quality. I set out to examine the cultural politics of knowledge in collaborative watershed governance in the Klamath, looking specifically at the ability of Karuk tribal members to participate in knowledge production and decision-making processes that impacted resource management and access to resources in their ancestral territory. In the research methods I co-designed with my dissertation committee and community partners, I focused on federal, state and local arenas of collaborative watershed governance in three Sub-Basins to evaluate the processes and outcomes of Klamath watershed democracy in terms of their impacts on tribal sovereignty, territoriality, access to resources and political and cultural self-determination.

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rights, and to secure to ourselves and our descendants the power to exercise the inherent rights of self governance". From Karuk Tribe Department of Natural Resources. *Eco-Cultural Resources Management Plan*. Orleans: 2011, p 2.

For each of the policy processes listed in Table 1, I employed a mixture of document analysis, participant observation, and in-depth interviews with agency scientists, administrators and staff to follow knowledge being generated, contested, stabilized and taken up into policy at the watershed scale. I initially attempted to structure my research into these knowledge production and governance process through a “nested” study, looking at knowledge and policy-making processes at the Klamath Basin-wide level, the Scott, Salmon, and Mid-Klamath sub-basin level, and three small creeksheds within each Sub-basin. I thought that this nested approach would provide an ideal window into Klamath watershed governance to both view the construction of Basin-wide science and policy in representative and deliberative bodies and observe its refractions through local everyday practices. By focusing on policy processes occurring around, within, and between these three watersheds, I had hoped to portray the complexity of scales and diversity of institutional arenas through which negotiations over watershed knowledge and value take place. However, I soon found out through interviews, focus groups and conversations with community partners that the way I was setting my sights and structuring my case-studies was missing important indigenous perspectives on scale and eco-cultural restoration.

As we will see in detail in chapters 3-5, ontologies and epistemologies of the watershed have been both leveraged and challenged by the Karuk Tribe. Collaborative watershed management forums have presented important opportunities for Karuk tribal members to influence resource management and carve out space for indigenous voices and values. However, the watershed scale has also to some extent squeezed out the tribal perspective. Rather than “neutral” grounds for governance, the watershed unit has proven to be a contentious site for bringing together multiple perspectives and diverse social and ecological values. Instead of apolitical grounds for assembling diverse knowledges, watershed-scale science and policy has actually opened up epistemic factions along cultural, economic, bureaucratic and political lines. Despite a commitment to epistemic diversity and deliberative democracy, watershed forums have struggled to harmonize different types of indigenous, traditional, local, and scientific knowledge and have instead provoked debates about what constitutes credible knowledge of watershed processes and who has authority to represent the values and interests attached to watershed resources. In chapter 4 and 5, I attempt to show how through these knowledge conflicts, the representativeness of the watershed has itself been called into question- its representativeness as a natural form in its ability to register local biophysical and ecological dynamics, and as an institutional form, in the ability of watershed assemblies to speak for the knowledges and values of their constituents.

Organizing democracy and natural resource management around the wrong scale has been termed a “*spatial misfit*” in the ecosystem and water management

literature<sup>353</sup>. Cohen (2011) uses the term “*scalar mismatch*” to describe the asymmetries of watershed-centric governance with “problemsheds”, “policysheds” and other scales that might actually be better spatial fits for democracy and ecosystem restoration<sup>354</sup>. Mollinga and Meinzen-Dick (2007) discuss the need to replace watershed-centric governance with a focus on political plurality, “problemsheds” and “issue-networks”<sup>355</sup>. They argue that watershed-centric “social engineering” approaches to democracy need to acknowledge the inherently political character and the plurality of actors, institutions and objectives of resource management. They argue that watershed-centrism is “unwise, given the complexity and multi-dimensionality of water management problems”<sup>356</sup>. They instead argue that a “problemshed” approach is more conducive than a watershed-centric approach because “the question regarding the boundaries of a given water management issue in space, in time and socially, is treated as an open, empirical question in a problemshed perspective, while, in a watershed perspective, boundaries are pre-defined spatially, sectorally and analytically through the primacy of ‘water’”. Through the course of conducting research on watershed democracy in the Klamath, I uncovered a similar “scalar mismatch” between watersheds and the spatiality of both local natural resource issues and local institutions for democratic deliberation and eco-cultural revitalization.

### *Watersheds, firesheds and foodsheds: opening up the scales of environmental democracy*

By structuring my case-studies around the drainage basin scale, I was making the same uncritical assumption as proponents of watershed democracy: that the watershed was the appropriate scale for both analyzing and implementing ecological democracy. I began to see how the scalar focus on watersheds was limiting the kinds of knowledge that could pattern as reliable in collaborative resource management forums. In Chapter 4, I show how in certain instances indigenous cosmologies and spiritual beliefs, in which knowledge cannot be separated neatly separated from life and everyday livelihood practices, were relegated to the realm of “mere” culture and seen as having no epistemic value. In other critiques, community partners mentioned instances in which knowledge had been shared out, but little benefit had been returned to the tribal community in the form of jobs, resource access or legal rights to land and resources. As we will see in

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<sup>353</sup> Borowski, I., J. Le Bourhis, C. Pahl-Wostl, and B. Barraqué. 2008. Spatial misfit in participatory river basin management: effects on social learning. a comparative analysis of German and French case studies. *Ecology and Society* 13(1): 7. A “spatial misfit” between a natural resource and resource management institution occurs if the two don’t refer to same geographical area; see also Saldías, Cecilia, et al. “Losing the watershed focus: a look at complex community-managed irrigation systems in Bolivia.” *Water international* 37.7 (2012): 744-759.

<sup>354</sup> Cohen, Alice, and Seanna Davidson. “The watershed approach: Challenges, antecedents, and the transition from technical tool to governance unit.” *Water alternatives* 4.1 (2011): 1-14.

<sup>355</sup> Mollinga, Peter P., Ruth S. Meinzen-Dick, and Douglas J. Merrey. “Politics, plurality and problemsheds: A strategic approach for reform of agricultural water resources management.” *Development Policy Review* 25.6 (2007): 699-719.

<sup>356</sup> Mollinga et al 2007, p. 707.

chapter 5, one of the strongest critiques I was hearing of watershed-centric governance from my community partners was that a watershed-centric gaze does not respond well to the way fire moves across landscapes.

At one focus-group session where I was attempting to get feedback from my committee on my research design, the committee suggested I start thinking about scales of resource governance other than the watershed in order to more effectively engage indigenous perspectives on scale. I began attending meetings of the “upslope working group”, who were then attempting to move the focus of collaborative research from the “in-stream” to the “upslope” areas of Klamath watersheds in order to more effectively manage fire and, in turn, watersheds. As we will see in chapter 5, the upslope group eventually formed the Western Klamath Restoration Partnership and began defining community “firesheds” and mobilizing collective action around them. Around 2005, after two decades of experiments in watershed democracy, the movement of fire across landscapes began suggesting alternative sites and shapes for the formation of democratic resource management institutions in the Klamath.

Around the same time (January 2013), I was also participating in the Klamath Basin Food Security project aimed at expanding access to traditional foods among indigenous communities in the Klamath. My community partners were exploring another unit of community-based resource management, the “foodshed”, to describe the spatiality of local indigenous food and fiber resources. By comparing the watershed to these other spaces and scales of resource management, I have been able to explore the multiple, contradictory and contested scales of Klamath resource governance and more general issues related to the politics of knowledge in the scaling of power and political representation. In Chapter 5, I compare watersheds, firesheds and foodsheds in their abilities to bring together diverse forms of environmental knowledge and place-based values around multiple scales of social and ecological processes.

Watersheds, firesheds and foodsheds are all “technologies of vision”, simultaneously enabling and constraining vision, making certain sets of social-ecological relations visible by obscuring others. These three ways of marking distinctions across the Klamath eco-cultural landscape materialize particular ways of knowing and living in nature. Watersheds, firesheds and foodsheds similarly emerge from long histories of resource struggle and contestation over the representation of the landscape and the shapes of its material processes, forms and functions. Each “way of seeing” inherits a different institutional and material-semiotic baggage in attempting to bring ecological democracy in more intimate contact with people and place. Following my community partners engage the more-than-human at multiple nested scales opens up new understandings of Klamath eco-cultural landscapes and new possibilities for democratic environmental governance.



To better depict the way water flows through Klamath watersheds and more responsibly represent the multiple scales through which watershed inhabitants understand and value nature, I suggest the need for multi-scalar and polycentric governance institutions, the boundaries and nesting patterns which are themselves designed through democratic processes. I argue that attempts to democratize science and environmental governance in the Klamath require an accompanying commitment to "*democratizing scale*", meaning opening up questions related to the appropriate spatial and temporal contours of collaborative environmental governance to deliberative inquiry. I argue that, in order to accommodate diverse ways of knowing and valuing nature, ecological democracy must also be able to find common ground among the different scales through which people seek knowledge about nature and act collectively to manage natural resources.

## **Chapter 2**

### ***Watershed narratives:***

#### ***Co-producing watershed science and watershed governance***

##### ***1. Introduction: Narrative Matters***

This chapter provides a genealogy of watershed science and governance in the Western United States as background for an in-depth analysis of Klamath experiments in watershed democracy. I bring an intellectual history of the watershed as a scale of knowledge-production together with an environmental history of the watershed as a scale of environmental governance and a social history of the watershed as a site of democracy. I demonstrate how understandings of watershed processes are built alongside particular political formations, ways of inhabiting watershed ecosystems and allocating watershed resources. In particular, I focus on how theories and practices of democracy are worked out through collective political action at the watershed scale. Each time the watershed provides a template for democracy, it articulates different relationships between expert and non-expert knowledge, states and their publics, political economies and the materialities of watershed ecosystems. I demonstrate in this chapter how the discourse and theory of watershed democracy is invoked, contested, revived and redeployed numerous times in numerous contexts, with both ruptures and continuities evidenced in modes of watershed science and democracy. I examine the role of watershed science in mediating relations between publics and their representatives, legitimizing public agency authority and defining the role of the state in regulating private land and water use. Chapters 3-6 will then analyze in detail how the watershed emerges as a unit of knowledge production, resource governance and democratic deliberation in the Klamath.

To begin this chapter, I explore debates among environmental historians about how relationships between humans and water change over time. These debates center on appropriate theoretical frameworks for charting the historical development in space and time of human institutions and technologies for managing water. Debates among environmental historians about the history of water governance in California are not merely about what happened or didn't happen and when, but also about appropriate epistemological and ontological positions for understanding human-nature relations in general. Following numerous environmental historians, I'll begin a social, intellectual and environmental history of the watershed by arguing that narrative inheres in all histories of human engagement with nature <sup>357</sup>. Stories arrange interactions

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<sup>357</sup> Cronon, William. "A place for stories: Nature, history, and narrative." *The Journal of American History* (1992): 1347-1376.; Fortmann, Louise. "Talking claims: discursive strategies in contesting property." *World Development* 23.6 (1995): 1053-1063.

between humans and their environments into causal sequences from which meanings and morals can be extracted. According to Cronon (1997), it is because we care about the consequences of our actions that we tell stories about nature, for the difference between beginning and end allows us to “extract a moral from the rhetorical landscape” and draw lessons from that difference<sup>358</sup>. Ordering events in space and time is a form of knowledge-making linked with ways of living in and moving through the world<sup>359</sup>. Fortmann (1995) for example, underlines the analytical power of narrative, arguing that stories have the power to frame understandings of the natural and social worlds: “to create and maintain moral communities; to validate current actions; and to empower, encourage and relieve their tellers”<sup>360</sup>. For Whitt (2009), storytelling is an important component of decolonial praxis and a crucial component of the ways in which nature comes to be known by groups of people<sup>361</sup>. This chapter lays out a narrative that details the emergence of the watershed as a scale of knowledge-production, a unit of integrated resource management and a template for ecological democracy in the Western United States. Throughout this historical narrative, I demonstrate that the ways humans understand and represent watersheds are deeply entangled with the ways in which we choose to live in them, manage them and allocate their resources.

In this chapter, I demonstrate how theorists of watershed-based democracy rely on narratives about the origin and development of watershed science and governance to anchor grand theories about the waning and waxing of empires, trajectories of environmental change and patterns of biological and social evolution. Each watershed narrative organizes the relationships between humans, institutions of governance and human interactions with land and water into a causal sequence with a beginning and an end in order to offer up morals and chart potential futures for watershed ecosystems and communities. The decisions of when to start, when to stop and what to include in-between have serious political, epistemological and material implications for how watersheds are managed. I will show in this chapter how narratives about the history of watershed science and governance have materially influenced resource management practices from the family farm to regional, national and inter-national scales of environmental governance. At stake in the story of how watershed-based institutions emerged and where they are headed is the ability to define a social order that is sanctioned by science and grounded in the forms of nature. The ability to define the past and plot its development into the present also allows the author to chart futures for nature and society and materially shape the way water flows through watershed ecosystems and communities.

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<sup>358</sup> Cronon 1992

<sup>359</sup> Turnbull, David. "Maps narratives and trails: performativity, hodology and distributed knowledges in complex adaptive systems—an approach to emergent mapping." *Geographical Research* 45.2 (2007): 140-149, esp. pgs 4, 53.

<sup>360</sup> Fortmann 1995, p. 1054

<sup>361</sup> Whitt, Laurelyn. *Science, colonialism, and indigenous peoples: The cultural politics of law and knowledge*. Cambridge University Press, 2009.

In bringing water and society together under the same analytical lens, I want to make sure that I avoid both environmental determinism, or explaining away culture and politics by reference to an unexamined nature, as well as cultural or technological determinism, or explaining human-nature relations through essentialist accounts about the linear development of human civilization and the eventual triumph of culture over nature. I therefore begin my account of the history of watershed science and governance with an overview of debates among geographers and political ecologists about the correct way to study the historical relationships between water, science and society.

## **2. Hydraulic Civilization vs. the Hydrosocial Cycle**

“Hydraulic civilization” is a now infamous concept used by mid-20<sup>th</sup> Century environmental historian Karl Wittfogel to describe the historical development of totalitarian societies based on the ways they managed large-scale water infrastructures<sup>362</sup>. His 1957 magnum opus “Oriental Despotism: A Comparative Study of Total Power” attempted to trace the historical development of the institutions through which Russian, Chinese, and Indian states built and controlled water works<sup>363</sup>. Writing in the 1950s, at the height of the cold war, his main project was to uncover the causes and forces that lead to the “Asiatic mode of production and social form” in ancient regimens of water management, as he believed that nature and society had intrinsic properties that led them to develop according to inner laws that could be unlocked by studying ancient water management regimes<sup>364</sup>. He located the origins of authoritarian rule in Stalinist Russia and Maoist China in in what he termed their “Asiatic” networks of State-controlled infrastructure for water management and irrigation. In his narrative of water and society, intrinsic cultural and institutional factors related to the necessity of large-scale water management combined with arid climatic conditions to predestine Asian institutions for despotism<sup>365</sup>.

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<sup>362</sup> Wittfogel, Karl August. *Oriental despotism: A comparative study of total power*. Vol. 3. Vintage books: (1957) 1981.

<sup>363</sup> Wittfogel 1957

<sup>364</sup> His thesis is often misinterpreted as “environmental determinism” rooted in the idea that the relatively arid conditions of pre-historic Asia and Russia necessitated large scale works and coordination which led inevitably to a despotic society, whereas the humid conditions of Europe incubated a decentralized “capitalist-democratic” mode of production. See Banister, Jeffrey M. "Are you Wittfogel or against him? Geophilosophy, hydro-sociality, and the state." *Geoforum* 57 (2014): 205-214.

<sup>365</sup> Wittfogel writes (1957) that the form of governance depends first on the “institutional order” and second on the ultimate target of mans' activity: the physical, chemical, and biological world available to him. According to Wittfogel, only with “all institutional conditions being equal” does the difference in the natural setting permit or preclude the development of new forms of technology, subsistence and social control. Against a strict environmental determinism, he shows how the “Asiatic mode of production” cannot be attributed solely to arid conditions by giving examples of “decentralized” co-ordination in Mormon irrigation, Po-Valley irrigation, and Dutch canal building.

Wittfogel's theory has since been disproven on account of its incorrect historical details and flawed evolutionary institutional model, its geographical simplifications, sloppy hydrology and dangerous assumptions that East is essentially different- biologically, environmentally, and racially- from West<sup>366</sup>. Still, it has influenced prominent theorists of water and social formation, including prominent environmental historians such as Donald Worster, whose vision of watershed democracy was discussed in detail in the last chapter. For example, in *Rivers of Empire* (1986), Worster attempts to rework Wittfogel's theory of "hydraulic civilization" to analyze the Federal reclamation of the American west. Worster begins his narrative with a description of the Friant Dam-Kern canal system in California, which he asserts can be seen as a metaphor for the watersheds of the West- canalized, abstracted, and controlled technologically to run in a straight line toward maximum yield and maximum profit. He invokes Wittfogel to assert that the Federal government's technological control of water has resulted in a "hydraulic society of the West"- a technocratic and authoritarian form of water governance ruled by an elite with a monopoly on power and expertise<sup>367</sup>. The critiques of Worster's broad brush history retrace some of the earlier criticisms leveled at Wittfogel- that he made historical errors, flattened cultural, geographical and institutional diversity, and is guilty of environmental and/or technological determinism<sup>368</sup>.

Wittfogel and Worster's theories have recently come under scrutiny in debates among geographers and political ecologists about the historical development of water science and governance institutions. Though one of the first attempts to systematically study the historical patterns of relationships between water, science and society, "hydraulic civilization" now stands as an example of "hydrologic determinism", or an over-reliance on water and the human relationship to water as an explanatory variable in understandings of social and environmental relations. Political ecologists, geographers and water scholars have instead sought out better models for understanding the heterogeneity and plasticity of relationships between science, technology, social institutions and water in more nuanced and dynamic terms. In contrast to "hydraulic civilization", geographers and political ecologists have recently begun to develop the concept of

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<sup>366</sup> See e.g. Banister 2014; Robbins, Paul. *Political ecology: A critical introduction*. Vol. 16. John Wiley & Sons, 2011, p. 57; Swyngedouw, Erik. "The Political Economy and Political Ecology of the Hydro-Social Cycle." *Journal of Contemporary Water Research & Education* 142.1 (2009): 56-60; Schmidt, Jeremy J. "Historicising the hydrosocial cycle." *Water Alternatives* 7.1 (2014): 220-234; Linton, Jamie, and Jessica Budds. "The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water." *Geoforum* 57 (2014): 170-180.

<sup>367</sup> Worster, Donald. *Rivers of empire: Water, aridity, and the growth of the American West*. Oxford University Press, 1985. See esp. pgs. 21-60.

<sup>368</sup> White, Richard. "Environmental history, ecology, and meaning." *The Journal of American History* (1990): 1111-1116. Richard White critiques Worster for his "clumsy value judgments" and his "ecological romanticism", which opposes a "naïve" natural, harmonious, and pristine nature to human-interacted landscapes. White claims that Worster's portrayal of the Bureau of Reclamation as monolithic and omnipotent "serves to simplify environmental analysis as much as capitalist agriculture has simplified farmers' fields".

the “*hydro-social cycle*” to describe the “socio-natural process by which water and society make and remake each other over space and time”<sup>369</sup>.

The hydro-social cycle is a more nuanced framework than hydraulic civilizations for capturing the way institutions, power relations and cultural politics shape and are shaped by flows of water through ecosystems and communities<sup>370</sup>. The hyphen between the hydro and the social ensures that the flow of water cannot be understood apart from its embeddedness in social relations<sup>371</sup>. Geographer Jamie Linton’s notion of “*hydrolectics*” refers to the mutually constitutive relations between water knowledges, water governance institutions, infrastructures and actual flows of water through ecosystems and human communities<sup>372</sup>. According to Linton, we can’t understand water apart from its embeddedness in social practices or its entanglements in relations with more-than-human others. Similarly, the flow of water through watersheds cannot be understood without attending to the complex ways that humans use, perceive, manage and fight over water.

The major difference between the idea of “hydraulic society” and the “hydrosocial cycle” is that the later is more concerned with how State and social institutions produce water knowledge and engage water’s materiality in particular historical moments and places rather than in identifying eternal essences in water and socio-cultural formations and explicating the universal laws according to which water governance unfolds. Against such universal essences, recent work on the co-production of waterscapes gets after the mutually constitutive dynamics between ways in which water is studied, valued and managed as well as the slippery ways water escapes all attempts to know and tame it. Whereas water is figured as a passive resource in “hydraulic civilization”, water plays the role of actor or agent in the “hydrosocial cycle”, and is portrayed as playing an active role in shaping patterns of social life. These accounts afford a glimpse of the complex ways in which flows of water, institutions and identities are co-produced in particular moments. In the hydrosocial cycle, in contrast to “hydraulic

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<sup>369</sup> Linton, Jamie, and Jessica Budds. "The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water." *Geoforum* 57 (2014): 170-180; Budds, Jessica. "Whose scarcity? The hydrosocial cycle and the changing waterscape of La Ligua river basin, Chile." *Contentious geographies: Environment, meaning, scale* (2008): 59-68; Boelens, Rutgerd. "Cultural politics and the hydrosocial cycle: Water, power and identity in the Andean highlands." *Geoforum* 57 (2014): 234-247; Swyngedouw, Erik. "The Political Economy and Political Ecology of the Hydro-Social Cycle." *Journal of Contemporary Water Research & Education* 142.1 (2009): 56-60.

<sup>370</sup> See e.g. Linton and Budds 2014; Bakker, Karen. "Archipelagos and networks: urbanization and water privatization in the South." *The Geographical Journal* 169.4 (2003): 328-341; Swyngedouw, 2004. *Social power and the urbanization of water: flows of power*. Oxford: Oxford University Press, 2004.

<sup>371</sup> See e.g. Swyngedouw 1997, p. 312: “the circulation of water is embedded in social power relations”. Swyngedouw, Erik. "Power, nature, and the city. The conquest of water and the political ecology of urbanization in Guayaquil, Ecuador: 1880-1990." *Environment and planning A* 29 (1997): 311-332.

<sup>372</sup> Linton, Jamie. *What is water?: The history of a modern abstraction*. UBC Press, 2010.

civilizations”, water and society are related internally. They are mutually constituted hybrids, built into one another rather than related as externally-related entities that develop according to their own internal logics.

In the hydrosocial cycle, water takes on different meanings in different contexts. Different ways of managing waters articulate different patterns of social relations, but not in any sort of linear, mechanistic or deterministic way. Flow regimes, or patterns of water flow (see Chapter 3), produce rhythms against which human societies organize their social, economic and cultural activities. Different kinds of political and social orders are realized in different ways of producing knowledge about, managing and relating to water, but these hydro-political orders are themselves fluid- hydrosocial formations are constantly changing shape, assembling, disassembling and reconfiguring patterns of social relations and water flows.

As we will see in this chapter, the watershed has attempted to gather humans, non-humans and flows of water together both conceptually and politically for centuries. As mentioned last chapter, the watershed gathers together humans, terrestrial and aquatic ecosystems and their non-human inhabitants together through the flows of water that draw them together and bind them. Similarly to the ways in which water and society are related dialectically in the model of the hydrosocial cycle, watersheds both embed and express social relations and power geometries. Watersheds can stabilize and organize social institutions, but they can also disrupt them. The relationships between watersheds and society are also fluid, complex and dynamic. They are messy and contingent, containing emergent dynamics, non-linear properties and multiple stable states. Always simultaneously a biophysical *and* social formation, the watershed emerges out of a mangle of knowledge practices, institutions, politics and material-semiotic flows.

### ***3. Ludwig Teclaff's watershed narrative***

Narratives help make sense of the long and complex histories of watershed science and governance by positing neat endings and beginnings and highlighting information of interest to the storyteller and their audiences. Narratives about the origin and development of watershed science and governance are not merely about letting the facts speak for themselves, but rather about putting forth a vision of ideal relationships between science, nature and society. To illustrate, I will first dig into the watershed historiography of Ludwig Teclaff, a legal historian who wrote during his life (1918-2003) on such varied topics as the “international law of the hydrologic cycle” and the protection of deep-sea “abyssal creatures” through the law of the sea<sup>373</sup>. His magnum opus, “The River Basin in History and Law”, is cited

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<sup>373</sup> See e.g. Teclaff, Ludwik A. *Water law in historical perspective*. Buffalo, NY: WS Hein, 1985; Teclaff, Ludwik A. "Evolution of the river basin concept in national and international water law." *Nat. Resources J.* 36 (1996): 359; Teclaff, Ludwik A. "International Law and the Protection of the Oceans

by numerous environmental historians and water scholars as an important original source on the early history of watershed-based governance<sup>374</sup>. I will analyze this watershed historiography as a narrative to demonstrate how Teclaff's description of how knowledge about watersheds is built over time and taken up into legal and political institutions is simultaneously a prescription for a harmonious moral, political, legal and natural order. I aim to challenge this narrative trope about the way watershed science and governance develops in order to more accurately portray the mutually constitutive relationships between watershed science, watershed governance and watershed materialities.

The River Basin in History and Law was written in 1967 amidst widespread conflicts related to the enlarging water footprints of growing urban regions such as London, Manchester, Liverpool, New York City and Los Angeles and their increasing demands on upstream and out-of-basin water resources<sup>375</sup>. These debates put into question the proper scale and structure of authority and decision-making in water governance. As Teclaff was writing its legal history, the river basin concept was being challenged as the primary unit of resource management and planning by politicians and economists advocating inter-basin transfers and long distance water-marketing projects. Teclaff specifically mentions the Pacific Southwest Water Plan, an attempt to harvest water from the "water rich" regions of Northern and Eastern California and divert it to the water-scarce but populous and growing regions of southern California, as a critical flash-point of debate<sup>376</sup>.

The Klamath was mentioned in this Plan and others in the 1950s and 60s. Numerous diversion points were proposed for the export of water from the Shasta, Scott, Salmon and Trinity sub-basins over the Klamath-Sacramento drainage divide and into the Central Valley where it could be used by Southern and Central Californian farmers and cities. Against the "water imperialism" of growing Southern and coastal cities, rural counties in Northern and Eastern California were organizing and claiming "area of origin" priority rights over what they saw as their water<sup>377</sup>. It is amidst these debates that Teclaff strung together a history of water governance in order to prove that water should be managed according to its "natural" drainage pattern.

His argument winds the history of water law into a tragic narrative whose plot was building to a climax in that very moment. In Teclaff's narrative, the steady accumulation of knowledge about watershed processes over time drove an alignment of legal doctrines and drainage patterns that gradually realized the

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from Pollution." *Fordham L. Rev.* 40 (1971): 529; Teclaff, Ludwik A. "River Basin Concept and Global Climate Change, The." *Pace Envtl. L. Rev.* 8 (1990): 355.

<sup>374</sup> Teclaff, Ludwik A. *The River Basin in History and Law*. Springer Science & Business Media: 2012 (1967).

<sup>375</sup> See Teclaff 1967 esp. Introduction, pgs. 6 and 203.

<sup>376</sup> *Ibid* pgs 2, 186-87, 202.

<sup>377</sup> Robie, Ronald B., and Russell R. Kletzing. "Area of Origin Statutes-The California Experience." *Idaho L. Rev.* 15 (1978): 419.



watershed's natural hydrologic unity in institutional form. According to Teclaff, the watershed had been implicitly recognized legally, politically and commercially since ancient times- "the functional unity of the river basin found expression in human institutions long before it was fully understood"- and he lays out a plethora of evidence in support of this claim<sup>378</sup>. He details military strategies to control river networks and flood or desiccate enemies in ancient Egypt, Mesopotamia, China and medieval Europe. He cites treaties such as the Pax Romana and medieval free-passage agreements, which kept large river systems navigable for transportation and trade. European basins such as the Oder, Rhine, Loire, and Seine were held open for commerce and transport through merchant agreements, trade leagues, shipowners associations, royal proclamations and treaties between cities, guilds, and manorial lords<sup>379</sup>. He also spots instances of "commercial unification" in the timber trade of the Rhine and St. Lawrence, the fur trade of the Mississippi, and the "giant granary" of the Visla Basin in Poland, where regional patterns of production coalesced around drainage networks. Logs, furs, grain and people flowed down drainage basins, connecting regional economies through flows of water.

The function of these proto-examples in Teclaff's narrative is to show how all of human and natural history has been yearning towards a codification of the river basin in legal and institutional form, but never quite achieving it. According to Teclaff, only in the early to mid 20th Century through trans-boundary navigation treaties, massive hydropower and flood control projects and basin-wide development planning was the formal legal and institutional unity of the river basin finally made possible. Ironically for him, the same social forces that allowed for a complete scientific and technological mastery of water flows allowed for the distribution and usage of water in patterns that "violated the natural unity" of the basin. The massive flood control, hydropower, irrigation and navigational infrastructures built in the first half of the 20<sup>th</sup> Century allowed for the comprehensive control of water at the river basin scale, but they also opened up "non-organic" patterns of water management and distribution. The prospect of inter-basin transfers had reached such frenzy by 1963 that the Bureau of Reclamation had pronounced the "death" of the river basin as a unit of water management and regional planning<sup>380</sup>. It is against this narrative of the inevitable death of the watershed that Teclaff lines up his evidence and positions his argument that the watershed has always been and should always remain a relevant formation for the arrangement of social and political relations<sup>381</sup>.

To read Teclaff's watershed history as a narrative is not to say that Teclaff is cherry-picking historical moments and distorting them at-will to launch his

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<sup>378</sup> Teclaff, Ludwik A. "Evolution of the river basin concept in national and international water law." *Nat. Resources J.* 36 (1996): 359, p. 361.

<sup>379</sup> Teclaff 1957, pg. 56.

<sup>380</sup> US Department of Interior. *Pacific Southwest Water Plan*. Washington D.C. 1963.

<sup>381</sup> Teclaff 1967, pg. 203.

political polemic against inter-basin transfers. Teclaff's narrative is grounded in real events whose imprints are reflected in real documents, treaties, war chronicles, and legal records. However, he strings these moments together in a narrative arc in order to elicit emotions from his audience, make them feel affinities to lost civilizations in their relations to water and enroll them in his drama of the watershed. His story forces us to think the watershed's historicity in a particular way that is linked directly to Teclaff's politics and his hope that we will do something in the present, namely, prevent the "death" of the watershed as a relevant institutional formation for managing land and water resources. While Teclaff's narrative provides a rich analysis of the watershed's intellectual and institutional history, it is a rather Whiggish history, in which the past is read as a sequence of steps leading ultimately to the accomplishments of today<sup>382</sup>. Following the history of watershed science and governance in the Klamath requires a more nuanced framework for understanding the complex feedbacks between understandings of watershed processes and the governance of watershed ecosystems.

First of all, there can be no neat beginning to a narrative about the social, intellectual or environmental history of the watershed. In narrating a brief history of watershed science and governance, I want to be careful not to posit too clean an origin or too linear a development for either watershed science or democratic watershed governance. Intimate knowledge of watershed processes and collective management of watersheds are evidenced in sophisticated indigenous Hawaiian *ahupua'a* catchment-based management systems and Pacific Northwest ceremonies around fisheries and fire management<sup>383</sup>. Berkes gives numerous examples of the watershed ecosystem concept and associated regulatory mechanisms among indigenous communities around the world<sup>384</sup>. Therefore, rather than a definitive origin story or a comprehensive history, this chapter provides a punctuated history in order to convey through a few distinct historical examples how the watershed emerges as a composite technoscientific, institutional and material-semiotic spatial formation. The discourse and theory of watershed democracy is invoked, deployed, contested, forgotten, revived and redeployed numerous times in numerous different contexts. The science of watershed processes and the governance of both watershed resources and society are intertwined in complex ways.

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<sup>382</sup> Winner, Langdon. "Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology." *Science, Technology, and Human Values* (1993): 362-378, p 370.

<sup>383</sup> Kaneshiro, Kenneth Y., et al. "Hawai 'i's mountain-to-sea ecosystems: social-ecological microcosms for sustainability science and practice." *EcoHealth* 2.4 (2005): 349-360; Mueller-Dombois, Dieter. "The Hawaiian Ahupua 'a Land Use System: Its Biological Resource Zones and the Challenge for Silvicultural Restoration." 23; Campbell, S. K., and V. L. Butler. 2010. Archaeological evidence for resilience of Pacific Northwest salmon populations and the socioecological system over the last ~7,500 years. *Ecology and Society* 15(1): 17.

<sup>384</sup>Berkes, Fikret, et al. "Minireviews: exploring the basic ecological unit: ecosystem-like concepts in traditional societies." *Ecosystems* 1.5 (1998): 409-415.

This chapter narrates a partial history of watershed governance through focusing on moments in which watershed science and institutions of watershed governance were co-produced. The goal of this chapter is to provide a broad-brush history of watershed science and governance as well as demonstrate how understandings of watershed processes are built alongside particular political formations, ways of inhabiting watershed ecosystems and allocating watershed resources. In particular, I analyze the ways discourses and theories of democratic governance are articulated and worked-out in different periods through negotiations around watershed science and governance. My goal is to lay out patterns in democratic theory, watershed science and environmental governance to show in the empirical chapters (Chapters 3-6) how they are refracted in patterns of thought and political action in the Klamath and to understand the particularity of the ways in which watershed democracy emerges and unfolds in the Klamath. Delving into the interface between knowledges of nature and modes of natural resource governance is important for understanding what is unique about Klamath watershed democracy and also for understanding academic debates about relationships between knowledge and politics in democratic environmental governance. I begin with an example of debates among early cartographers about the proper way of representing both natural and political formations through the order of the watershed.

#### **4. Enlightenment Cartography and the Political and Natural Order of the Watershed**

One of the earliest written treatises on the watershed was penned by Phillipe Buache, head cartographer under King Louis XVI, map-maker of the French Empire and tutor to the Royal family<sup>385</sup>. On November 15, 1752, Buache, presented a paper to the French Royal Academy of Sciences which put forth “general perspectives on the structure of the globe”<sup>386</sup>. Buache expounded a theory that the totality of landforms on the earth's surface is best conceived of as a mosaic or tapestry of drainage basins. He portrayed the relationship between drainage systems and landscape features as a “mutual dependence which shapes the skeleton of the earth,” emphasizing: “we can not doubt the *liason*...that mountains have with rivers”<sup>387</sup>. Buache’s thesis was unique for its time in that it represented landforms by way of defining water flows, “us(ing) the clues left by rivers”, rather than appeals to either a Creator or an inner “vulcanism” of the Earth. River basins provided Buache with a framework that allowed him to reorder the earth, establish

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<sup>385</sup> Molle, François. "River-basin planning and management: The social life of a concept." *Geoforum* 40.3 (2009): 484-494; Molle, François. *Planning and managing water resources at the river-basin level: emergence and evolution of a concept*. Vol. 16. IWMI, 2006.

<sup>386</sup> Buache, Phillipe. *Essay in physical geography proposing general perspectives on the structure of the globe, which is made up of mountain ranges crossing the oceans and lands, with some particular considerations regarding the different sea basins and the internal configuration of the sea*. French Royal Academy: 1752.

<sup>387</sup> Buache 1752.

a new science of physical geography and lay down the foundation for an “objective” social and political order.

The watershed did not emerge from Buache’s head fully formed, nor was it the result of a successive series of hypothesis-driven experiments. The grounds of Buache’s truth, his epistemological commitments and performances of objectivity were shaped by a complex mixture of cultural norms, values and politics. In the late 18<sup>th</sup> Century, debates in physical geography were worked out in part through debates about Buache’s basins and other conflicts around the proper basis for political boundaries. Buache attempted to counter claims such as those of the Count de Buffon’s *Theorie de la Terre* that there was a general “lack of order” in natural processes and landforms by identifying a solid “principle by virtue of which natural objects may hold together”<sup>388</sup>. The watershed concept provided Buache the ideal the conceptual architecture that could order objects logically in space and time. Interestingly, Buache grounded his search for order not in commitments to moral or methodological objectivity, but through persuasive visual techniques, geometry and maps. Buache was famously disdainful of empirical evidence. Though he relied selectively on the increasingly circulated travel literature, sailors and merchants accounts, and other tales of the foreign and exotic, he considered most of these accounts unreliable. He was known to have rejected “facts” at will if they contradicted his theories<sup>389</sup>.

His science was thus stretched between classical ideals of geometric precision and harmony of form and newer commitments to moral “disinterestedness”, desire for patronage in the scientific academies and new cartographic techniques for representing secular space. Unlike many of his contemporaries in other burgeoning scientific disciplines, he was more driven by illumination of natural form through cartography than in testing hypotheses or demonstrating truth claims through experiments in front of modest witnesses<sup>390</sup>. More than anything, it was the material-social-textual technology of the “planisphere”, a cartographic technique, that allowed Buache to express the order and intelligibility of watershed systems<sup>391</sup>. His maps attempted to cut through the constant flux of transient forms and allow the core essences of rivers and ridge systems to explain one another through their respective geometrical relations on the earth’s surface<sup>392</sup>.

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<sup>388</sup> Tang, Chenxi. *The Geographic Imagination of Modernity: Geography, Literature, and Philosophy in German Romanticism*. Stanford University Press, 2008, p 30-32.

<sup>389</sup> Debarbieux, Bernard. 2008. "The Mountains between corporal experience and pure rationality: the contradictory theories of Philippe Buache and Alexander von Humboldt" pgs 87-104 in Cosgrove, Denis E., and Veronica Della Dora. *High places: cultural geographies of mountains and ice*. Vol. 15. IB Tauris, 2008.

<sup>390</sup> On “Modest Witnesses” in early experimental science see Shapin, Steven and Simon Schaffer. *Leviathan and the air-pump*. Princeton: Princeton University Press, 1985. For a critique of the concept, see Haraway, Donna Jeanne. *Modest- Witness@ Second- Millennium. FemaleMan- Meets- OncoMouse: Feminism and Technoscience*. Psychology Press, 1997.

<sup>391</sup> Debarbieux 2008, pgs 3 and 11.

<sup>392</sup> Debarbieux 2008.

Buache's river basin theory was not merely a description of the natural world, it was simultaneously a prescription for a harmonious social and political order. In Europe in the mid to late 18<sup>th</sup> Century, political borders and territories were being constantly redrawn in the context of ongoing war, revolution, and colonization. The handful of people who identified as "physical geographers" were scrambling to stake out some solid conceptual ground for descriptions of the natural and social world amidst this turmoil while simultaneously attempting to portray their practices as a respectable scientific discipline among the new natural sciences. According to Prussian geographer Johan Christian Gatterer, "a few hours can wreak great havoc to the works of our political geographers" as political borders "take on a new form almost every month"<sup>393</sup>. Gatterer, Buache and their colleagues sought a "pure geography" of the earth that was "free from political influence" to both explain natural processes and anchor political borders in the "objective and indisputable order of nature"<sup>394</sup>. Jean Nicolas, Buache's nephew and Edme Mentelle, one of Buache's colleagues at the Royal Academy, were among those who proposed that the "natural borders" of drainage divides should determine the territorial boundaries of states within Europe and New France<sup>395</sup>. Gatterer himself borrowed from Buache's ideas to advocate in his 1775 "Outline of Geography" for Prussia and other emerging nation-states to structure territorial divisions based upon the "natural boundaries" of the hydrologic basin<sup>396</sup>.

In addition to new ways of representing nature and society, early physical geographers were attempting to chart a new direction for geography away from its role as the handmaiden of government and towards a respectable scientific discipline recognized in the academies<sup>397</sup>. In the geography literature of the turn of the 19<sup>th</sup> century, one can find evidence of boundary disputes between those statisticians, ethnographers, natural philosophers, physical geographers, and political geographers attempting to define the boundaries of their new disciplines<sup>398</sup>. While Gatterer, Mentelle, Ritter, Humboldt and other early geographers borrowed from Buache's theories and techniques, they also attempted to define themselves and their emergent discipline, "physical geography", in opposition to his theories and methodologies. For Gatterer, one of two professors along with Immanuel Kant who taught physical geography classes in Europe at the time, the watershed was not a changless, eternal natural form standing before politics, but rather the emergent outcome of social and natural forces in their historical development. Gatterer used Buache's river basins to express the mutually transformative dynamics of natural and social formations and demonstrate the subjective dimension of all geographical knowledge and

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<sup>393</sup> Gatterer, Johan Christian. *Outline of a Theory of Geography*. 1775, see Tang, 2008, pg. 32 and ref 74.

<sup>394</sup> Tang 2008, p. 32.

<sup>395</sup> Molle 2008.

<sup>396</sup> Tang 2008, p. 32.

<sup>397</sup> *Ibid.*

<sup>398</sup> Debarbieux 2008, Tang 2008.

representations of nature. For Gatterer and colleagues, the “truth value of geography resides not in the earth itself, but in the ways in which the subject approaches the earth”<sup>399</sup>. Gatterer found a balance in the watershed form between ceaseless change, and a certain continuity of many of its properties, forms and patterns<sup>400</sup>.

As another example of early watershed science as “politics by other means” Alexander Humboldt, Buache’s river basin theory provided a jumping off point to criticize “armchair geography” and emphasize the importance of in-situ empirical observation and geologic sampling, as well as the subjective and transcendental experience of nature<sup>401</sup>. He specifically disputed Buache’s depiction of the course of the Casiquiare river, which he held actually connected rather than separated the Amazon and Orinoco basins, and he travelled there to prove it. In addition to demonstrating Buache’s technical errors, Humboldt showed how water flow, communication and trade did in fact exist between the two basins. He also used the opportunity to criticize Buache for his lack of concern for empirical detail:

“by a false application of the principles of hydrography, that from the safety of their office desks, geographers have tried to determine the direction of mountain ranges in countries whose river courses they (felt they) understood precisely.”<sup>402</sup>

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<sup>399</sup> Tang, Chanxi. 2008, p 32.

<sup>400</sup> See Tang 2008: The term *Erdkunde*, theoretical knowledge of the earth, was coined by Gatterer in his *Outline of Geography* to refer to a subjective knowledge of the earth born of a personal investment in and reckoning with earth’s forms and processes, which changed constantly and developed historically. *Erdkunde* was distinguished from the older term, *Erdeschriebund*, denoting the geographical sciences, that, like Buache’s basins, referred to an objective description of the condition of the earth whose forms remained forever the same.

<sup>401</sup> On “science as politics by other means” see Latour, Bruno. “The Pasteurization of France. Translated by Alan Sheridan and John Law.” *Cambridge, MA: Harvard University Press* (1988). P 229; See also Segerstråle, Ullica. Politics by Scientific Means and Science by Political Means: Trojan Horses in the Sociobiology Debate.. “Trojan Horses in the Sociobiology Debate.” *Science Studies* 13.1 (2000): 3-18; on Humboldt’s critique of Buache, see Debarbieux 2008. While touring the globe, Humboldt collected extensive soil samples to test the material composition of mountains and launch theories about the “internal make-up” of the planet. Explaining surface landforms through the physical properties of matter was in direct contradiction to Buache’s river basin theory and a nod towards the “vulcanism” of his peers. Humboldt’s last departure from Buache was through his Goethean emphasis on the analytical virtue of the “subjective experience of nature through direct sensory organs of perception” (Debarbieux 2008). He believed that in order to represent natural forms accurately and virtuously, one must experience them directly. By combining mineral analysis with experiential data from his self-experiments, he thought he could convey a subjective and objective sense of the sweep of the landscape.

<sup>402</sup> Debarbieux 2008, p 22, ft nt 49: Philippe Buache shows a mountain range between Orinoco and Rio Negro as great as the watercourses it separates. In a note attached to this map, he writes that “the communication which is supposed to exist between the Orinoco and the Amazon is a geographical monstrosity which la Cruz’s map has groundlessly propagated and in order to correct this matter one need only recognize the direction of the great range which divides the waters”, see *ibid* p 3 ft nt 3.

Rather than the eternal order of nature posited in Buache's river basin theory, Gatterer and Humboldt pivoted on and away from the watershed in their attempts to break with classical and enlightenment approaches to geography and forge a modern approach to representation of earth's physical and social processes and a reflexive, subjective experience of space. As Buache's river basin geography fell out of favor, so too did the idea that watersheds should form the basis for post-revolutionary political order in France<sup>403</sup>.

Overseas in America, the Constitutional Congress adopted Jefferson's rectilinear grid in the Land Ordinance of 1785 as the method of organizing the administration and expansion of the new republic. Under the Ordinance the lands west of the Appalachians, north of the Ohio River and east of the Mississippi were to be systematically divided into townships six miles on a side. Each township would be further sub-divided into thirty-six square mile sections (640 acres each) and even further into 160 acre family farms. As we will see next section, the Jeffersonian grid and the new water laws forged in the American West would direct the settlement of the continent away from the watershed as the basis of social and natural order as envisioned by Buache, Gatterer and other French Enlightenment cartographers.

## 5. Watershed hydrology comes to America

Alongside the tumultuous shifts in the political geography of revolutionary France, the authority to regulate forests was also being negotiated and reworked. In the absence of clear State or Royal authority, a wave of rapid timber harvesting swept across France<sup>404</sup>. The pace of deforestation in French forests sparked a heated public debate regarding the links between forests, climate, river flows and floods<sup>405</sup>. The debates that flared up among scientific communities called up ancient Mesopotamian wars, medieval debates and historical accounts such as those of Pliny the Elder of landslides, floods and desertification in the wake of

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<sup>403</sup> See Molle 2008 p. 485; see also Andréassian, Vazken. Waters and forests: from historical controversy to scientific debate. *Journal of Hydrology* 291 (2004) 1-27.

<sup>404</sup> See e.g. Pinchot, Gifford. *A Primer of Forestry*. 1905, "The discussion of forest influence on climate began in this way. When the French revolution broke out in 1789, the old restrictions on the management of private forests were done away. A wholesale cutting of these timberlands promptly followed, and as early as 1792 the consequences began to be observed. The question of forests and climate was then raised for the first time; but questions of this kind can not be answered without long and careful observations." see Andréassian 2004, p 7. According to Kittredge (1948), observations of forest influences led Medieval and Renaissance governments to establish protection forests. In France, according to Andréassian (2004), King Philippe Auguste issued a decree in 1219 "of the Waters and Forests" that recognized the close relation between water and forests in forest management. See e.g. Kittredge, J., 1948. *Forest Influences: the Effects of Woody Vegetation on Climate, Water and Soil, with Applications to the Conservation of Water and the Control of Floods and Erosion*. McGraw Hill, New York, 394 pp.

<sup>405</sup> See Andréassian 2004. As early as 1800, Rougier de la Bergerie summarized the "abuses of clear-cutting and the destruction of woods and forests" and published a "long list of ruined forests, denuded slopes, catastrophic floods, and instances where the water simply disappears".

deforestation.<sup>406</sup> The deforestation following the revolution polarized the burgeoning forest hydrology community in post-revolutionary France between the “foresters” and “engineers” and in many ways foreshadowed forest-water debates to follow in the United States, California and even the Klamath. The French episode set the scientific terms, discursive frames and political stakes for watershed management from the early 1900s until the late 1960s when systems theory, ecology, and information-technology based scenario modeling would gain some footing alongside experimental catchment studies.

The “Foresters” held that forests both prevented floods and maintained “balanced” stream flows and should therefore be protected, maintained and enhanced<sup>407</sup>. The “engineers”, on the other hand were “dubious (or at least reticent) about the romantic ideas of their opponents, and they tried to approach the problem by collecting and analyzing hydrometric and meteorological data”<sup>408</sup>. The forester-engineer debate even reached French parliament in 1836, when the physicist Arago argued with the chemist Gay-Lussac about the climatic role of forests<sup>409</sup>. On the side of the engineers was Valles, a chief engineer in the Corps and a “sworn enemy of foresters” and more famously Belgrand of the Corps, who was determined to put an end to “romantic speculation” through the “first watershed hydrologic comparison” in the Yonne river basin in 1853<sup>410</sup>.

In the first “paired watershed” study, Belgrand compared how a fully forested, a partially forested and a deforested watershed reacted to a rainfall event. He concluded that forests did not play a significant hydrological or metrological role, that “woods do not greatly reduce the runoff of rainfall” during flood events and that “forests, when in leaf, diminish rather than augment the flow of streams”<sup>411</sup>. His studies eventually set the standard for the burgeoning field of forest hydrology as well as laid out the playing field for the forest-water debates to

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<sup>406</sup> McGuire, Kevin and Gene E. Likens. “Historical Roots of Forest Hydrology and Biogeochemistry” in Delphis F. Levia, Darryl Carlyle-Moses, Tadashi Tanaka (eds) *Forest Hydrology and Biogeochemistry*. 2011. According to Biswas (1970), the earliest accounts of interactions between forests and water flows were most likely those of Vitruvius (ca. 27–17 BCE) when he recognized that forests played an important role in evaporation. See Biswas, Asit K. *History of hydrology*. Amsterdam: North-Holland, 1970. I demonstrate in chapters 4 and 5 about how Karuk possessed sophisticated knowledge about the interactions between fire, vegetation, water flows and fisheries habitat.

<sup>407</sup> On the side of the foresters, for example was F.A. Rauch, who put forth romantic ideas about the relationship between forests and rivers in a book called *Harmonie Hydrovegetale* (1801) and later commented in the *European Annals of Plant Physics and Public Economy* (1821) that: “the trees may be considered as siphons- intermediaries between the clouds and the earth; by their attracting top boughs, they command from afar the wandering waters of the atmosphere to approach and pour into their protecting urns the water that is to feed the springs, make the streams flow”, see Andreassin 2004, p. 3.

<sup>408</sup> Andreassin 2004, p 3.

<sup>409</sup> See Andréassian, p 7.

<sup>410</sup> *Ibid*, p 5 ft nt 4.

<sup>411</sup> *Ibid*, pgs 4-5, citing Belgrand, E., 1854a. De l’influence des fore^ts sur l’e^coulement des eaux. *Annales des Ponts et Chaussées* (61), 1–27.



follow. It wasn't until the first decade of the 20<sup>th</sup> century that the first experimental catchment studies were performed in Switzerland and Colorado. However, the French debates charged the circuits of international knowledge on the effects of forests on water flow alongside similar debates about the effects of forests on watershed processes taking place around the globe.

Around the same time, the science of "catchment dessicationism" was being forged by British colonial botanists in British colonies in service of territorial control<sup>412</sup>. In 1847, the Court of Directors of the British East India Company made an official inquiry into the "effects of forest destruction on catchments" in woodland Western Bengal<sup>413</sup>. Botanist-surgeon-naturalist Alexander Gibson initiated a study on "deforestation and desiccation" around the same time in Konkan and South Canara and used the results to convince the East India company to promote the first Forest conservancy laws, leading eventually to the Bombay Forest Conservancy<sup>414</sup>. British colonial botanists in Africa<sup>415</sup> were similarly drawing on connection between drought and deforestation to justify State preserves. Local population growth, ignorance, and greed was portrayed as leading to "forest mismanagement", which then led to deforestation and land degradation and in turn to "desertification" of the climate.

Forest management based on objective scientific understanding of catchment processes was portrayed as necessary to bring the recalcitrant "slash-and burn" practices of nomadic forest dwellers and wild jungle landscapes in line with rational laws of nature and ensure a steady supply of timber. Sivaramakrishnan (1999) describes an elaborate network of colonial and amateur botanists and foresters, army officers, administrators, and "surgeon-naturalists" conducting field trials, plantation experiments, and vegetation surveys to produce and circulate this new catchment science around the globe<sup>416</sup>. As a result of these global circulations, a "new colonial geographical sensibility in relation to forests emerged from the confluence of desiccationism and the imperatives of territorial control"<sup>417</sup>. In the middle 19<sup>th</sup> Century, a new modality of governance was developing around the watershed in relation to the new sciences of forest hydrology emerging in French and British colonies.

According to many sources, French and British watershed hydrology traveled to America through the writings, policies and oratory of Senator George

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<sup>412</sup> See e.g. Sivaramakrishnan, Kalyanakrishnan. *Modern forests: Statemaking and environmental change in colonial eastern India*. Stanford University Press, 1999, p 129.

<sup>413</sup>Sivaramakrishnan 1999, p 129.

<sup>414</sup> *Ibid*, p 129, ft nt 47

<sup>415</sup> Leach, Melissa, and Robin Mearns. *The Lie of the Land: challenging received wisdom on the African environment*. James Currey Ltd, 1996.

<sup>416</sup> *Ibid*, pg. 130.

<sup>417</sup> *Ibid*, pg. 129.

Perkins Marsh<sup>418</sup>. Through his travels around Europe and the Middle East, Marsh was exposed to the forest-hydrology debates, which he then brought home and expounded through writings, policies and speeches. He first proposed the theory that deforestation leads to desertification and or flooding in an address delivered before the Agricultural society of Rutland County on Sept. 30, 1847<sup>419</sup>. In this address, he purports that the “progress of civilization” and the scientific knowledge of nature leads to a “better economy in the management of our forest lands”<sup>420</sup>. In this address, Marsh lays out a theory of how “uncivilized” and ignorant man is led by their savage nature to overexploit their environment, whereas “civilized” man learns how to conserve and protect it. He argues for forest conservation on the grounds that “forests serve as reservoirs and equalizers of humidity”, both supplying steady stream flows in drought years and preventing extreme high flows in flood years<sup>421</sup>.

While posted in Rome in the 1860s, he wrote his magnum opus, “Man and Nature: or Physical geography as modified by human action” which dealt extensively with the question of land and forest influence on hydrologic processes<sup>422</sup>. Published in 1864, it was widely influential in shaping public opinion on connections between forests, stream flows, climate and floods as well as making a strong case for “preservation” of forests. This work is considered one of the earliest treatises on the watershed, laying the conceptual and political terrain that both watershed science and the environmental movement such as Pinchot, Powell and Muir were eventually to inherit. Marsh popularized the notion of the watershed in American political culture and championed the importance of connections between land-use and water flows. However, the watershed played a minor and supporting role in his orations, nowhere near the prominent role it played in the watershed evangelism of John Wesley Powell.

## **6. John Wesley Powell and the Republicks (sic) of Science**

Powell’s vision of watershed commonwealths, outlined in the last chapter, developed over a long period of time, taking nascent form during his survey of the Colorado in the 1860s and billowing, by the 1890s, into a fanaticism that would ultimately lead to his fall from political and popular favor. While surveying the Colorado River for what was at the time the US Geographical and Geologic Survey,

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<sup>418</sup> See Mole 2008; Pinchot 1905; Teclaff 1967. Marsh held such varied esteemed credentials as Fish Commissioner and congressmen from Vermont, anti-slavery advocate and co-founder of the Smithsonian, co-designer of the Washington monument and US ambassador to Turkey and Italy.

<sup>419</sup> Perkins Marsh, George. Address to Agricultural Society of Rutland County, Sept. 30, 1847.

<sup>420</sup> *Ibid.*

<sup>421</sup> *Ibid.*: “Forests serve as reservoirs and equalizers of humidity. In wet seasons, the decayed leaves and spongy soil of woodlands retain a large proportion of the falling rains, and give back the moisture in time of drought, by evaporation or through the medium of springs. They thus both check the sudden flow of water from the surface into the streams and low grounds, and prevent the droughts of summer from parching our pastures and drying up the rivulets which water them.”

<sup>422</sup> Marsh, George Perkins. “*Man and Nature; or Physical geography as modified by human action.*” University of Washington: 1965 (1864).

Powell kept a base camp at Kenab, which was near the site of a Mormon irrigation society devoted to ideals of shared work and worship and organized according to systems of common property in land, wealth and water<sup>423</sup>. According to Worster's biography of Powell (2002), the Mormon irrigation communes likely provided a model for Powell and colored his concern for the fate of American democracy in the arid frontiers of the West.

The grid had captured the American democratic spatial imagination and shaped the institutional forms of the early 19<sup>th</sup> Century, taking over the brief late-Enlightenment romantic fascination with the drainage basin as a natural basis of institutional form<sup>424</sup>. Jefferson's rectilinear grids laid out in the Land Ordinance of 1785 were adopted by planners, surveyors and settlers in township and county boundaries. The ancient common law water rights system based upon the "riparian doctrine", which kept water flowing according to its "natural course", was also being dismantled in England, France, New England and especially in the mining camps in California<sup>425</sup>. The correlative system of rights was being replaced by an "appropriative rights system", which apportions out exclusive titles to discrete quantities of water for specific uses according to the principle of "first in time, first in right". This rights regime is virtually unconstrained by any reference to a natural drainage pattern, as the rights entitle their holder to a specific quantity, type and location of water-use determined solely determined by priority, itself determined by date of first water application, with no consideration of watershed function, natural flows, ancient uses or actual quantities of variable year-to-year stream flows. Most early uses of water in the West were for sluicing, hydraulic mining and irrigation for ranching and farming, which rarely occurred near the "natural" course of streams or floodplains<sup>426</sup>.

Powell's anxiety over the direction prior appropriation was taking water governance in the American West mixed with his concerns over the aridity of the West and its implications for the fate of "democratic civilization". The small streams were being quickly gobbled up and the larger rivers could only be managed en masse by either "cooperative organizations, great capitalists, or the General or State governments" and thus would entail "momentous institutional and technological" changes<sup>427</sup>. As expressed through his writings and speeches, Powell was convinced that the future of democratic governance in the West hinged upon crafting appropriate institutions for managing its scarce water resources.

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<sup>423</sup> Worster, Donald. *A river running west: the life of John Wesley Powell*. Oxford University Press, 2002.

<sup>424</sup> See Horowitz, Morton. *The Transformation of American Law (1870-1960: The Crisis of Legal Orthodoxy*. Oxford: 1992.

<sup>425</sup> Horowitz 1992; Pisani, Donald J. "Squatter Law in California, 1850-1858." *The Western Historical Quarterly* (1994): 277-310; Pisani, Donald J. "Enterprise and equity: A critique of Western water law in the nineteenth century." *The Western Historical Quarterly* (1987): 15-37.

<sup>426</sup> Pisani, Donald J. *Water, Land, and Law in the West: The Limits of Public Policy, 1850-1920*. Univ Pr of Kansas, 1996.

<sup>427</sup> Worster 2002, pg. 349.

Powell's "Report on the Lands of the Arid Region", which was distributed to Congress in 1878, was a "blue-print" for land reform, calling for the re-orientation of Western settlement policy away from the laissez faire manner in which it was proceeding<sup>428</sup>. Powell envisioned settlement being directed by "disinterested Government Science" and federal land surveys, with each region's land-use and industry being tailored to its particular geological, botanical, and hydrologic characteristics<sup>429</sup>. Powell expressed deep concern about the social and environmental consequences of Western States abandoning the riparian doctrine in favor of the appropriative doctrine. Powell describes how the "ancient principles of common law which keep rivers in their natural courses" were being dismantled in the arid region so that rivers could be diverted for industry, irrigation or hydraulic mining<sup>430</sup>. According to Powell's prophesy, once water became an entitlement separated from its drainage basin, it would concentrate in the hands of the elite few, and these "water monopolies" would control the West's entire political and economic apparatus. Powell's proposed scheme of settlement therefore specified land-uses that would keep water flowing according to its natural drainage pattern and "into the hands of the people" through common property and shared governance institutions. If government science could direct settlement according to "hydrographic basins", communitarian institutions could flourish within them.

This blessing from Congress to survey the entire drainage system of the West was a golden opportunity for Powell to make his move towards what he would later call "river basin commonwealths". The irrigation survey painted a West that was a mosaic of interconnected watersheds. These integrated units would serve as the natural boundaries for human institutions through which basin citizens could communally apportion water and designate usage. As the survey picked up speed, Powell's passion for his basin commonwealths kept pace and evolved into a full-blown evangelism that was to be his downfall. In his addresses to the constitutional conventions of North Dakota and Montana in 1889, he invoked the ancient irrigation societies of the Tigris-Euphrates and the Nile and linked the "civilization (which) was born in arid lands" to the "march of progress" across the frontier. In order to continue this legacy, he urged the delegates to organize their political boundaries and coordinate land-use according to drainage divides and then "hold the waters in the hands of the people"<sup>431</sup>.

Powell's proselytizing made an enemy of Senator Stewart and his allies, who mired him in scandal by spreading rumors that his irrigation district scheme was a communist ploy to divide up the spoils of the West. Still, Powell continued

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<sup>428</sup> Powell, John Wesley, et al. *Report on the Lands of the Arid Region of the United States: With a More Detailed Account of the Lands of Utah. With Maps*. Vol. 1-3. Government Print. Office, 1878, 1879.

<sup>429</sup> Powell designated "irrigation lands" in which he proposed to allow settlers to organize into "irrigation districts" and collectively own and manage land and water.

<sup>430</sup> Powell 1878.

<sup>431</sup> Worster 2002, p. 481

preaching the gospel of “river basin commonwealths” unto his deathbed. His last formal articulation of the watershed imaginary, published in 1890 in *Century Magazine*, was to be the fullest and most zealous explication of his “basin commonwealths” ideal<sup>432</sup>. Powell's narrative portrays “nature herself” as having drawn clearly-defined boundaries across the land in the form of drainage divides. As described last chapter, Powell proposed that each watershed be organized under national and state laws into a commonwealth. The federal agencies would be responsible for demarcating the basins and congress for providing statutory authority for districts to organize within basins. The citizens of the basins would then craft constitutions specifying electoral, legal and legislative procedures, pass bond measures, levy taxes, and build water works as a community. In Powell's vision of watershed democracy, the cooperation of Congress and the Agencies, political and legal institutions could be designed in accordance with natural forms and processes, providing a “cradle for the infant dryland democracy” and ushering in a “new phase of Aryan Civilization...in the Western half of America”<sup>433</sup>.

In Powell's theory, “river basin commonwealths” were actually a vehicle through which government science and common property would enable cultural evolution. Powell famously espoused a theory of cultural evolution that depicted scientific advancements being taken up into systems of governance and enabling “*enlightened republicanism*” (sic), which in turn ushered cultural forms through successive stages of savagery, barbarism, and civilization<sup>434</sup>. Powell's “*Science of Man*” depicted the “evolution of institutions” proceeding in step with the progress of science and the biological evolution of the species. Kinship patterns, forms of property, modes of production, knowledge formations and mythological belief systems all followed natural laws of evolution and led, eventually, to “enlightened republicanism. At the apogee of civilization, primitive forms of magic, kinship, and property are replaced with what Powell saw as civilized forms of science, democratic institutions and “communalism”. This is what Powell had in mind when he ended his 1890 piece in *Century Magazine* on Institutions for the Arid Lands: “It is thus that a new phase of Aryan civilization is being developed in the western half of America”. Therefore rather than prototypes of 21<sup>st</sup> century watershed democracy as Worster argues, or chariots of evolutionary progress in science and civilization as Powell himself advocated, Powell's “river basin commonwealths” must be viewed critically as technologies of racialized subject formation<sup>435</sup>.

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<sup>432</sup> Powell, John Wesley. “Institutions for the arid lands.” *The Century* 40 (1890): 111-116.

<sup>433</sup> *Ibid*, p. 116. It is perplexing to me that scholars as influential and brilliant as Donald Worster and Wallace Stegner can manage to ignore the racist dimensions of Powell's commonwealth ideal. Even though both scholars have criticized the blatantly racist implications of Powell's theories of scientific progress and cultural evolution, they both celebrate his vision of watershed commonwealths as a prophetic insight that must be reincarnated to reform US water policy. See e.g. Stegner, Wallace. *Beyond the hundredth meridian: John Wesley Powell and the second opening of the West*. Penguin, 1992.

<sup>434</sup> Powell, John Wesley. *Truth and Error: Or, The Science of Intellection*. Open Court Publishing Company: 1898.

<sup>435</sup> cf. Worster, Donald. “Watershed democracy: Recovering the lost vision of John Wesley Powell.” *J. Land Resources & Env'tl. L.* 23 (2003): 57.

## ***7. Paired catchment studies and expert science for the Public***

Though Powell's river basin commonwealths went decidedly out of favor during his lifetime, the watershed was revived shortly after his death (1902) in progressive era policy and planning, but in ways Powell would have seen as drastically different from his notion of watershed democracy. Unlike Powell's "river basin commonwealths", the watershed governance institutions of the early 20<sup>th</sup> century were more oriented around expert-driven science and efficient, utility maximizing resource management. In addition, unlike Powell's monolithic institutions, which encompassed all law, planning and regulation related to land and water use within a drainage basin, the watershed bodies of the first decades of the 20<sup>th</sup> century were separated into multiple strands of governance dealing with different components of the watershed, such as navigation, power-generation, fisheries, forest-flood interactions, and soil erosion. The watershed often played second fiddle to other scales of management such as farm, irrigation district, township, service network, county, or state boundaries. Watershed debates in the early 20<sup>th</sup> century carried forward older polemics regarding the federal government's authority to settle disputes between conflicting water uses and regulate land and forest use in view of securing in-stream flows. At stake in these debates was the authority of expert-driven government science to direct the governance of watershed systems.

The first major watershed initiative of the federal government was the Inland Waterways Commission, created by Congress in March of 1907 following the request of Teddy Roosevelt to develop "a comprehensive plan for the improvement and control of the river systems of the United States"<sup>436</sup>. The panel was chaired by Theodore Burton, (R MO) the ranking member of the House River and Harbors committee, and composed of the nation's water luminaries and "progressives" such as chief of the forest service Gifford Pinchot, the first director of the Bureau of Reclamation, Fredrick Haynes Newell and most notably, W.J. McGee, the director of the USGS and protégé of John Wesley Powell. Though at fist the Commission was charged with a narrow focus on transportation and navigation issues, by the end of the year, Pinchot and McGee had persuaded the panel to extend the focus to encompass all aspects of multiple-use, basin-wide planning. By the time of their first report was issued in 1908, watershed fever had taken over the Commission. Even Teddy Roosevelt himself waxed poetically about watersheds in the introduction to the report:

"every river system, from its headwaters in the forest to its mouth at the coast is a single unit and should be managed as such"<sup>437</sup>

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<sup>436</sup> Instrument of the President, March 14, 1907.

<sup>437</sup> Roosevelt, T. "Introduction" to US Inland Waterways Commission. 1908.

William John McGee was then a leading figure in the Washington intellectual establishment and a “chief theorist of the conservation movement” with considerable political influence<sup>438</sup>. McGee’s watershed approach was to a large extent inherited from Powell, his mentor at the USGS and the US Bureau of Ethnology, but also pulled in a number of different directions through marginal cost economics, progressivism and considerations of relatively more recent water uses, such as the production of electricity. In particular, McGee’s advocacy of a river basin approach to water management was driven by actual and anticipated conflicts between the use of flowing water in-stream for navigational purposes and the storage of water behind dams for the generation of hydropower<sup>439</sup>. McGee saw in the multiplicity of water’s uses a strong argument for the necessity of a strong, central authority to arbitrate objectively between conflicting uses using expert science and cost-benefit economics<sup>440</sup>.

McGee argued that “full control of the nation’s rivers could be achieved by the federal government and only by the federal government”<sup>441</sup>. When he became vice-chairman of the Commission in 1907, he insisted on expanding the focus of the commission beyond navigation corridors to the full range of water’s uses, from hydropower generation, navigation, and flood control to irrigation and municipal drinking water. Scaled comprehensively to the drainage basin and framed as a “multiple-use resource”, McGee argued that the principle of maximum utility could allocate water to its socially optimal use. River basin institutions were for McGee a natural-social system engineered by experts to produce the most social utility or welfare. We see here the transformation of water into a “resource”, what geographer Jamie Linton terms “modern water” which is abstracted from its ecological and social contexts through watershed science, cost-benefit economics and river-basin engineering<sup>442</sup>. In McGee’s articulation of watershed governance, we see a co-production of ways of understanding and valuing watershed processes, ways of managing water resources through a strong federal body and ways of conceiving water as a “resource”<sup>443</sup>.

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<sup>438</sup> Pisani, Donald J. "Water Planning in the Progressive Era: The Inland Waterways Commission Reconsidered." *Journal of Policy History* 18.4 (2006): 389-418, p 7.

<sup>439</sup> Schmidt, Jeremy J., and Dan Shrubsole. "Modern water ethics: Implications for shared governance." *Environmental Values* 22.3 (2013): 359-379; Schmidt, Jeremy J. "Historicising the hydrosocial cycle." *Water Alternatives* 7.1 (2014): 220-234.

<sup>440</sup> See e.g. Porter, Theodore M. *Trust in numbers: The pursuit of objectivity in science and public life*. Princeton University Press: 1996. See esp. "Chapter 7: US Army Engineers and the Rise of Cost-Benefit Analysis".

<sup>441</sup> Pisani 2006, p 7.

<sup>442</sup> McGee, W. J. "Water as a Resource." *Annals of the American Academy of Political and Social Science* 33.3 (1909): 37-50; Linton, Jamie. "Modern water and its discontents: a history of hydrosocial renewal." *Wiley Interdisciplinary Reviews: Water* 1.1 (2014): 111-120; Linton, Jamie. *What is water?: The history of a modern abstraction*. UBC Press, 2010.

<sup>443</sup> McGee 1909. See also Schmidt, Jeremy J., and Dan Shrubsole. "Modern water ethics: Implications for shared governance." *Environmental Values* 22.3 (2013): 359-379.

After its first report, the committee lagged due to World War I and Newell's inability to get legislation through Congress. He was finally able to do so in 1917, but the committee was disbanded in 1920 by the Federal Power Act after publishing only two preliminary flood control assessments on the Sacramento and Mississippi rivers. According to water historian Donald Pisani (2006), the Commission's watershed-wide focus trespassed into the jurisdiction and territory of other federal agencies such as the Bureau of Reclamation, Army Corp of Engineers, and the Forest Service, as well as State water departments, which ultimately provoked suspicion and jealousy and led to the disbanding of the Commission. For example, the creation of a permanent inland waterways commission with the ability to manage entire watersheds would have challenged the Forest Service's mandate to manage forests and secure favorable water flows in streams<sup>444</sup>.

Though largely inert in the end, the Inland Waterways committee had managed to ignite a national debate on watershed-based planning and management. Like their French predecessors, these debates also managed to polarize the resource management community into two camps, the "foresters" who held that forests stabilized flows and prevented both floods and droughts and "engineers", who advocated artificial dams, dikes and levees as means of managing water systems. Fortunately for the foresters, in addition to WJ McGee, they had in their corner the French-transplant forestry guru Gifford Pinchot. Congress had given Presidents Cleveland and Harrison the authority to set aside over 40 million acres as forest reserves in the Forest Reserve act of 1891 without giving any direction for the management of the reserves<sup>445</sup>. The Organic Act 1897 was intended to remedy this lack of direction, specifying four purposes for the proposed forest reserves. In addition to "improving and protecting the forest" and "furnishing a continuous supply of timber", the reserves were also set to task in: "*securing favorable conditions of water flows*".

This last line was reportedly snuck into the Organic Act by Pinchot himself, then an employee of the US Bureau of Forestry. Considered the "first professional forester" in the US, Pinchot had studied forestry in Europe and was intimately familiar with the French forest hydrology debates. He had read Marsh's "Man and Nature" voraciously and was especially alarmed by his warning of civilizations that had vanished as a result of abusing their watersheds<sup>446</sup>. From the French debates and his veneration of Marsh, Pinchot developed a reverence for the watershed and an appreciation of the relationship between forests and rivers:

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<sup>444</sup> Pisani 2006: "The Forest Service looked from the forest inward to the river, assuming that trees served as the ultimate stabilizing force for soil as well as stream flow. An inland waterways commission was likely to look from a river outward to the watershed, giving priority to the stream itself."

<sup>445</sup> Langston, Nancy. *Forest dreams, forest nightmares: the paradox of old growth in the Inland West*. University of Washington Press, 1995.

<sup>446</sup> 2007; Glasser, Stephen P. *Short History of Watershed Management in the Forest Service: 1897-2100*; USDA Forest Service, National Water Uses and Rights Program, Washington DC



“The connection between forests and rivers is like that between father and son: No forests, no rivers . . . Every river is a unit from its source to its mouth. Its uses are many and with our present knowledge, there can be no excuse for sacrificing one use to another if both can be served.”<sup>447</sup>

Around the same time as Pinchot was pushing watershed language into the Organic Act, California senators and assemblymen were attempting to protect forests in headwater catchments in order to secure drinking water supplies for growing urban regions in the Bay Area and Los Angeles. According to historian Raymond Clar, there was the least opposition to the Federal forest reserve act in California, Colorado and Utah, for “the importance of mountain watersheds in those states was a dominating actor in developing an atmosphere of reasonable harmony”<sup>448</sup>. For example, in 1895, the California senate adopted a bill “to protect the forest reservations and secure favorable conditions of water flow”, almost identical language to that which ended up in the Federal Organic Act<sup>449</sup>. As the water demand of cities began to grow, so too did interest in watershed protection. Around the turn of the 20<sup>th</sup> century, the “California Society for Conserving Waters and Protecting Forests” was formed by a diverse group of representatives from University of California Horticultural and Agricultural societies, State park commissioners, miners associations, the Sierra Club, boards of trade and chambers of commerce was held in the hall of the State Chamber of Commerce in San Francisco<sup>450</sup>. Hydrologists at Berkeley’s school of Forestry were hired by this society to study the effects of forests on water flow<sup>451</sup>.

Over the next seven years, the Society grew into a 5,000 member association whose roster boasted a veritable “who’s who in California at the turn of the Century”, including Stanford and Berkeley presidents Jordan and Wheeler, over 100 faculty members, two US senators, the lieutenant governor, appointed and elected state officials, state supreme and superior court judges, and over 100 county, as well as important Federal agency officials<sup>452</sup>. According to Clar, most “were not concerned with economic use of water, nor were they of the John Muir

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<sup>447</sup> Pinchot, Gifford. *The fight for conservation*. Doubleday: 1910.

<sup>448</sup> Clar, Raymond. *California Government and Forestry*. 1959. p 164 ft nt 5.

<sup>449</sup> California Senate Joint Resolution 1, the McRae Bill, HR 119.

<sup>450</sup> Clar 1959, ft nt 12: “The society was presided over by JM Gleaves, the US surveyor general, as well as Abbot Kinney, a prominent forest hydrologist, and 17 other scientists and politicians. The commission was to report to the next legislative session upon the status of water and forest conditions in California and recommend appropriate legislative measures.”

<sup>451</sup> In the next legislative session on February 16 and 17, 1899, five “water and forest commissioners” were appointed, including: hydrologist George Davidson and soil scientist EW Hilgard of UC Berkeley, Abbot Kinney, and Stanford botanist William Dudley. After the commission hadn’t accomplished anything after a year, earning it the name of the “phantom commission”, Abbot Kinney called a meeting for the purpose of organizing a Forest and Water Society.

<sup>452</sup> That November, a meeting was held in San Francisco and the California Water and Forest Association was formed (Clar 1959). According to the San Francisco newspapers, “not even the jungle fighting of Americans against the insurrectionist Aguinaldo nor the foundering of the US cruiser Charleston on a Philippine rock could detract from the news of the big meeting”.

type, but probably each one of them was genuinely concerned with the place of water in the continued prosperity of the State as a whole”.

The association published a monthly magazine titled “Water and Forest” and distributed it to more than 168 towns<sup>453</sup>. Their masthead was a tall tree with a rising sun and the logo “moisture means millions” and their early slogan was: “to work for the building of a greater California”. The primary goal of the association was to secure financial and legislative support for studies and plans to initiate the long term development of water storage and transport within the State and to convince the State legislature to expedite and supervise proper water conservation and use. The California Water and Forest association was a major factor in bringing about Progressive-era legislation in watershed conservation in California during the years 1903 to 1906, and also was apparently influential in the selection of two candidates for the gubernatorial race of 1902. Unfortunately, the archives burned up in the 1906 fire, leaving few traces of “Water and Forest” and now the Association is nearly forgotten. Still, its existence points to the growing importance of watershed science in the California cultural imagination at the turn of the 20<sup>th</sup> century.

As expanding cities such as Oakland, San Francisco and Los Angeles were attempting to meet their growing water demands by securing headwaters and forested watersheds in the Sierras, a debate was initiated as to the proper structure and grounds of authority in determining the uses and management of watersheds and the distribution of their benefits<sup>454</sup>. The famous debates over Hetch Hetchy, where John Muir decried the damming of the Tuolumne to provide San Francisco’s drinking water, colored the forest hydrology debates taking place across the nation<sup>455</sup>. Cities and rural regions, engineers and foresters, city planners and conservationists were all pitted against each other in these debates over the proper management of watershed systems. On the East Coast, with the establishment of the US Forest Service in 1905 and the appointment of Pinchot as its Chief, the Forest Service was leaning on its statutory charge to “secure favorable conditions of water flows” to set aside headwaters and remote watersheds as National Forests.

The Weeks Act, which was passed in 1911, gave the Forest Service explicit authority to purchase lands near the headwaters of navigable streams to protect the streamflows that made navigable waterways navigable. Such purchases were seen as “landgrabs” by rural landowners and conservationists, sparking debates and even violent protest in Owens Valley and West Virginia<sup>456</sup>. The debates again

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<sup>453</sup> Clar 1959.

<sup>454</sup> Hundley, Norris. *The great thirst: Californians and water, 1770s-1990s*. University of California Press, 1992.

<sup>455</sup> Meyer, John M. "Gifford Pinchot, John Muir, and the boundaries of politics in American thought." *Polity* (1997): 267-284; Mulr, John. "Hetch Hetchy Valley, The." *Repub: Hastings W.-Nw. J. Env't'l L. & Pol'y* 13 (2007): 223.

<sup>456</sup> Dodds, Gordon B. "The stream-flow controversy: A conservation turning point." *The Journal of American History* 56.1 (1969): 59-69.

polarized the resource management community into two camps, the foresters and the engineers. Pinchot felt that the engineers' position undermined the conservationist cause by undercutting one of the key arguments for forest protection, that of securing favorable conditions of flows. In order to gain political support for purchase of national forest lands in the East Coast, he needed to prove that forests prevented floods and low-flows on interstate navigable waterways. Even the House Judiciary Committee decided that the commerce clause could conceivably permit the purchase of watersheds of navigable streams if it could be proved that forests prevented floods and low-flows.

Into the heated discussion stepped Raphael Zon, a protégé of Pinchot and head of forest research at the USDA Forest Service Office of Silvics. Zon proposed an experiment to definitively put an end to the forest-flood debates<sup>457</sup>. Modeled in part on a similar experimental catchment study being conducted in Emmental, Switzerland, the study was the first coupled watershed experiment to be conducted in the US<sup>458</sup>. The study was carried out over the course of the next 20 years, and was intended to provide a final, definitive answer as to the effects of forest cover on streamflow and erosion. According to Bates and Henry, the co-authors of the Wagon Wheel publication, "it is not enough to know whether forests influence stream flow; it is necessary to know how much, at what seasons, and under what conditions of climate, soil and topography, and the variations between different kinds of forest, as well"<sup>459</sup>.

In 1909, the Forest Service selected a site in Rio Grande forest in the Rocky Mountains near the town of Wagon Wheel Gap, Colorado. The scientists chose two contiguous watersheds, Watershed A and Watershed B, which were similar in topography, slope, aspect and forest cover and which drained into the Rio Grande. The researchers intended to compare differences in the timing and quantity of sediment and water delivered to the stream before and after removal of the forest. In the summer of 1919, after eight years of continuous stream-flow measurements and nearly nine years careful meteorological observations, they "denuded" (deforested) all of watershed B except for a buffer strip of timber 15 feet wide on each side of the stream<sup>460</sup>. The final report held that forest removal actually *increased* the annual water yield compared to the control watershed<sup>461</sup>.

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<sup>457</sup> Zon, Raphael. "Forests and water in the light of scientific investigation." US Forest Service:1927.

<sup>458</sup> Andresassian 2004, p. 8; McGuire and Likens 2011.

<sup>459</sup> Bates, Carlos G. 1921. "First results in the streamflow experiment, Wagon Wheel Gap, Colorado." *Journal of Forestry* 19.4 (1921): 402-408. Bates, Carlos G., and Alfred Judson Henry. "Second Phase of Streamflow Experiment at Wagon Wheel Gap, Colo." *Monthly weather review* 56.3 (1928): 79-80.

<sup>460</sup> After a year, the buffer strip was cut as well and the slash windrows burned. They continued the same measurements as before until the effects of the forest destruction upon the time and amount of stream flow, the amount of the erosion and the quantity of silt carried by the streams had been determined. The study was terminated in 1926 and the report published by CG Bates of the Forest Service and AJ Henry of the Weather Bureau. See Bates 1921, Bates and Henry 1928.

<sup>461</sup> However, the amount of the water yield increase became smaller as vegetation reestablished, the watersheds becoming similar in delivery of water and sediment to the stream after 7 years.

The Wagon Wheel Gap study set the standard for watershed research in the United States for the next fifty years and brought some temporary closure to the watershed debates in the United States. The advent of experimental paired-catchment studies moved the debates over forest hydrology and watershed management from the political arena to the domain of experimental, expert-oriented science. It also brought with it a stark division of labor between watershed science and watershed policy that was to structure watershed management for the next fifty years. The McSweeney-McNary Act of 1928 established a full network of regional experiment stations which would serve as Forest Service research sites and provide the scientific grounds for Forest Service regulatory policy. Paired-catchment studies conducted through a nation-wide network of experimental watersheds produced “objective” science of watershed processes which was then taken up by administrators into regulatory policy and watershed management in national forests and parks<sup>462</sup>.

In the Wagon Wheel experiments, we first see the modernist separation of watershed science and watershed policy and the beginning of the “experimental turn” in US watershed hydrology. The McSweeney-McNary Act also definitively separated Forest Service research from Forest service regulatory policy. It is here that long-term experimental catchment studies undertaken by public agencies on behalf of their publics become the standard for settling, once and for all, the question of forest influences on streamflow. These watershed laboratories would then be used to test out and set Forest Service regulatory policy for the management of National Forest lands. In Progressive imaginaries of watershed governance, we see an articulation of democracy and scientific environmental management that demands a strict separation of science and policy. Again, the relationship between science and democratic politics was worked out through watersheds, but this time through large-scale, long-term catchment experiments designed to settle matters of public policy. This model persisted and resulted not just in new understandings of watershed systems, but new ways of working out the proper relationships between science, democracy, economic development and public interests.

Between Wagon Wheel and the late 1960s, experimental watershed studies expanded under the direction of Edward Munn, the US Forest service director of watershed research. Munn established a vast network of experimental forests, watersheds, and laboratories in National Forests around the United States<sup>463</sup>. These experimental catchments have functioned as laboratories churning out facts about watersheds for the past 50 years and have contributed much knowledge about how forested watersheds behave. There is still a robust network of

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<sup>462</sup> Adams, Mary Beth, Linda H. Loughry, and Linda L. Plaugher. *Experimental forests and ranges of the USDA Forest Service*. Northeastern Research Station, 2010.

<sup>463</sup> Lugo, Ariel E., et al. "Long-term research at the USDA Forest Service's Experimental Forests and Ranges." *BioScience* 56.1 (2006): 39-48. "The network of experimental forests and ranges administered by the US Department of Agriculture Forest Service consists of 77 properties that are representative of most forest cover types and many ecological regions in the nation", p. 39.

experimental watershed research stations around California and the United States maintained mostly by the US Forest service and universities including UC Berkeley<sup>464</sup>.

### **8. *Democracy on the March***

In this section, I demonstrate through the case of the Tennessee Valley Authority how the production of a particular kind of knowledge about the movement of water and sediment through a drainage system is co-produced along with new institutions of governance and reconfigurations of patterns of access to watershed resources. In 1933, Congress passed the Tennessee Valley Authority Act in response to the dust bowl and the depression<sup>465</sup>. The Act chartered a "body corporate" and charged it with coordinating the development of the resources of the entire drainage basin. "The Corporation", as it is referred to in the legislation, was an experimental institution, a strange chimera of public-private governance, with representatives from Federal, State, County, and local governments, private corporations, and the military. The TVA Act instructed the President to appoint a Board of Directors and compelled them to work with local, State, and Federal agencies as well as with private landowners and companies. It was given quasi-governmental authority to raise taxes, issue bonds, condemn property, and to make and enforce laws. Its planning powers to coordinate land and resource use across the drainage basin entailed a complex choreography of irrigation, afforestation, and soil conservation projects and a dexterous apportioning of water between agricultural, hydropower, industrial, navigational and urban usage. The Authority was intended to pull the South out of the depression and provide a model of "Grass roots democratic planning and economic development" that could be replicated across the country. In the TVA was vested first the hopes of ending the depression and later, after WWII in transitioning the War-ravaged regions of the globe to Strategic cold-war allies.

According to longtime director of the TVA, David "Mr. TVA" Lilienthal, "What God had made one, man was to develop as one"<sup>466</sup>. In Lilienthal's opinion, through the TVA, Congress set out "to command nature, not by defying her", but by obeying "her first law- the oneness of men and natural resources, the unity that binds together land, streams, forests, minerals, farming, industry, mankind"<sup>467</sup>. Through comprehensive planning, the watershed was to be transformed into an "organic machine" that produced electric power, fertilizer, timber, exportable cash crops,

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<sup>464</sup> UC Berkeley maintains a network of Experimental forests, watersheds, field stations and reserves for researchers. See <http://cbc.berkeley.edu/ucbfieldstations.htm> (last accessed 6/20) for more info.

<sup>465</sup> Tennessee Valley Authority Act of 1933. 48 Stat. 58-59, 16 U.S.C. sec. 831.

<sup>466</sup> Lilienthal, David E. *TVA: Democracy on the March*. 1944.

<sup>467</sup> Thus atoned, the America of the future will be able to avoid the fate of the ancient civilizations who, "because they have sinned against the unity of nature...have fallen into decay and lie buried into oblivion." see Lilienthal 1944, pgs. 52, 59.

and military weapons such as bombs, missiles and aircraft<sup>468</sup>. Importantly, in addition to a stable economy and national security, the TVA was engineered to produce a new form of participatory democracy.

The TVA was touted by Lilienthal as an example of decentralized, "grass-roots" democracy, as it enrolled the participation of local communities in planning and carrying out regional development projects. The agency made an effort to work through local governments and community groups and to offer "on-farm" schooling, training and workshops. Scientific and technical experts were portrayed by Lilienthal as neutral advisors who served up "facts for use"<sup>469</sup>.

While Lilienthal's notion of "grassroots democracy" attempt to reconcile participatory forms of democracy with technical expertise, it entailed rigorously separating scientists and engineers from politics. According to Lilienthal, "a river had no politics; the comprehensive development of a great river's watershed was not a political matter, though it certainly required popular cooperation"<sup>470</sup>. Lilienthal attempted to extend technical expertise and engineering into the social realm by cultivating a democratic citizenry at the river basin scale. Management is portrayed as a "humanist art" which aims to "interpret the desires and emotions of others" and "bring out the latent dreams of other human beings"<sup>471</sup>. The art of management, for Lilienthal, requires the "same magic of human personality that built great cathedrals and immortal works of art" and ultimately is in service of the "liberation of human energies"<sup>472</sup>. While the comprehensiveness of the TVA's planning scope and its institutional choreography of separate components of the drainage system were significant for Lilienthal, it was the avenues of democratic participation that made it a triumphantly American endeavor. Arthur Morgan, another TVA board member saw the Tennessee Valley Authority as a miniature experimental "laboratory of the nation", designed to test out watershed-scaled democracy in the Tennessee Valley before exporting it around the nation to pull it out of the depression and engineer a new era of democracy in America<sup>473</sup>.

The title of Lilienthal's 1944 book, "TVA: Democracy on the March" couldn't capture the essence of the TVA more perfectly, as it rings a kind of militaristic tone and foretells the fate of Lilienthal's watershed imaginary. During and immediately after the Second World War, the TVA model was "exported" overseas as a vehicle for "strategic development" to align economies, open markets to foreign capital, establish western-friendly forms of "democratic" governance, and prevent the

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<sup>468</sup> White, Richard. *The organic machine: The remaking of the Columbia River*. Macmillan, 2011.

<sup>469</sup> Lilienthal 1944, p. 39-40

<sup>470</sup> Scott, James C. "High modernist social engineering: the case of the Tennessee Valley Authority." in *Experiencing the state* (2006): 3-52 2006, p 24.

<sup>471</sup> Lilienthal, David Eli. *Management: a humanist art*. Columbia University Press: 1967, pgs. 19-32.

<sup>472</sup> *Id*, pgs 19, 22, 33.

<sup>473</sup> Scott 2006, p 23, ft nt 57.

spread of communism<sup>474</sup>. In contrast to Soviet river management, which was portrayed as under the heavy hand of authoritarian regimentation, TVA-style development promised a "development of the spirit, an opportunity to cultivate the democratic and enterprising soul of a people" <sup>475</sup>. In 1949, Harry Truman's "Point Four" program was intended to provide "technical assistance to achieve the economic growth that assured social stability and, therefore, immunity to the lure of communism"<sup>476</sup>. In pitching the Point Four program to the public, Truman invoked the TVA, saying... "I see immense undeveloped rivers and valleys all of over the world that would make TVAs"<sup>477</sup>. Historian and public intellectual Arthur Schlesinger Jr. also touted the importance of the TVA in the confrontation with the Soviet Union. He stressed the decentralized, democratic and inclusive aspects of the TVA, emphasizing that "the TVA is a weapon which, if properly employed, might outbid all the social ruthlessness of the Communists for the Support of the peoples of Asia"<sup>478</sup>. Opposed discursively to communist-style river basin development, American river basin development was inclusive, ensuring that "communities and individuals would be franchised in their administration"<sup>479</sup>.

After his directorship at the TVA, Lilienthal started a private consulting company "Development and Resources" which initiated big dam projects around the world, in Colombia, Iran, Puerto Rico, and South Vietnam<sup>480</sup>. In 1951, Eugene Black, the director of the World Bank took interest in Lilienthal's work and adopted his basin development strategy at the Bank, initiating the era of structural adjustment loans, Big-D development, and the proliferation of massive combined dam-power-irrigation projects on major rivers around the world. By the late 1960s, when Lilienthal was appointed head of the Mekong project to "neutralize" Southeast Asia during the Vietnam War, democratic river basin development had already lost its esteemed position in the popular imagination, and the project failed miserably<sup>481</sup>. Despite its fall from popular favor due to the social and ecological impacts of basin-wide engineering projects, Lilienthal's watershed imaginary had hatched and traveled the world over, laying its own river basin development projects everywhere it went.

In the case of the TVA and its progeny, we can clearly see how the production of a particular kind of knowledge about the movement of water and sediment through a drainage system is co-produced in conjunction with new

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<sup>474</sup> Ekbladh, David. "'Mr. TVA': grass-roots development, David Lilienthal, and the rise and fall of the Tennessee Valley Authority as a symbol for US Overseas Development, 1933-1973." *Diplomatic History* 26.3 (2002): 335-374.

<sup>475</sup> Ekbladh 2002 pgs. 350-351.

<sup>476</sup> *Ibid* p 349, ft nt 60.

<sup>477</sup> *Id* ft nt 61.

<sup>478</sup> *Id* ft nt 66.

<sup>479</sup> *Ibid*

<sup>480</sup> Ekbladh 2002.

<sup>481</sup> Biggs, David. "Reclamation Nations: The US Bureau of Reclamation's Role in Water Management and Nation Building in the Mekong Valley, 1945-1975." *Comparative Technology Transfer and Society* 4.3 (2006): 225-246.

institutions of governance as well as local, regional and global redistributions of watershed resources. Dams and soil erosion control features went up, forests were planted, and irrigation pipelines were laid around the world. Much of conceptual architecture for the way we understand, value and manage watersheds today was also laid during the TVA period. The connections between development and democracy in the TVA and its progeny, however, turned out to be mostly rhetorical. By the 1970s, it was clear that comprehensive river basin development was failing to live up to its lofty promises. Rather than "unlocking the creative energies of a people", dams displaced thousands of people only to put them to work in menial wage-labor jobs on farms and in factories, while the profits seemed to accrue everywhere except within the basin<sup>482</sup>.

The promises of participation turned out to be mere rhetoric, as the avenues of participation and channels of decision-making were accessible only to the well-positioned. The TVA came under fire for systematically excluding poor and African American farmers while the projects aboard were criticized for further concentrating power and money in the hands of the elite<sup>483</sup>. James Scott (2006) has argued that instead of modeling "grassroots democracy", the TVA in practice embodied a form of "*participatory autocracy*", meaning that decision-making was ultimately "top-down" and citizens played no role in producing science or setting policy<sup>484</sup>. Rather, citizen participation entailed "mere administrative involvement", which, according to Scott (2006) "simply transforms an unorganized citizenry into a reliable instrument for the achievement of administrative goals and calls it 'democracy'"<sup>485</sup>.

Lastly, though it claimed to be in harmonious unity with the natural drainage system, river basin development wreaked absolute havoc upon terrestrial and aquatic communities. Dams, which were the lynchpins of TVA-style comprehensive river basin development projects, in particular turned out to have significant ecological impacts. In short, dams alter hydrologic flow-regimes and patterns of sediment transport. They fragment the ecological and hydrologic continuity of river systems and they transform the biological and physical dynamics of river channels and floodplains<sup>486</sup>. The critiques of the TVA model on procedural grounds as a weak form of democracy as well as for its economic and environmental outcomes eventually led to the so called "third wave" of watershed

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<sup>482</sup> e.g. Goldsmith, Edward, and Nicholas Hildyard. *The social and environmental effects of large dams. Volume 2: case studies*. Wadebridge Ecological Centre, 1986.

<sup>483</sup> Selznick 1949; Ekbladh 2002, pg. 344.

<sup>484</sup> Scott 2006, pg. 28.

<sup>485</sup> Scott 2006, ft nt 75.

<sup>486</sup> Bednarek, Angela T. "Undamming rivers: a review of the ecological impacts of dam removal." *Environmental management* 27.6 (2001): 803-814.p 803. Petts, G. E. 1984. *Impounded rivers: Perspectives for ecological management*. John Wiley & Sons. Chichester, England; Ward, J. V., and J. A. Stanford. 1995. Ecological connectivity in alluvial river ecosystems and its disruption by flow regulation in *Regulated Rivers: Research and Management* 11:105-119; Poff, N. L., J. D. Allan, M. B. Bain, J. R. Karr, K. L. Prestegard, B. D. Richter, R. E. Sparks, and J. C. Stromberg. 1997. "The natural flow regime". *Bioscience* 47(11):769-784.



management, centered around the watershed as a social and ecological unit and a arena of deliberative democratic governance. Before the “third-wave” of watershed governance, with its heavy influence on direct participation in knowledge production and decision-making, could crest in the mid-1980s and 1990s, however, substantial changes in scientific understandings of watersheds and popular understandings of both science and democracy would change the epistemic and political grounds of watershed governance in the 1970s.

### **9. The cybernetic watershed**

This section traces the post-war traffic in the language and theory of complex adaptive systems from cybernetics into watershed hydrology and ecology, and from there into natural resources law and policy. The stable climax communities of equilibrium-based ecology were replaced in the new discursive and epistemic framework of “social-ecological resilience” which portrays ecosystems and watersheds as complex, unpredictable and constantly shifting assemblages<sup>487</sup>. This “ecological” understanding of the watershed laid the groundwork for the “third-wave” of watershed democracy, in which local, citizen and indigenous knowledges were seen as viable contributions to understandings of watershed processes. In response to new understandings of ecological processes, a flexible and adaptive approach to watershed management was fashioned in opposition to the top-down engineering approach to river basin management promoted in the first half of the century<sup>488</sup>. The watershed seen as a “complex adaptive system” seemed to suggest more inclusive, fluid and polycentric modes of governance than the watershed republics of the past<sup>489</sup>. As multiple learning and communication pathways were seen as attributes of “resilient” social-ecological systems, a premium was put on “epistemic diversity” and experiments with participatory forms of governance at the watershed scale ensued<sup>490</sup>. Beginning in the late 1980s, the watershed became a central site for experimenting with new theories of

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<sup>487</sup> Scoones, Ian. 1999. New ecology and the social sciences: what prospects for a fruitful engagement? *Annu. Rev. Anthropol.* 28:479-507. Tarlock, Dan. 1994. The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law, *27 Loy. L.A. L. Rev.* 1121. Holling, Crawford S., and Lance H. Gunderson. "Resilience and adaptive cycles." *Panarchy: Understanding transformations in human and natural systems* (2002): 25-62.

<sup>488</sup> Berkes, Fikret, Carl Folke, and Madhav Gadgil. *Traditional ecological knowledge, biodiversity, resilience and sustainability*. Springer Netherlands, 1995; Holling, CS (ed). 1978. *Adaptive environmental assessment and management*. (Editor) London: John Wiley & Sons.

<sup>489</sup> Schlager, Edella, and William Andrew Blomquist. *Embracing watershed politics*. Boulder: University Press of Colorado, 2008, esp. Ch1.

<sup>490</sup> Olsson, Per, Carl Folke, and Fikret Berkes. Adaptive Comanagement for Building Resilience in Social-Ecological Systems. *Environmental Management* Vol. 34, No. 1, pp. 75–90; Pahl-Wostl, C., E. Mostert, and D. Tàbara. 2008. The growing importance of social learning in water resources management and sustainability science. *Ecology and Society* 13(1): 24.; Mostert, E., C. Pahl-Wostl, Y. Rees, B. Searle, D. Tàbara, and J. Tippett. 2007. Social learning in European river-basin management: barriers and fostering mechanisms from 10 river basins. *Ecology and Society* 12(1): 19.

complex systems and putting strategies of adaptive and collaborative management into practice<sup>491</sup>.

In the early 1970s, as changing understandings of ecological and biophysical processes painted a more nuanced picture of watershed processes, the institutional forms grounded in the watershed also shifted to accommodate new principles of order and chaos<sup>492</sup>. As the equilibrium paradigm began to unravel in the late 1960s and early 1970s, ecologists began searching for a new vocabulary to explain the complex, non-linear, and unpredictable behavior of ecosystems<sup>493</sup>. The language of post-war cybernetics and systems theory provided a useful resource for explaining systems operating at “the edge of chaos”<sup>494</sup>. Cybernetics was the name given to the burgeoning discipline by one of its pioneers, MIT mathematician Norbert Wiener while developing communication and feedback mechanisms for anti-aircraft artillery during WWII<sup>495</sup>. Wiener borrowed the term from the Greek *'Kubernetes'*, steersman or helmsman, which was used famously by Plato in the first Alcibiades dialogue as a metaphor for the “governor” of a political body<sup>496,497</sup>. Wiener thought of the new discipline as the science and art of managing and directing highly complex systems.

While early cybernetics work was more focused on control and management of systems, the so-called “second wave” of cybernetics was more concerned with understanding the properties and dynamics of “self-organizing” systems such as organisms, neural networks, and corporations<sup>498</sup>. The theoretical

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<sup>491</sup> Woolley, John T. & Michael McGinnis. "The California Watershed Movement: Science and the Politics of Place". *Natural Resources Journal*, Vol 42, 133, 2002; Michael McGinnis, editor. *Bioregionalism*, Routledge, 1998; Montgomery, David R., Gordon E. Grant, and Kathleen Sullivan. "Watershed analysis as a framework for implementing ecosystem management." *Water resources bulletin* 31.3 (1995): 369-386; Gary Snyder. *A Place in Space: Ethics, Aesthetics, and Watersheds*. Counterpoint, 1995; Peter Berg, (ed). *Reinhabiting A Separate Country: A Bioregional Anthology of Northern California*. San Francisco: Planet Drum, 1978.

<sup>492</sup> Schlager and Blomquist 2008

<sup>493</sup> Gunderson, Lance H. "Ecological resilience--in theory and application." *Annual review of ecology and systematics* (2000): 425-439.

<sup>494</sup> Lansing, J. Stephen. "Complex adaptive systems." *Annual review of anthropology* (2003): 183-204.

<sup>495</sup> Wiener, Norbert. *Cybernetics: Or Control and Communication in the Animal and the Machine*. MIT Press: 1948.

<sup>496</sup> See Francois, Charles. Systemics and Cybernetics in a Historical Perspective. *Systems Research and Behavioral Science Syst Res.* 16, 203-219 (1999)

<sup>497</sup> The term had also appeared in French in 1843 to denote 'the art of government' in Ampere's classification of the sciences, and in the same year in a book on management written in Polish. For a discussion of the relation of "steering" to the "art of government, see Pickering, Andrew. *The cybernetic brain: Sketches of another future*. University of Chicago Press, 2010 and Foucault, Michel, et al. *Security, Territory, Population: Lectures at the Collège de France 1977--1978*. Vol. 4. Macmillan, 2009.

<sup>498</sup> The first wave was represented by e.g. Wiener 1948; von Foerster, H., Mead, M., & Teuber, H. L. (Eds.). (1951). *Cybernetics: Circular causal and feedback mechanisms in biological and social systems. Transactions of the seventh conference*. New York: Josiah Macy, Jr. Foundation, p. vii; Von Neumann, John. "Probabilistic logics and the synthesis of reliable organisms from unreliable components." *Automata studies* 34 (1956): 43-98. The second wave was represented by e.g. Bateson, Gregory.

tools developed in cybernetics were used to explain behavior in a whole range of complex systems such as electrical grids, neural networks, markets, firms and eventually, watersheds<sup>499</sup>.

The mathematical and conceptual language used to describe the emergent properties, non-linear dynamics, and state variables of complex systems proved useful to ecologists and biologists seeking to explain complex ecological phenomena<sup>500</sup>. In a seminal paper in 1973, C.S. Holling used systems theory to describe predator-prey relations in a fresh-water lake ecosystem, claiming that such ecosystems more often behave like non-linear systems “at some distance from equilibrium” than systems that predictably return to a stable state<sup>501</sup>. These systems can move between any number of temporarily stable configurations, termed “basins of attraction” after biologist Stuart Kauffman’s research on natural selection through experiments with networks of lightbulbs<sup>502</sup>. Instead of one magic equilibrium point, collections of organisms and abiotic elements were portrayed as cycling between multiple states of variable stability<sup>503</sup>. Holling termed the persistence of relationships within a system “resilience”, thus inaugurating an organizing concept for ecology, hydrology and watershed governance<sup>504</sup>.

As the ideas of Holling and colleagues gained credibility in the early 1980s, they begat a crisis for resource managers, watershed hydrologists and environmentalists<sup>505</sup>. Since ecosystems and watersheds could no longer be seen as

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1972. *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology*. University Of Chicago Press; Bateson, G. 1979. *Mind and Nature: A Necessary Unity*. Advances in Systems Theory, Complexity, and the Human Sciences. Hampton Press; Maturana, Humberto & Varela, Francisco 1973. *Autopoiesis and Cognition: the Realization of the Living*. Robert S. Cohen and Marx W. Wartofsky (Eds.), Boston Studies in the Philosophy of Science; Publishing Co.; Beer, Stafford. *Brain of the firm: the managerial cybernetics of organization*. New York: J. Wiley, 1981.

<sup>499</sup> Lansing, 2003; Pickering 2010.

<sup>500</sup> Lansing 2003; Folke, Carl. 2006. Resilience: The emergence of a perspective for social-ecological systems analyses. *Global Environmental Change* 16 (2006) 253-267; May, R. M. 1973. *Stability and complexity in model ecosystems*. Princeton University Press, Princeton, N.J.

<sup>501</sup> Holling, Crawford S. "Resilience and stability of ecological systems." *Annual review of ecology and systematics* (1973): 1-23.

<sup>502</sup> Kauffman S. 1993. *The Origins of Order: Self- Organization and Selection in Evolution*. New York: Oxford Univ. Press; Kauffman S. 1995. *At Home in the Universe: the Search for Laws of Self- Organization and Complexity*. New York: Oxford Univ. Press

<sup>503</sup> Patten, Bernard C., and Eugene P. Odum. "The cybernetic nature of ecosystems." *American Naturalist* (1981): 886-895.

<sup>504</sup> Folke, Carl. "Resilience: The emergence of a perspective for social-ecological systems analyses." *Global environmental change* 16.3 (2006): 253-267; Berkes, Fikret, Johan Colding, and Carl Folke, eds. *Navigating social-ecological systems: building resilience for complexity and change*. Cambridge University Press, 2002.

<sup>505</sup> Ruhl, J. B., and Robert L. Fischman. "Adaptive management in the courts." *Minn. L. Rev.* 95 (2010): 424; Ruhl, J. B. "Thinking of environmental law as a complex adaptive system: how to clean up the environment by making a mess of environmental law." *Houston Law Review* 34.4 (1997); Tarlock, Dan. 1994. The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law, 27 *Loy. L.A. L. Rev.* 1121.

stable entities that returned to equilibrium if left undisturbed, the scientific ground underneath much of the initial environmental legislation of the late 1960s and early 1970s crumbled<sup>506</sup>. Law and regulatory policy demanded a level of certainty regarding causal links and metrics of ecosystem or watershed health that was not possible in complex adaptive systems operating at the “edge of chaos”. In addition to enormous data gaps and lack of consensus on methods and terminology, Newtonian mechanics could not adequately describe systems composed of a large number of heterogeneous elements whose patterns of interactions produced emergent and non-linear dynamics<sup>507</sup>. Emergent properties of watershed ecosystems could not be predicted by analyzing the separate system components; their non-linear behavior meant a small change in one parameter could lead to a sudden and drastic change in another. With issues such as non-point pollution and endangered species habitat protection, it was difficult if not impossible for courts to determine cause-and-effect relationships, standing or liability, and just as difficult for them to take a “hard look” at the new ecological science<sup>508</sup>.

Into the scientific, political and legal turmoil entered the watershed. The watershed became a way of wrestling with the complexity of nature, for it provided an *in situ* model of both an ecosystem and a complex adaptive system, as well as a preferred unit of implementation for both ecosystem management and adaptive management. The watershed was cited as a textbook example of an ecosystem, a defined set of relationships between biotic community and its abiotic environment<sup>509</sup>. As mentioned last chapter, the two terms are sometimes used concurrently- watershed ecosystems- to highlight the tight connections between ecosystems and hydrologic systems. Nevertheless, ecosystems and watersheds are not always contiguous. Depending on how the boundaries are drawn, a watershed can contain many ecosystems or an ecosystem can contain more than one watershed. However, the epistemic practices organized around each concept have contributed significantly to the organization of thought and talk about the other<sup>510</sup>. When natural resource agencies attempt to implement ecosystem management, they often rely on the watershed as the unit of implementation. The quote by Schlager and Blomquist (2008) summarizes why watersheds are relied upon by

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<sup>506</sup> Tarlock 1994.

<sup>507</sup> Folke, Carl, et al. "Adaptive governance of social-ecological systems." *Annu. Rev. Environ. Resour.* 30 (2005): 441-473; Folke, Carl. "Social-ecological systems and adaptive governance of the commons." *Ecological research* 22.1 (2007): 14-15.

<sup>508</sup> Tarlock 1993; Rhul 2010; Rhul 2005. Regulation by Adaptive Management; *Minn JL Sci and Tech* 2005; Doremus, Holly. Adaptive Management, the Endangered Species Act and the Institutional Challenges of “New Age” Environmental Protection, 41 *Washburn LJ* 2001; Sabatier, Paul A., Will Focht, Mark Lubell, Zev Trachtenberg, Arnold Vedlitz, and Marty Matlock (eds). *Swimming Upstream: Collaborative Approaches to Management*. MIT Press: 2005 for non-point pollution.

<sup>509</sup> Lotspeich 1980; Montgomery 1995; Tarlock, A. Dan. "Putting rivers back in the landscape: The revival of watershed management in the United States." *Hastings W.-Nw. J. Env't'l L. & Pol'y* 6 (1999): 167; Tarlock, A. Dan. "Reconnecting property rights to watersheds." *Wm. & Mary Env'tl. L. & Pol'y Rev.* 25 (2000): 69.

<sup>510</sup> Schlager and Blomquist 2008, p. 3.

resource managers as units for implementing and monitoring ecosystem restoration and management:

“Watersheds thus are not merely examples of ecosystems, they are seen by advocates of ecosystem management as near-substitutes for ecosystems and as an appropriate physical landscape on which to put ecosystem management concepts into practice”<sup>511</sup>

As mentioned last chapter, the watershed is seen by ecologists and ecosystem managers as a working example of a complex ecosystem, or relationship between a biotic community and its abiotic environment<sup>512</sup>. Beginning in the 1980s watershed therefore became a *de facto* unit for studying ecosystems and complex adaptive systems as well as implementing ecosystem-based adaptive management. As we will see in Chapter 4, the watershed became the primary unit for implementing adaptive ecosystem restoration through the Klamath Fisheries Task Force in the mid-1980s and the USFS Watershed Analyses under the Pacific Northwest Forest Plan in the late 1990s.

In many ways, an ecologically based understanding of watersheds was formulated in stark contrast to the river basin accounting paradigm of the Progressive and Post-war era, which assumed that steady progress in scientific knowledge of watershed processes would lead to complete understandings of watershed systems and thus enable complete mastery of these systems and an optimal allocation of their resources. Figuring the watershed as a complex adaptive system nods to the uncertainties, emergent properties, non-linear dynamics and multiple attractors in our representations of watershed forms and processes. Aware of the problems that non-equilibrium ecology posed for environmental management, Holling himself proposed an “adaptive” approach to environmental policy and assessment in 1978<sup>513</sup>.

With adaptive management, regulatory policy and law themselves become scientific experiments aimed at reducing uncertainties in understandings of complex system behavior<sup>514</sup>. Management under this paradigm is designed to be

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<sup>511</sup> Schlager and Blomquist 2008 p 4 and footnote 2; Ruhl, J. B. "The (political) science of watershed management in the ecosystem age." *JAWRA Journal of the American Water Resources Association* 35.3 (1999): 519-526.

<sup>512</sup> See e.g. Lotspeich, Frederick B. "Watersheds as the Basic Ecosystem". *JAWRA Journal of the American Water Resources Association* 16.4 (1980): 581-586. ; Montgomery 1995; Leopold 1967; Brandes, M. Oliver, et al. "At a Watershed: Ecological Governance and Sustainable Water Management in Canada—POLIS Project on Ecological Governance." *Urban Water Demand Management. University of Victoria, Victoria, BC, Canada* 2005; p 87.

<sup>513</sup> Holling, Crawford S. "Adaptive environmental assessment and management." *Adaptive environmental assessment and management*. (1978).

<sup>514</sup> Holling, Crawford S., Fikret Berkes, and Carl Folke. "Science, sustainability and resource management." *Linking social and ecological systems: management practices and social mechanisms for building resilience* 342 (1998): 350-52.

flexible, reflexive and iterative<sup>515</sup>. Policy and law is crafted to either passively or actively test hypothesis regarding system or sub-system behavior. Rigorous monitoring and learning “feedback loops” are built into the management cycle so that policy revisions can reflect new information about the system. By the early 1990s, adaptive management had gained traction in ecology and management circles as the best management response to complex issues such as climate change and biodiversity loss. By the late 1990s, most Federal and State agencies and major environmental NGOS had endorsed adaptive management. In the last ten years, even Courts have begun to inject adaptive management principles into decisions through flexible flow allocations and experimental habitat mitigation plans.

The “new ecologists” have articulated adaptive management principles in tandem with calls for deliberative democracy and participatory governance<sup>516</sup>. Complex social and environmental problems are framed as requiring complex solutions and necessitating an intricate “polycentric” network of actors and institutions<sup>517</sup>. Local, traditional, and especially indigenous knowledge are positioned as valuable sources of environmental data and knowledge<sup>518</sup>. “Traditional ecological knowledge” is hailed as a prime example of adaptive management and revered as receptacle of wisdom gleaned from monitoring and managing ecosystems over millenia<sup>519</sup>. A premium is put on “epistemic diversity”, as multiple pathways to arriving at knowledge and multiple mediums for communicating knowledge are seen as features of resilient social-ecological systems<sup>520</sup>.

As mentioned last chapter, the importance of indigenous knowledge for conservation, adaptive management and sustainable development became apparent in the late 1970s<sup>521</sup>. Momentum from the participatory research

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<sup>515</sup> Walker, Brian, et al. "Resilience, adaptability and transformability in social--ecological systems." *Ecology and society* 9.2 (2004): 5.

<sup>516</sup> Scoones, Ian. "New ecology and the social sciences: what prospects for a fruitful engagement?." *Annual Review of Anthropology* (1999): 479-507.

<sup>517</sup> Holling 2001, 2002; Folke et al 2005.

<sup>518</sup> Berkes, Fikret, Johan Colding, and Carl Folke. "Rediscovery of traditional ecological knowledge as adaptive management." *Ecological applications* 10.5 (2000): 1251-1262; Berkes, Fikret, Carl Folke, and Madhav Gadgil. *Traditional ecological knowledge, biodiversity, resilience and sustainability*. Springer Netherlands, 1995.

<sup>519</sup> Berkes 2000; Olsson et al 2004; Berkes, F. and D. Jolly 2001. Adapting to climate change: Social-ecological resilience in a Canadian western Arctic community. *Conservation Ecology* 5 (2): 18; Riedlinger, D. and F. Berkes 2001. Contributions of traditional knowledge to understanding climate change in the Canadian Arctic. *Polar Record* 37: 315-328.

<sup>520</sup> Olsson et al 2004; Berkes, F. and C. Folke 2002. "Back to the future: Ecosystem dynamics and local knowledge". In: *Panarchy: Understanding Transformations in Human and Natural Systems* (L.H. Gunderson and C.S. Holling, eds.) Island Press, Washington, DC, pp. 121-146

<sup>521</sup> Zent 2012 p 33; e.g. Brokensha, Warren and Werner (eds) 1980. *Indigenous Knowledge Systems and Development*. University Press of America: 1980; Sillitoe, Paul. 1998. "The Development of Indigenous Knowledge". *Current Anthropology* vol. 39, no.2: 223-252; Thrupp, L.A. 1989. "Legitimizing Local Knowledge: From Displacement to Empowerment for Third World People". *Agriculture and Human Values* vol. 6, no.3: 13-24.; Berkes, F. 1987. "Common property resource

movement, the indigenous rights movement and the “local” turn in resource management led to a radical shift in rural development and conservation practice that began to treat indigenous technical and ecological knowledge as important resources in movements for social justice and ecological sustainability. These shifts in understandings of social and natural systems as complex adaptive systems laid the epistemic groundwork for the so-called “third-wave” of watershed governance that reinvented, yet again, the watershed as a unit of democratic governance.

## 10. The dawn of watershed democracy?

As mentioned last section, critiques of expert-driven, multi-purpose river basin development pivoted on the watershed to reinvent a form of democratic governance scaled to the drainage basin that began to gain ground in the mid-1980s and early 1990s. However, in contrast to previous imaginaries of democracy scaled to the watershed, issues concerning knowledge, expertise and epistemology were foregrounded in the “third” wave of watershed governance<sup>522</sup>. As mentioned last chapter, according to water historians, the so-called “third-wave” of watershed democracy began in the late 1960s and crested around the turn of the 21<sup>st</sup> century. The “third wave” of watershed governance was inflected with “third wave” democratic discourses such as “deliberative democracy” and “direct democracy” and therefore emphasized direct citizen participation in governance, development, knowledge production and resource management<sup>523</sup>. Beginning in the late-1960s and gathering momentum around the mid-1980s, the “third wave” of watershed-based governance brought citizen inclusion in both knowledge-making and governance directly into the center of approaches to managing watersheds. Both watershed science and watershed management policy were significantly influenced by the discourses of inclusion gaining traction towards the end of the 20<sup>th</sup> Century.

In addition to obscure scientific journals and academic conferences, the science of watershed ecosystems was being worked out through political debates regarding environmental regulation and natural resource management. The early

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management and Cree Indian fisheries in subarctic Canada”. In: *The Question of the Commons*, B.J. McCay and J.M. Acheson (eds.), Univ. of Arizona Press, Tucson, pp. 66-91; Berkes, F. 1990. “Native subsistence fisheries: A synthesis of harvest studies in Canada”. *Arctic* 43: 35-42.

<sup>522</sup> See Chapter 1. According to water historians, the “first wave” of watershed governance was the basin-wide engineering projects at the turn of the 20<sup>th</sup> century in Europe, the US and Egypt, while the “second wave” came through the TVA-inspired river basin development projects in the mid-20<sup>th</sup> century. See Warner, Jeroen, Philippus Wester and Alex Bolding. “Going with the flow: river basins as the natural units for water management?” *Water Policy Supplement* 2008. 121-138. P 122. See also Sabatier, Paul, Chris Weible and Jared Ficker, “Eras of Water Management in the United States: Implications for Collaborative Watershed Approaches” in Sabatier, Paul, Will Foct, Mark Lubell, Zev Trachtenberg, Arnold Vedliz and Marty Matlock. *Swimming Upstream: Collaborative Approaches to Watershed Management*. MIT Press: 2006.

<sup>523</sup> Warner 2008; see also Molle, Francois. River basin planning and Management: the Social Life of a Concept. *Geoforum*. 2009, Molle, Francois. Planning and managing water resources at the river-basin level: emergence and evolution of a concept. 2006.

environmental legislation, such as the National Environmental Policy Act of 1969, the 1970 creation of the EPA, and the 1973 Endangered Species Act significantly altered the orientation of American resource management by establishing procedures to account for non-human organisms and include citizens more meaningfully in environmental decision-making<sup>524</sup>. While it in many ways paved the way for "collaborative watershed management", this initial slew of legislation was largely oblivious to watershed boundaries and in many ways its flaws and shortcomings led to the "watershed movement" of the late 1970s<sup>525</sup>.

Frustration with the new environmental legislation and the movement towards collaborative watershed management came from many directions. From one side came the farmers and ranchers, members the "wise use" movement and the "sagebrush rebellion", who felt their interests were not being represented in environmental decision making. Environmentalists, for their part felt that EPA administration and litigation under the ESA were ineffective at achieving on the ground results. Many environmental issues such as non-point pollution or habitat conservation were much too technically complex and diffuse to be addressed through a two-party litigation system<sup>526</sup>. "Alternative dispute resolution" emerged in the 1980s as an alternative to expensive and interminable litigation, and typically took the shape of a watershed, as stakeholders implicated in suits were typically all interconnected through water-use, especially in cases of non-point pollution<sup>527</sup>. As mentioned last chapter, "bioregionalists" such as Peter Berg and Gary Snyder preferred d.i.y. place-based approaches to impersonal administration based upon political rather than ecological boundaries. To them, a watershed approach enabled a place-by-place commitment to "rehabitation", which reconnected ecological and social communities and lead to spiritual and cultural transformation<sup>528</sup>. Informal "watershed councils" and "friends of the river" coalitions in this vein sprouted up around river basins in Northern and Eastern California from the late 1970s onward<sup>529</sup>.

Watershed fever spread around California and the United States in the "third wave of the 1980s and 1990s. Lubell et al (2002) demonstrate that 75.8% of the 958 watershed partnerships in the United States were formed between 1990

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<sup>524</sup> Sabatier 2005, pg. 40-42.

<sup>525</sup> *Id.*, pgs. 40-43; Griffin, Carol B. "Watershed Councils: An Emerging Form of Public Participation in Natural Resource Management." *JAWRA Journal of the American Water Resources Association* 35.3 (1999): 505-518; Kenney, Douglas S. *Arguing about consensus: Examining the case against Western watershed initiatives and other collaborative groups active in natural resources management*. Boulder, CO: Natural Resources Law Center, University of Colorado School of Law, 2000.

<sup>526</sup> Sabatier 2005, pg. 45; Kenney, Douglas S. "Historical and Soiopolitical Context of the Western Watersheds Movement.." (1999): 493-503.

<sup>527</sup> See e.g. Bingham, Gail. *Resolving environmental disputes: A decade of experience*. Washington, DC: Conservation Foundation, 1986; Blackburn, J. Walton. "Environmental mediation as an alternative to litigation." *Policy Studies Journal* 16.3 (1988): 562-574.,

<sup>528</sup> See e.g. Berg, Peter. *Reinhabiting a separate country: A bioregional anthology of northern California*. Planet Drum Foundation, 1978; Snyder 1995, pgs. 246-247.

<sup>529</sup> Woolley et al 2002, pg. 134.



and 2000<sup>530</sup>. In a similar survey of watershed institutions, but focused on California, Woolley et al (2002) found that the mean founding year of California's 153 watersheds was 1987 and the number of organizations doubled between 1994 and 2000<sup>531</sup>. The drastic increase in watershed organizations cannot be seen as a natural progression towards watershed-based governance or even as a social-movement springing from "grassroots" organizing<sup>532</sup>. The numerical increase in "watershed organizations" over time is also related to the fact that struggling State and Federal agencies recognized the efficacy of strategically partnering with watershed groups and began offering grants and incentives to form watershed councils, using their data, co-authoring plans with them and devolving *de facto* authority and responsibility to them<sup>533</sup>.

In the "third wave" of watershed democracy, the grass-roots, bottom-up momentum coming from the bioregionalist and environmentalist movements converged with trends in ecology, law and governance and in this conjunctural moment, the watershed emerged as a primary locus of democratic governance. Civil society collaborative watershed organizations gained formal recognition and patronage from government agencies and spread around the world in the 1990s and early 2000s. The "watershed movement" received official blessing beginning in 1987 with the amendments to the Clean Water Act. The legislation explicitly addressed non-point sources of pollution and encouraged the formation of watershed partnerships through a grant program and through the TMDL procedure, which encourages watershed councils to establish beneficial uses for waterways and set daily loads cooperatively. Similar encouragement came from states governments in California, Oregon, Massachusetts, New York, Washington, Wisconsin, and Pennsylvania, who in the early 1990s started advocating watershed-based planning and collaboration as a way to avoid political and regulatory deadlock. As a result of the "third wave" of watershed governance, collaborative watershed management, watershed coalitions, watershed councils, watershed partnerships, and watershed action networks are now set up in over half of the watersheds in the United States<sup>534</sup>.

California water and environmental agencies have been supporting local watershed councils through grants, technical support, joint planning and organizational incentives since the early 1990s. Legislation supporting collaborative watershed management has passed at the State level, such as the Wayne Watershed Protection Act of 2000 (California Stream Partnership Act, AB 2117), the Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Bond Act of 1999 (AB 1584), the Watersheds, Clean Beaches & Water Quality Act of 2002 (AB 2534) and the California Watershed Protection and

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<sup>530</sup> Lubell, Mark, et al. "Watershed partnerships and the emergence of collective action institutions." *American Journal of Political Science* (2002): 148-163.

<sup>531</sup> Wooley et al 2002.

<sup>532</sup> *Ibid*, pg. 134.

<sup>533</sup> Sabatier et al 2006.

<sup>534</sup> Lubell et al 2002.

Restoration Act of 2003 (AB 1405). This legislation in turn supports the development of collaborative watershed programs and policies in California regulatory agencies. For example, the California Department of Conservation sponsors a “Statewide Watershed Program”, the purpose of which is to “advance sustainable watershed-based management of California’s natural resources through community-based strategies”<sup>535</sup>. As a joint effort between the California Natural Resources Agency and the California Environmental Protection Agency, the “California Watershed Portal” provides information on watershed management in the state.

The State and Regional Water Boards approved a “Watershed Management Initiative” (WMI) as part of their 1995 Strategic Plan, which provides authority and support for “watershed coordinators” for each of the nine Regional Water Quality Control Boards<sup>536</sup>. Since 1998, watershed management coordinators provide assistance to local watershed groups and prepare annual watershed strategic plans for the regional Water Quality Control Boards<sup>537</sup>. The Water Boards also adopted a “Watershed Memorandum of Understanding” (MOU), which defines a cooperative process for improving watershed health in California<sup>538</sup>. The Regional Water Boards also sponsor Basin-Wide collaborative planning in all California watersheds. Each Regional Board has a publicly reviewed Basin Plan that sets the water quality standards and includes implementation plans to improve water quality in each of California’s watersheds.

In their article on “the ecology of democracy”, Kemmis and McKinney (2011) compare the emergence of collaborative watershed governance in the “third age” to similar emergent properties evidenced in complex adaptive systems, describing it as an “emergent form of democracy”<sup>539</sup>. By this, they mean that it is not possible to predict the formation of collaborative watershed management institutions or the paths along which they develop. Looking at the emergence of watershed democracy through complexity theory stresses that it is “inherently impossible to provide in advance a rule or algorithm that will produce the structure or pattern that in fact emerges”<sup>540</sup>. Therefore, as next chapter will argue, it is imperative to take an in-depth look at how exactly watershed-based environmental

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<sup>535</sup> The California Secretary of the Natural Resources Agency requested that the former CALFED Bay-Delta Watershed Program become a Statewide Watershed Program, to be administered by the Department of Conservation. See: <http://www.conservation.ca.gov/dlrp/wp/Pages/Index.aspx> last visited 6/1/15.

<sup>536</sup> California State Water Resources Control Board, *Brief Summary of Control Board and Regional Water Quality Control Board Watershed Related Programs*. 9/25/01. See also Watershed Management Initiative Charter, February 2008.

<sup>537</sup> California State Water Resources Control Board 2001.

<sup>538</sup> State Water Resources Control Board Watershed MOU Revised on November 30, 2004, this MOU replaces the April 28, 2003, Watershed Management MOU required by the Watershed, Clean Beaches, and Water Quality Act.

<sup>539</sup> Kemmis, Daniel, and Matthew McKinney. "Collaboration and the ecology of democracy." *Sustainable Dev. L. & Pol'y* 12 (2011): 46.

<sup>540</sup> Kemmis and McKinney 2011.

governance plays out in particular watershed ecosystems and communities. Next chapter, I begin to examine how the global circulations of watershed discourse and knowledge are refracted through local knowledges and everyday resource management practices in the Klamath. I also analyze the ways in which the Klamath becomes a petri dish for experimenting with national regulatory policy and working through resource conflicts involving multiply scaled local, regional, national and even global publics.

## **11. Conclusion**

This chapter has examined the entwined histories of watershed science and watershed governance over the past two centuries. I have demonstrated that each time the watershed provides a template for democracy, it articulates different relationships between expert and non-expert knowledges, States and their publics, political economies and the material watershed ecosystems they are embedded within. Each articulation of the imaginary of watershed-based democratic governance posits a different role for expert science in both democratic governance and the management of natural resources. For example, Phillippe Buache's Enlightenment-era river basins attempted to elucidate a natural order of the Earth while simultaneously prescribe an "objective" political geography for war-torn Europe and build credibility for the emerging discipline of geography. Powell's "river basin commonwealths" attempted to realign State and County boundaries and their water law with the natural flows of water through the landscapes of the arid American West.

When Powell's ideas were picked back up by early 20<sup>th</sup> century progressivists, they were infused with newer ideas about the role of expert scientists and managers in commanding nature and engineering society as well as concerns related to conflicts over the impacts of newer water uses such as hydropower generation on the timing and magnitude of water flows through watersheds. In Progressive approaches to watershed governance in the first two decades of the 20<sup>th</sup> century, we see an articulation of democracy and scientific environmental management that demands a strict separation of science and policy. In TVA-style "grass-roots democracy", scientists and engineers were recruited to enable the full development and use of river basins, as well as engineer a new form of liberal democracy and open up regional market economies<sup>541</sup>. The post-war cybernetic turn in watershed science overlapped with the bioregional movement in the 1960s and 1970s and set the stage for the so-called "third wave" of watershed democracy in which the watershed became primary grounds for experimentation in deliberative democracy, social learning and ecosystem restoration.

By examining the links between the intellectual history of the watershed and the governance of watershed systems in this Chapter, I attempted to set the

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<sup>541</sup> Ekbladh, David. 2002. 'Mr. TVA': Grass-Roots Development, David Lilienthal, and the Rise and Fall of the Tennessee Valley Authority as a Symbol for U.S. Overseas Development, 1933–1973. *Diplomatic History*, 26(3), 335–374

stage for understanding how collaborative governance at the watershed scale emerges and unfolds in the Klamath. In Chapter 3, I make the claim that the era of “watershed democracy” dawned in the Klamath in 1986 when congress chartered the Klamath Fisheries Task Force, an advisory body made up of representatives of the many resource user communities in the Klamath. I argue that the watershed scale then guided collaborative knowledge-making and shared governance through the USFS Pacific Northwest Forest Plan in the 1990s, the State and Regional Water Board’s TMDL development and implementation process in the early 2000s and FERC’s dam relicensing and removal negotiations over the last decade. The watershed became a primary arena for sorting out matters of cultural difference, resolving resource conflict, pooling diverse knowledges and coordinating policy at bioregional scales. I demonstrate in chapters 3-6 how numerous facets of democratic governance such as relationships among public agencies and between representatives and citizens, the terms and conditions of sovereignty and self-determination, modes of inclusion and participation, the boundaries of jurisdictions and the extent of public reach in private property were all negotiated through the watershed.

The next Chapter analyzes major areas of law and regulatory policy directing land and water use in the Klamath as well as the different theoretical positions from which to study the multiple ontologies and epistemologies of Klamath watersheds and the mutually constitutive relations between expertise, regulatory policy and the materialities of Klamath watershed ecosystems. In particular, I dissect two formative moments in the history Klamath watershed governance, the formation of the Klamath Fisheries Task Force in 1986 and the Fish Kill of 2002-2003, through two different theoretical frameworks: co-production and scale performativities. I argue through these cases for the importance of attending to the precise ways in which knowledge-making and governance processes at the watershed scale materially shape watershed-ecosystems, redistribute resource benefits and burdens and reconfigure patterns of access to resources and representative institutions. Through an analysis of these two important incidents in the history of Klamath watershed governance through two different theoretical frameworks, I set the stage for the next three empirical chapters (Ch 4-6) in which I examine the complex relationships between knowledge of watershed processes, institutions of watershed governance and watershed materialities in the Salmon, mid-Klamath and Scott Basins.

## Chapter 3

### *How watersheds and watershed institutions “think”*

#### 1. “Science for Suckers”

“The Klamath decision should have been based on law and science and not a political operative’s agenda, polls, and campaign priorities.”

- Senator John Kerry, press release 09/05/2003

Over a decade ago, when the so-called “Klamath water wars” were at their peak, even presidential hopeful John Kerry was attempting to define the proper boundaries between science, law and politics for the management of Klamath watersheds. Kerry’s outrage was voiced in response to an expose in the Wall Street journal alleging that federal scientists from the Department of Commerce’s National Marine Fisheries Service (NMFS) and the Department of Interior’s Fish Wildlife Service (FWS) had revised their 2002 biological opinions (biops) at the behest of political advisor Karl Rove<sup>542</sup>. The biops had lowered the minimum flows required for Klamath Lake and the Klamath River, effectively prioritizing irrigation deliveries to upper-Basin farmers at the expense of endangered Lost River Sucker and Coho Salmon populations<sup>543</sup>. The relaxation of flow minimums was seen as a favor for a right-leaning political district in Oregon, then considered a swing district in a swing state in an upcoming congressional election. That fall, a combination of lowered dam releases, a drought and an outbreak of an algae-related fish pathogen resulted in a massive fish kill. Over 34,000 fish carcasses lined the banks of the Klamath, costing the Klamath fisherfolk around \$82 million and catapulting the Klamath again into the national spotlight<sup>544</sup>. As the science connecting dam flow releases and fish mortality was contested in front of courts, congressional committees and the media, it threw into question the role of science in directing Klamath watershed management policy.

The previous summer of 2001 had also brought national attention to Klamath watershed politics when the Bureau of Reclamation curtailed irrigation deliveries to

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<sup>542</sup> Hamburger, Tom. “Oregon Water Saga Illuminates Rove’s Methods With Agencies”. *Wall Street Journal*, July 30, 2003.

<sup>543</sup> Doremus, Holly, and A. Dan Tarlock. “Fish, farms, and the clash of cultures in the Klamath basin.” *Ecology LQ* 30 (2003): 279.

<sup>544</sup> The USFWS estimated over 34,000 adult fish died, see US Fish and Wildlife Service. 2003a. *Klamath River fish die-off September 2002, Report on estimate of mortality*. Report Number AFWO-01-03. 28 pp. “This total included: 32,553 fall-run Chinook salmon (*Oncorhynchus tshawytscha*), 344 coho salmon (*O. kisutch*), 629 steelhead (*O. mykiss*), 311 Klamath smallscale sucker (*Catostomus rimiculus*), 87 sculpin (*Cottus* sp.), nine speckled dace (*Rhinichthys osculus*), one coastal cutthroat trout (*O. clarki*), one American shad (*Alosa sapidissima*), one green sturgeon (*Acipenser medirostris*) and 120 unidentified fish”. See also Turek, S., et al. “September 2002 Klamath River fish-kill: Final analysis of contributing factors and impacts.” *California Department of Fish and Game*. 183pp 2.3 (2004): 4.

farmers in the upper Basin to meet the minimum in-stream flow recommendations for the first time in its nearly 100-year history<sup>545</sup>. The summer of 2001 was particularly dry and, compounded by the irrigation cutoffs, devastating to Upper Basin farmers. Direct financial losses were estimated at \$28-35 million<sup>546</sup>. Upper Basin farmers organized protests and acts of civil disobedience, attempting to draw attention to their plight through “bucket-brigade” demonstrations, “convoy of tears” marches, radio broadcasts and roadside pickets. Between 2002 and 2007, the science behind watershed process and function was animated, performed and negotiated in front of numerous publics. Watershed science was contested in numerous institutional forums including courts, regulatory agency hearings, campaign debates, scientific journals and newspapers and hydropower company share-holder’s meetings. On the surface, last decade’s Klamath controversies were questions of how water should flow through the Basin and in what quantity, quality, timing, and temperature. Negotiated alongside flow regimes, water quality data and exposure analyses, however, were also broader epistemic and political questions of who should be responsible for producing authoritative watershed knowledge and through what kinds of institutions and processes.

The battle for scientific high ground in Klamath watershed debates was given the name “March Madness” due to the fact that every February, NMFS and FWS would release biological opinions stipulating minimum flows and inevitably courts would hear related cases every March, with different coalitions of farmers, dam operators, fishermen, tribes, and agencies sitting on either side of the bench depending on the flow recommendation<sup>547</sup>. Legal scholar Holly Doremus coined the term “macho law” to describe the inflexible, winner-take-all legal regimes of the Klamath and the term “combat biology” to describe “the plight of scientists in the basin, squeezed between the demands of conducting science as they learned it in graduate school, the macho legal regimes and political pressures from various constituencies”<sup>548</sup>. In Doremus’ opinion, the over-reliance on science to resolve these complex resource disputes has channeled “culture wars”, or deep cultural divides rooted in a long and violent history, through scientific battles over watershed hydrology, water chemistry, and fisheries biology, effectively sidestepping important political and legal questions about sovereignty, rights and responsibilities<sup>549</sup>. She argues that “science alone cannot determine how water should be allocated among competing demands” and cautions that dependence on science to resolve such complex cultural and political questions will only exacerbate resource conflicts<sup>550</sup>. In her words:

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<sup>545</sup> Doremus, Holly, and A. Dan Tarlock. *Water war in the Klamath Basin*. Island Press: 2008.

<sup>546</sup> Bill Jaeger, *Alternative Approaches to Water Management in the Klamath Basin*. Department of Agricultural and Resource Economics, Oregon State University: 2001, p. 7.

<sup>547</sup> Pers Com 2/14

<sup>548</sup> Doremus and Tarlock 2008, p xvii.

<sup>549</sup> *Ibid*, pg. 12: “Framing disputes in scientific terms cannot remove values from the equation, but it can make their role less apparent.”

<sup>550</sup> *Ibid*, p 17.

“It is a mistake to demand that scientists identify the *magic point* at which agricultural water withdrawals can be precisely balanced with environmental protection. That point may not exist, and even if it does exist it will be impossible to identify. The futile search for the magic point will continue to escalate controversy, satisfying no one.”<sup>551</sup>

Instead, Doremus argues that policy makers must face the fact that they are dealing with a clash of cultures and must therefore make tough political decisions through equitable and democratic processes: “society must choose between farming and fish, or find a way to accommodate both”<sup>552</sup>. I agree with Doremus that “combat biology” ends up diverting resource conflicts rooted in over a hundred years of cultural and environmental conflict into battles over “best available science”<sup>553</sup>. However, pinning the Klamath controversies on irreconcilable clashes of culture that must be solved through political processes leaves open important questions about the specific role that science should play in resolving environmental conflicts, achieving social and environmental justice and facilitating democratic resource governance processes in the Klamath. Rather than relying on expert scientists to supply policy makers with the “magic point” which will balance all water uses, what are needed are ways of brining Klamath watershed sciences themselves into democracy. That watershed science can never be purified of all politics, economics or cultural values does not mean that resource management agencies and basin inhabitants should give up on attempting to find ways of producing watershed knowledge and learning collectively at eco-hydrologic, bioregional or locally meaningful scales. Rather, it suggests the need for ways of producing watershed knowledge through democratic processes at ecologically and culturally appropriate scales that effectively link up local, regional, State and National law and policy-making processes, and conversely, bring the rich diversity of knowledges in the Klamath to bear on local, State and Federal resource management policy and forms of collective action.

As this and the next chapter will show, the “water wars” of the early 2000s came on the heels of nearly two decades of experiments in democratic watershed governance. That watershed debates ended up in courts, where combat biology and macho law ruled the day, signaled a failure of the first round of collaborative watershed bodies and initiated a search for different kinds of collectives and processes for producing knowledge and making resource management decisions. Some of these collaborative efforts continued to organize at the watershed scale, while others sought out grounds for community-based resource management at other scales such as firesheds and foodsheds, as will be explored in detail in chapter 5. In the decade following the 2002 Fish Kill, Klamath inhabitants redoubled efforts across multiple scales and governance networks to find a more appropriate relationship between science and democratic environmental governance that could accommodate

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<sup>551</sup> Doremus 2003, p. 349.

<sup>552</sup> *Ibid.*

<sup>553</sup> Doremus, Holly. "Purposes, Effects, and Future of the Endangered Species Act's Best Available Science Mandate, The." *Envtl. L.* 34 (2004): 397.

the diversity of knowledges, values and cultures attached to Klamath watershed resources.

This chapter analyzes the epistemic and regulatory landscape of the Klamath by grappling with the question of “how Klamath watersheds and watershed institutions think”. I argue against the extreme theoretical positions that either “institutions are the facts”- that governance institutions and interest groups make-up facts solely to secure power, or that “the facts are the facts”- that expert science maintains privileged access to the true nature of the watershed. I argue that both positions are inadequate for theorizing processes and outcomes of Klamath collaborative watershed governance. As alternatives to these theories, I evaluate two conceptual frameworks- 1. co-productionist accounts of science and social formations and 2. performative theories of scale- as theoretical positions from which to analyze the mutually constitutive relations between knowledges of watershed processes, institutions of watershed governance, and watershed materialities. I set each theory to work in attempting to analyze an important knowledge-related regulatory conflict in Klamath watershed governance. I first use a co-productionist framework to analyze the political and scientific controversy involved in the “Fish Kill incident” and regulatory hearings of 2002-2003 which attempted to assign blame for a massive fish die-off in the Klamath. I argue that applying the co-production frame to this incident helps the analyst track exactly how knowledge, regulatory institutions and material watershed processes are linked and who wins and loses when knowledge, institutional, and material formations stabilize in particular configurations.

I then turn my attention to theory that emerged from conceptual debates amongst political geographers about the politics, performativity and materiality of scale in resource governance. I use theoretical frameworks from this literature to describe and analyze the emergence of the Klamath Fisheries Task Force, the first “collaborative watershed management” body in the Klamath. Through this incident, I analyze how “watershed democracy” came into being at a particular historical moment as a result of a distributed effort springing from multiple conflicts that, for a number of number of reasons, provisionally patterned representative institutions and materialized social relations around the watershed. Resource conflicts and knowledge conflicts that were channeled through the Task Force materialized the watershed as a space of collective action and collaborative watershed-ecosystem governance for 20 years, from 1986-2006. The science and policy of the Task Force was thoroughly contested throughout its history, but still effective at achieving temporary closure and provisional collective action aimed at achieving restoration at the watershed scale.

The Task Force initiated basin-wide deliberation and knowledge-sharing for the first time in the Klamath and funneled over \$40 million to watershed restoration projects. However, knowledge production, decision-making and material outcomes were all unbalanced, as evidenced in the initial omission of Karuk and Yurok representatives from the Task Force and the overall uneven distribution of jobs, benefits, resource access in the implementation of restoration projects. I argue



through these cases for the importance of attending to the precise ways in which knowledge-making and governance processes at the watershed scale materially shape watershed-ecosystems, redistribute resource benefits and burdens and reconfigure patterns of access to resources and representative institutions. Through an analysis of these two important incidents in the history of Klamath watershed governance through two different theoretical frameworks, I set the stage for the next three empirical chapters (Ch 4-6) in which I examine the complex relationships between knowledge of watershed processes, institutions of watershed governance and watershed materialities in the Salmon, mid-Klamath and Scott basins.

## 2. Power, knowledge and watershed degradation

The “combat biology” of the Klamath water wars mentioned earlier seem to follow Stephen Hilgartner’s tongue-in-cheek theorem that “for every expert there is an equal and opposite expert”<sup>554</sup>. The idea that scientific and technical experts can provide policy makers with apolitical, objective, and universally valid “facts” is no longer tenable in either Klamath watershed management policy or in the literature on science policy and environmental governance. However, neither is the other extreme position put forth by early critics of the Theory of Himalayan Environmental Degradation, Thompson and Warburton (1988), that “institutions are the facts”. This “markedly social constructionist view” of the Himalayan watershed debates directly opposes the notion that “the facts are the facts”, or that expert scientists can deliver up neutral and apolitical facts about nature<sup>555</sup>. Formulated by journalists and scientists from the Global North in the 1960s, the “Theory of Himalayan Environmental Degradation” held that the population growth, ignorance, and greed of upstream pastoralists and agro-foresters causes them to overuse their forests and extend cultivation and grazing onto steeper slopes<sup>556</sup>. This in-turn resulted in accelerated erosion rates, excessive sedimentation of river beds and increasingly frequent and severe flooding downstream<sup>557</sup>. In the late 1980s, a number of geographers and political ecologists published articles critiquing THED science for seriously underestimating the social and ecological complexity and spatial variability of the Himalayan region. They held that earlier studies had drastically overestimated the anthropogenic causes of erosion and that “rapid orogenic uplift” was responsible

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<sup>554</sup> Hilgartner, Stephen. *Science on stage: Expert advice as public drama*. Stanford University Press, 2000, p. 5.

<sup>555</sup> Thompson, M., Warburton, M. and Hatley, T. 1986. Uncertainty on a Himalayan Scale: An Institutional Theory of Environmental Perception and a Strategic Framework for the Sustainable Development of the Himalayas. London : Milton Ash; cf. Blaikie, Piers, and Daniel Coppard. "Environmental change and livelihood diversification in Nepal: Where is the problem?." *Himalaya, the Journal of the Association for Nepal and Himalayan Studies* 18.2 (1998): 11, pg. 1.

<sup>556</sup> Ives, Jack D. "The theory of Himalayan environmental degradation: its validity and application challenged by recent research." *Mountain Research and Development* (1987): 189-199; Forsyth, Timothy. "Science, myth and knowledge: testing Himalayan environmental degradation in Thailand." *Geoforum* 27.3 (1996): 375-392.

<sup>557</sup> Blaikie, Piers M., and Joshua SS Muldavin. "Upstream, downstream, China, India: the politics of environment in the Himalayan region." *Annals of the Association of American Geographers* 94.3 (2004): 520-548.

for naturally high rates of erosion, mass wasting and large-scale episodic delivery of sediment to the river system. Most anthropogenic erosion was shown to occur mostly in State forests and large foreign-owned farms. Upstream farmers and pastoralists were largely acquitted of their watershed crimes.

Early work in Political Ecology looked specifically at the politics of watershed knowledge, particularly concerning the connections between upstream land-use, erosion, sediment and water flows and downstream flooding and siltation in the Himalayas. Blaike and Brookfield famously showed how watershed science is put to work in service of “degradation narratives”, which are used to criminalize upstream farming practices and justify State and BINGO intervention in resource management in Nepal<sup>558</sup>. Interpreting these debates in an article in 1997, geographer Julie Guthman concluded that the “facts of environmental degradation are socially constructed and always contested... victory in these contests is determined not by scientific evidence, but rather by relations of power”<sup>559</sup>. Thompson and Warburton (1986) similarly portray “Himalayan degradation” as having less to do with the biophysical realities of watershed processes than with the discourses and narratives “generated by institutions, for institutions”. In their view, watershed science serves merely an ideological function in reproducing political and economic institutions and legitimizing uneven power relations.

Responding to Guthman and others in 2004, political ecologist Piers Blaike wrote that such social constructivist critiques leave a “vacuum of responsibility” and offer no policy alternatives or bases to build positive understandings of social-ecological relations<sup>560</sup>. Blaikie instead called for a “responsible science” that provides a common language and a democratic process for building and debating a variety of different constructions of environmental change. He argued for a “social-justice based approach” which combined a “weak social constructivism” with strong democratic deliberative processes and rigorous evaluation of policy outcomes<sup>561</sup>. Without rigorous empirical social and environmental data conveyed in quantitative form, he argues, degradation theory would never have been overturned. However, Guthman was not saying that “there exists no material basis to the relationship between land-use, erosion and flooding”, rather that all explanations of this relationship are “socially and historically embedded, as well as power-laden”, including her own and Blaikie’s.

Political ecologist Tim Forsyth attempts to strike a middle ground in between Guthman and Blaikie by tempering radical constructivist analyses of the politics of environmental knowledge with a materially-grounded “epistemology of social

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<sup>558</sup> Blaikie, Piers, and Harold Brookfield. *Land degradation and society*. Methuen, 1987.

<sup>559</sup> Guthman, Julie. "Representing Crisis: The Theory of Himalayan Environmental Degradation and the Project of Development in Post-Rana Nepal." *Development and Change* 28.1 (1997): 45-69.

<sup>560</sup> Blaikie, Piers M., and Joshua S. Muldavin. "Upstream, downstream, China, India: the politics of environment in the Himalayan region." *Annals of the Association of American Geographers* 94.3 (2004): 520-548.

<sup>561</sup> Blaikie 2004a, p 147.

justice”<sup>562</sup>. He borrows from Jasanoff to argue for a co-productionist approach to the politics of environmental knowledge that sees watershed science and social and institutional forms as mutually constitutive. Forsyth is careful not to deny the environmental impacts of shifting cultivation on erosion, stream flow and downstream siltation and flooding. Rather, he argues that popular narratives that link upland land-use with downstream degradation are overly simplistic- they “underpin normative visions of both environment and society” and do not provide a sound basis for addressing the complex challenges of watershed management. Rather than leaving a vacuum of social responsibility or retrenching the authority of expert-driven science, Forsyth opens the way for alternative accounts of social and environmental change. He draws on diverse forms of local and scientific knowledge, combining GIS and Caesium-137 erosion analysis with political-economic institutional analysis while critically reflecting on the simultaneous uncertainty of truth claims and the materiality of watershed processes.

In the next section, I rely on theories of co-production to stake-out a middle ground between the extreme positions that either “institutions are the facts” or “the facts (as presented by experts) are the facts” in order to look more closely at exactly how Klamath watershed institutions think with and about the watersheds they govern. Following Blaike and Forsyth, I attempt to situate my own research between uncritical positivism and radical constructivism to discover ways of generating more equitable and democratic accounts of watershed processes in dialogue with the inhabitants of particular watersheds, even if it means going beyond the spatial scale of the watershed itself.

### **3. Do watersheds and/or watershed institutions think?**

The notion that watershed institutions can and do think counters the position that thinking is something that only individuals do. “Knowledge”, as David Turnbull puts it, “is not a unified abstract thing residing in individual minds; rather knowledge is socially distributed, it arises from the interactions of autonomous independent agents”, including more-than human agents<sup>563</sup>. In her influential essay “How institutions Think”, Mary Douglass explores the social and cultural dimensions of epistemology from two directions by looking, on one hand, at how individuals’ cognitive processes are shaped by social institutions and, on the other, at how shared epistemologies provide solid ground for social formations<sup>564</sup>. In Douglass’ account, the most important factor in determining the strength and durability of an institution is a shared epistemology, for shared ways of knowing anchor institutions at once in

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<sup>562</sup> Forsyth, Tim, and Andrew Walker. *Forest guardians, forest destroyers: the politics of environmental knowledge in northern Thailand*. University of Washington Press, 2008; Forsyth, Timothy. "Science, myth and knowledge: testing Himalayan environmental degradation in Thailand." *Geoforum* 27.3 (1996): 375-392.

<sup>563</sup> Turnbull, David. "Maps narratives and trails: performativity, hodology and distributed knowledges in complex adaptive systems—an approach to emergent mapping." *Geographical Research* 45.2 (2007): 140-149.

<sup>564</sup> Douglas, Mary. *How institutions think*. Syracuse University Press: 1986.

nature and in reason, and “any institution that is going to keep its shape needs to gain legitimacy by distinctive grounding in nature and in reason”<sup>565</sup>.

Douglass draws on philosopher of science Ludwig Fleck’s notion of a “*thought collective*” to demonstrate that, once nature and reason are buried deep inside their epistemic machinery, institutions are able to legitimize their rules, justify their power relations, and effectively reproduce themselves<sup>566</sup>. Through self-sustaining feedback loops, “thought styles” and “thought collectives” reciprocally produce and reproduce one another as they generate facts and representations of the world alongside particular patterns of social relations. For both Fleck and Douglass, institutions and epistemologies depend on one another for their sustenance and reproduction: facts are made by and for institutions while institutions are made of facts. Though Douglass repeatedly points to the importance of epistemology in grounding institutions in nature and reason, her “entirely general account of how groups get together and stay together” does not provide much empirical evidence of how they are or are not able to achieve this in practice<sup>567</sup>. Science and Technology studies, feminist and post-colonial studies of science and political ecology all provide different theoretical tools for analyzing how specific sets of knowledge practices are shaped through interaction with different race, gender, and class formations, institutional configurations and the “more-than-human” material world<sup>568</sup>.

In this section, I explore the ways in which different concepts- such as thought collectives, civic epistemologies, epistemic cultures, epistemic communities and actor-networks - figure the relations between knowledge practices, the formation and stabilization of governance institutions and material watershed processes. Picking the right figure with which to perform the linkages between knowledge practices, intuitions and materialities is part of the task of building better, more inclusive ways of “co-producing” watershed knowledge. Building an appropriate theoretical framework is also necessary for analyzing the processes and outcomes of Klamath watershed governance. To begin with, Karen Knorr-Cetina’s term “*epistemic cultures*”, designates “those amalgams of arrangements and mechanisms-bonded through affinity, necessity and historical co-incidence-which, in a given (scientific) field, make

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<sup>565</sup> Douglas 1986, p. 112, 45.

<sup>566</sup> See Fleck, Ludwig. *The genesis of a scientific fact*. Trans. F. Bradley (1935) 1979. For Fleck, a thought collective is “a community of persons mutually exchanging ideas or maintaining intellectual interaction” within the parameters of a given thought style. A “thought style” in turn determines the conditions of true knowledge such as what reasonable questions will look like, how evidence is to be presented and what kinds of procedures will adjudicate between contending truth claims.

<sup>567</sup> Hacking, Ian. “Knowledge: Review of Douglas ‘How Institutions Think’”. *London Review of Books*. Vol. 8 No. 22 · 18 December 1986, pgs 17-18.

<sup>568</sup> See e.g. Anderson, Warwick. “Introduction: postcolonial technoscience.” *Social Studies of Science* (2002): 643-658; McNeil, Maureen. “Introduction: postcolonial technoscience.” *Science as Culture* 14.2 (2005): 105-112; Harding, Sandra. *Sciences from below: Feminisms, postcolonialities, and modernities*. Duke University Press, 2008; Chen, Mel. *Animacies: Biopolitics, racial mattering, and queer affect*. Duke University Press, 2012; Haraway, Donna Jeanne. *When species meet*. U of Minnesota Press, 2008.

up how we know what we know”<sup>569</sup>. Through this term, she explicitly calls attention to the diversity of processes and the collectivities of actors/actants, instruments and artifacts through which different communities make different kinds of knowledge.

Rather than being trapped in individual minds or in the self-replicating feedback loops of human “thought collectives”, the production of knowledge in “epistemic cultures” is distributed across vast and heterogeneous networks of interacting humans and non-humans spanning the globe but linked through nodes grounded in particular locations and communities of practice. In Knorr-Cetina’s account, epistemic cultures are formed through a process of “curling-up”, where “cultural specificities arise and thrive when domains of social life become separated from one another- when they curl up upon themselves for a period of time”<sup>570</sup>. This “curling-up” allows each epistemic culture to become an “internally referential system” that is oriented towards and materially sustained by the external world in a particular way. Epistemic cultures display a very different kind of self-referentiality than that posited by Craig Thomas’ figure “epistemic community”, which he used to depict knowledge -production among California environmental regulatory agencies<sup>571</sup>. For Thomas, members of an “epistemic community” share similar normative values, beliefs in the same causal relationships and a common methodology for validating knowledge, “all of which shape their formulation of best management practices”<sup>572</sup>. Whereas an “epistemic culture” is still engaged in and even sustained by specific relationships with the material world, an “epistemic community”, like Fleck’s thought community, “produces consensual knowledge, regardless of whether this knowledge reveals truth or is socially constructed”<sup>573</sup>.

Jasanoff (2011) develops the term “civic epistemologies” to designate “culturally-specific, historically and politically grounded public knowledge ways”<sup>574</sup>. Civic epistemologies depict the ways political communities know things in common, test knowledge claims and develop epistemological grounds for collective action<sup>575</sup>. The notion that different culturally specific notions of democracy articulate different relationships between science and the state is meant to counter theories that pose a static and universal relationship between science and democracy. However, Jasanoff’s

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<sup>569</sup> Cetina, Karin Knorr. *Epistemic cultures: How the sciences make knowledge*. Harvard University Press, 2009, p. 1.

<sup>570</sup> Knorr-Cetina 2009, p 2.

<sup>571</sup> Thomas, Craig W. "Public Management as interagency cooperation: testing epistemic community theory at the domestic level." *Journal of Public Administration Research and Theory* 7.2 (1997): 221-246. Thomas, Craig Warren. *Bureaucratic landscapes: Interagency cooperation and the preservation of biodiversity*. Vol. 1. MIT Press, 1997.

<sup>572</sup> Thomas 1997.

<sup>573</sup> Thomas 1997, p 41

<sup>574</sup> Jasanoff, Sheila. *Designs on nature: science and democracy in Europe and the United States*. Princeton University Press, 2011, p 249.

<sup>575</sup> In comparing civic epistemologies across three national political and epistemic cultures, Jasanoff attempts to capture patterns of civic engagement with governmental reason, particularly how the relationship between science and the state is negotiated differently under three different democracies.

“civic epistemologies” concept was developed specifically in view of national-scale differences in epistemic and political culture and State level approaches to science-policy and democratic decision-making. In the case of collaborative watershed governance, which involves multiple local, Tribal, State and Federal agencies, the scale of democratic decision-making is itself being co-produced alongside State formations, “public knowledge-ways” and norms of democratic governance.

Through an “actor-network” approach, watershed knowledges, watershed institutions and even material watersheds themselves are figured as dynamic processes and patterned effects generated by a diverse and distributed network of interacting materialities and meanings<sup>576</sup>. Through an actor-network lens, watersheds could be said to be “made-up” in the sense that there is “no such thing as natural, unmediated, unbiased access to (the) truth” in the way waters flow through watersheds or waterscapes<sup>577</sup>. However, watersheds are *not* “made-up” in the sense that watershed knowledge is invented ex-nihilo “by and for institutions” without reference to biophysical and social reality. Watersheds through an actor-network frame are materially “made-up” or fabricated in the sense that they are the composite product of a vast ensemble of human and more-than human relations, flows of matter-energy and sets of material, social and textual practices. In contrast to the portrayal of nature as a passive resource for self-replicating social institutions, each node in a network that “makes-up” a particular constellation of facts about a watershed is figured as an embodied and emplaced agent with the capacity to act and shape the overall effect produced by the network.

Geographer Chris Sneddon has asked specifically whether or not an Actor-Network approach is helpful in addressing questions of materiality, scale, and power in watershed governance in Thailand<sup>578</sup>. He asks, “what usefulness are actor-

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<sup>576</sup> Law, John. “Notes on the theory of the actor-network: Ordering, strategy, and heterogeneity.” *Systems practice* 5.4 (1992): 379-393, p. 380, 383. For example, Finnish scholar Jarmo Kortelainen (1999) portrays the River Pielisjoki in eastern Finland as itself an “actor-network”, an assemblage of different non-human and human actors co-constructing the watershed materially and socio-culturally as a transportation corridor, an energy source, a sewer, salmon habitat, and a symbol of environmental protection. See Kortelainen, Jarmo. “The river as an actor-network: the Finnish forest industry utilization of lake and river systems.” *Geoforum* 30.3 (1999): 235-247. Chou (2012) follows the long-term formation of a river governance network through a case study of the Keelung River watershed in urban Taiwan and shows how human and nonhuman actors and actants are brought together in networks through enrollment devices such as stream gauges that come to “speak for the river” and eventually materially configure the watershed for irrigation and flood drainage functions. See Chou, Tsu-Lung. “ANT Analysis on the River Management of Urban Taiwan: A Case Study of Keelung River in Taipei Basin.” *Advances in Applied Sociology* 2.03 (2012): 203.

<sup>577</sup> See Latour, Bruno. “Why has critique run out of steam? From matters of fact to matters of concern.” *Critical inquiry* 30.2 (2004): 225-248, p 227.

<sup>578</sup> Sneddon, Chris. “Reconfiguring scale and power: the Khong-Chi-Mun project in northeast Thailand.” *Environment and Planning A* 35.12 (2003): 2229-2250. See also: Sneddon, Chris. “Water conflicts and river basins: the contradictions of comanagement and scale in Northeast Thailand.” *Society & Natural Resources* 15.8 (2002): 725-741; and Sneddon, Chris, and Coleen Fox. “Rethinking transboundary waters: A critical hydropolitics of the Mekong basin.” *Political Geography* 25.2 (2006): 181-202.

network approaches when the networks themselves are maddeningly complex and lousy with intersections among multiple networks, ...when the nonhuman entities include water and a host of aquatic organisms whose own associations (physical, bio, ecological dynamics) are poorly understood and ill defined?<sup>579</sup>. He argues that the “political and cultural construction of scale” literature in geography pays insufficient attention to the “ecological production of scale”- the participation of nonhumans in the co-construction of socio-spatial formations and the dynamic processes in watershed-ecosystems which continuously generate and influence a continuum of scalar entities. For Sneddon, “spatial scales are also produced through ecological means, and never solely through social processes and discourses”<sup>580</sup>. Agreeing with Latour that “power over something or someone is a composition made by many people and things”<sup>581</sup>, Sneddon argues for a symmetrical approach to the social and ecological production of the watershed as a scalar composition, a space of knowledge generation, a unit of governance and a site of struggle for access to resources and power<sup>582</sup>. According to Sneddon, “scale and power are thus intimately related within complex environmental conflicts, and tracing their linkages through an array of actors and across a variety of scales (the approach associated with actor-network methods) can reveal a great deal about how power and scale are co-created”.

Many other science and technology studies scholars disagree, holding that Actor-Networks are insufficient theoretical devices for following how knowledge practices and power relations articulate within configurations of social relations and in connection with specific materialities and material livelihood practices<sup>583</sup>. As Jasanoff puts it, “when actor-network theory confronts the nature of power, ...it side-steps the very questions about people, institutions, ideas, and preferences that are of greatest political concern”<sup>584</sup>. By ignoring institutions, actor-networks “display curiously little of the moral and political conflicts that normally accompany the creation and maintenance of systems of governance.” Langdon Winner (1993: p. 368) similarly critiques actor-networks for their “disdain for anything resembling an evaluative stance or any particular moral or political principles”<sup>585</sup>. While alleging to open up the “black boxes” around the concepts of science, nature and society, Winner holds that, upon opening ANT’s black boxes, he found them empty<sup>586</sup>. Even Latour

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<sup>579</sup> Sneddon 2003, p 2231. While remarking that an actor-network approach is more useful when an environmental conflict is delimited by fairly specific sets of human and nonhuman agents, he also thinks that ANT trains attention on ways that more-than-human agent/actants “matter” in the production of “scalar effects” and the distribution of power in watershed governance networks.

<sup>580</sup> Sneddon 2003, p 2234.

<sup>581</sup> Latour, Bruno. "Visualization and cognition." *Knowledge and society* 6 (1986): 1-40. p 265

<sup>582</sup> Sneddon 2003, p 2247.

<sup>583</sup> See e.g. Haraway, Donna Jeanne. "A game of cat's cradle: science studies, feminist theory, cultural studies." *Configurations* 2.1 (1994): 59-71; Strathern, Marilyn. "Cutting the network." *Journal of the Royal Anthropological Institute* (1996): 517-535; Mol, Annemarie, and John Law. "Regions, networks and fluids: anaemia and social topology." *Social studies of science* 24.4 (1994): 641-671.

<sup>584</sup> Jasanoff 2004, p 23.

<sup>585</sup> Winner, Langdon. "Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology." *Science, Technology, and Human Values* (1993): 362-378.

<sup>586</sup> Winner 1993.

himself later agreed that actor-networks “become empty when asked to provide policy, pass judgment or explain stable feature”<sup>587</sup>. When applied to watershed governance, Chou (2012) for example holds that “ANT is theoretically unable to come up with any future policy recommendations for flood control in the (Keelung River) watershed.” By ignoring the importance of political and regulatory institutions in configuring knowledge-power relations, ANT cannot explain how particular “actor-networks sustain some representations of nature and the social world at the expense of others”<sup>588</sup>.

I agree with Jasanoff and others that co-production is a more suitable theoretical position than ANT from which to study the dynamic formations of knowledge, nature and society. A co-productionist position sees the production of watershed knowledge as always linked with particular institutions and ways of inhabiting and managing watersheds. This dissertation adopts a co-productionist standpoint to analyze the mutual constitutions of knowledge about watershed processes, institutions of watershed governance and material watershed processes and the social-ecological relations they support. In the next section, I demonstrate a co-productionist framing of the “Fish Kill” debates by showing how particular sets of knowledge practices stabilize and destabilize alongside the formation of governance institutions such as regulatory policies, water quality standards, court opinions and the flow regimes they support.

I argue that the “*flow regime*”, or the pattern of the timing of water flowing through the Klamath Basin, is itself a temporary stabilization of knowledge politics, court cases and regulatory conflicts, the outcomes of which maintain a particular quantity, timing and quality of water flowing through watersheds and, in turn, the webs of social and ecological relations and livelihood practices that depend on those particular flow conditions. A co-productionist stance on the Fish Kill debates sees watershed knowledge, governance institutions, flow regimes and watershed relations between upstream and downstream water-users as linked in ongoing mutually constitutive interaction.

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<sup>587</sup> Latour, Bruno. "Social theory and the study of computerized work sites." *Information technology and changes in organizational work* (1996): 295-307, p. 304.

<sup>588</sup> Chou, Tsu-Lung. "ANT Analysis on the River Management of Urban Taiwan: A Case Study of Keelung River in Taipei Basin." *Advances in Applied Sociology* 2.03 (2012): 203. As an alternative to the “actor-network” metaphor, Donna Haraway (1994) offers up “Cat’s Cradle” as a “less deadly” way of figuring practices of technoscience and guiding critical processes of world building. In her opinion, the network metaphor is mired in a past of cybernetics, game theory and “the war of words and things, where practice is modeled as military combat, sexual domination, security maintenance, and market strategy”. Instead of “tracing actors and actants through networks in yet another war game” she calls on the collective and embodied pattern-making practices of Cat’s Cradle to help her follow “how worlds are made and unmade, and for who”.



#### 4. Co-producing hydropower, flow regimes, microcystins and fish carcasses

The Fish Kill debates of 2002-2003 unleashed a frenzy of research on temperature and flow-dependent algae growth and fish mortality which led to new ways of conceptualizing, representing and monitoring relations between upper basin farming and hydropower production and downstream flows, specifically bluegreen algae growth patterns. Research produced by Tribes and environmental groups was eventually able to link the artificially low flow conditions of 2002 to high growth rates of the blue-green algae *Microcystis aeruginosa*, which in turn produced Microcystin compounds, known to have toxic effects on fish and humans<sup>589</sup>. In humans, the effects of exposure to Microcystin were shown to range from skin inflammation and upset stomachs to liver damage, respiratory failure and even death<sup>590</sup>. In September, 2010, the Klamath River became the first river in the US to be listed under the Clean Water Act section 303(d) as impaired for Microcystin. The Yurok tribe eventually received a declaratory judgment holding the held the agencies responsible for the fish kill, but not for violating their trust responsibility to the tribes. The agencies were found to have no trust obligation to tribes beyond those specified in environmental statutes.

Here we see how, even though the ability to render links between upstream water use and downstream impacts was able to influence one set of regulatory institutions, questions of sovereignty and the federal government's duty to protect tribal trust were *not* "co-produced" along with new watershed knowledge. Different constellations of human institutions and knowledge practices entangle with biophysical/eco-hydrological processes and co-produce "flow regimes", specific flows of water through Klamath watershed ecosystems and communities<sup>591</sup>. These flow

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<sup>589</sup> California Environmental Protection Agency. 2005. Memo from Dr. Karlyn Kaley, EPA Toxicologist, to Matt St. John, North Coast Regional Water Quality Control Board, re: *Cyanobacterial Microcystin Toxin Summer 2005 Water Sampling Results from Copco and Iron Gate Reservoirs*. Integrated Risk Assessment Branch, California Environmental Protection Agency, Sacramento, CA 4 p.; Federal Energy Regulatory Commission. 2007. *Final Environmental Impact Statement for Hydropower License, Klamath Hydroelectric Project*, FERC Project No. 2082-027. FERC/EIS-0201F; Kann, J. 2006. *Microcystis aeruginosa Occurrence in the Klamath River System of Southern Oregon and Northern California*. Report for the Yurok Tribe Environmental Program and Fisheries Department, Klamath, CA by Aquatic Ecosystem Sciences, Ashland, OR; Kann, J. and S. Corum. 2006. *Summary of 2005 Toxic Microcystis aeruginosa Trends in Copco and Iron Gate Reservoirs on the Klamath River, CA*. Prepared For: Karuk Tribe Department of Natural Resources, by Kann, J; Corum, Susan; March, 2006.; Kann, J. and S. Corum. 2007. *Summary of 2006 Toxic Microcystis aeruginosa Trends in Copco and Iron Gate Reservoirs on the Klamath River, CA*. Prepared For: Karuk Tribe Department of Natural Resources by Kann, J; Corum, Susan; June, 2007. 23pp; Yurok Tribe Environmental Department. 2006. *Klamath River Blue-Green Algae Bloom Report*. Yurok Tribe Environmental Department, Klamath, California. 15 p; Yurok Tribe Environmental Program. 2007. *Klamath River Blue-Green Algae Summary Report, 2006*.

<sup>590</sup> Yurok Tribe Environmental Program, Klamath, California; Yurok Tribe Environmental Program. 2008. *Final 2008 Klamath River Blue-Green Algae Summary Report*. By Ken Fetcho. Yurok Tribe Environmental Program, Klamath, California

<sup>591</sup> For "flow regime", see e.g. Poff, N. LeRoy, et al. "The natural flow regime." *BioScience* (1997): 769-784.

regimes never stabilize for very long, for the constellation of knowledge practices and regulatory institutions that support them soon becomes terrain for future contestations over Klamath watershed resources and the livelihoods they sustain.

Disappointed with the formal institutional channels such as courts and regulatory hearings, there was a proliferation of public protest, political theatre and civil disobedience by Klamath Tribes. The Yurok tribe left hundreds of fish carcasses on the steps of Congress. The Karuk tribe staged protests, pickets and political theatre such as “Salmon cook-ins” outside and inside hydropower company shareholder meetings in Scotland and Nebraska<sup>592</sup>. The Tribes sought a settlement outside of the courts and began working the Oregon and California state legislatures while simultaneously pursuing numerous formal regulatory and legal channels related to FERC dam relicensing, the NMFS Southern Oregon-Northern California Coast Coho Restoration process and the TMDL process under the Clean Water Act.

As we will see next chapter, the North Coast Regional Water Quality Control Board worked with Klamath tribes to establish a unique category of cultural beneficial uses that would reflect ceremonial uses of water, making the TMDL standards for Microcystin rigorous enough for ceremonial leaders to be able to consume small amounts of water during certain times of year without risk. Eventually, concerted pressure from multiple individual tribes and coalitions of tribes through multiple formal and informal channels led to a dam removal agreement between federal agencies California and Oregon state governments and most of the tribes in the basin. The Klamath dam-removal was approved by the Secretary of Interior in 2013 and Senator Wyden (D-OR) recently introduced authorizing legislation, the Klamath Basin Water Recovery and Economic Act of 2014, into the Senate this May<sup>593</sup>. If passed, the bill would sponsor the largest dam removal in US history.

In addition to the political action and regulatory hearings of the Fish Kills, there was a nation-wide debate sparked by the Klamath controversy regarding the proper role of expert science in democratic decision-making and environmental governance. For many, including the Washington Post reporter quoted below, the route to better watershed governance entailed rigorously separating science from politics:

“Americans expect our government to make decisions about the survival of fish and wildlife based on science. But in the drought-plagued Klamath Basin, science has long taken a back seat to sweetheart deals and political favoritism.”<sup>594</sup>.

The immediate outcome of the initial 2003 expose in the Wall Street Journal was an investigation conducted by the Interior Department’s Office of Inspector General into Sen. Kerry’s claims that Federal agency regulatory decisions were not

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<sup>592</sup> See e.g. “Tribes continue power firm fight: Native American tribes have returned to Scotland to protest outside the headquarters of Scottish Power”, BBC World News, 7/20/2005.

<sup>593</sup> Klamath Basin Water Recovery and Economic Restoration Act of 2014, s.2379.

<sup>594</sup> Pedery, Steve. “Cheney: A river runs through him” *Washington Post*. July 08, 2007.

made according to the “best available science”. After their investigation, the Interior’s Inspector General found that proper administrative procedures had been followed, that no biologists had been subjected to undue political pressures and that, overall, “best available science” had supported the departments’ decisions to lower dam releases. He also conjectured that the scientific uncertainty in the case was due to the “fiercely competing interests” of the Tribes, irrigators, fishermen, and environmentalists, and the “highly charged difference of opinions concerning what constitutes the best scientific and commercial data available”<sup>595</sup>.

A 2003 article in *Science* entitled “Combat Biology on the Klamath”, also defended the fisheries biologists and agency administrators against blame for the 2002 fish kill, saying that they were forced to make “tough decisions in a scientifically uncertain and politically charged climate”<sup>596</sup>. In the wake of the Fish Kill controversies, a hearing on the “abuse of science” in Klamath watershed governance was held in 2007 in the House Committee on Natural Resources<sup>597</sup>. The chair of the committee, Rep. Rahall (D-VT) publically condemned the “tweaking (of) scientific data in order to advance a political agenda” as a practice “worthy of the Middle Ages, when the pioneers of astronomy were forced by officials of the time to recant their science, and to swear that the Earth was flat”. In the Fish Kill example, we see how Klamath watershed debates sparked national conversations about the proper relationship between science and democratic governance.

Amidst the claims of sloppy science, junk science, and “science for Suckers” could also be heard cries for more science, better science, and more objective science. Each time the sanctity of science was invoked, it was in relation to distinct cultural practices, livelihoods or ways of living in the world. Calls for a more democratic and accountable relationship between watershed science and watershed management policy resounded from all sides, from State-of-Jefferson libertarians to indigenous communities, National Research Committee panels, Congressmen and presidential candidates. While for libertarian farmers and ranchers in the “State of Jefferson”, “better” watershed science entailed limiting the reach of federal and state government regulation, for indigenous communities it entailed respecting knowledge sovereignty, protecting indigenous intellectual and cultural properties and enhancing tribal self-determination through inclusion of tribal representatives and cultural perspectives in governance processes. Many environmentalists called for “better” watershed science and for “best available science” to uphold environmental statutes such as the Endangered Species and Clean Water Acts. For scientific advisory panels such as the National Research Council, “better” science entailed sending Agency science and regulatory policy through independent peer-review bodies and building adaptive learning loops into the decision-making process. Different communities and

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<sup>595</sup> Inspector General Office, U.S. Department of the Interior. *Semiannual Report to Congress*: Report No. 04-S-04. April 1, 2004.

<sup>596</sup> “Combat Biology on the Klamath”; *Science* 4/4/2003; Vol. 300. no. 5616, pp. 36 - 39

<sup>597</sup> House Committee on Natural Resources, Full Committee Oversight Hearing: “Crisis Of Confidence: The Political Influence Of The Bush Administration On Agency Science And Decision-Making”. July 31, 2008, 10 am.

representative institutions had very different ideas of both what constitutes credible knowledge and how that knowledge should be used to support democratic environmental governance.

Though knowledge politics did play a large role in showing the impacts of dams on fish and the potential benefits of dam removal on fish, it was in connection with multiple other forms of political and legal action. It was not the case in the fish kill debates that knowledge was produced merely “by and institutions and for institutions”, but neither did it emerge from scientists speaking for nature based on Mertonian norms or apolitical, value-neutral and “disinterested” processes. Rather, knowledge about watersheds was built through resource conflicts, regulatory debates, and in connection with livelihood practices and distinct ways of living in the world. This does not mean that watershed knowledge is “made-up” at will by institutions or fabricated without reference to material watershed processes. Rather, knowledge about watershed processes is built through successive waves of cooperation and conflict, iterative everyday material practices and ways of living in and managing Klamath watershed ecosystems. I attempt to demonstrate in this chapter how watersheds entail a complex bio-cultural choreography of knowledge-making, resource governance and collective action and should therefore be theorized as collective compositions articulated by groups of people in conversation with place.

The title of this chapter, “how watersheds think” is intended to reflect an ambiguity and tension. On one hand, watersheds are “always-already” social institutions, meaning there can’t be any unmediated access to the “nature” of the watershed via an objective and neutral science. On the other, watersheds must also be seen and theorized as the composite product of the more-than-human actors/actants, relations, materialities, and socialities implicated in making watersheds and watershed knowledge. This means that there can be no a priori access to the truth of watersheds via denatured social relations, if we mean by “social” only those actions undertaken by human collectivities. While it is important to acknowledge that watershed institutions make watershed knowledge and shape material watershed processes, it is important to acknowledge that they do not do so in a frictionless medium, but always in dialogue with more-than-human relations, socialities and materialities.

Watershed institutions “think” and “think with” the watersheds they govern through epistemologies that are composed of vast assemblages of people, other-than-human agents, instruments, texts and artifacts that connect particular places with global circulations of text and discourse. These watershed assemblages temporarily stabilize in formations and institutions that shape flows of knowledge, power, meaning and the relations between sediment, water, algae fish and human bodies and cultures. Watersheds think like Eudardo Kohn’s forests think, that is, through “ecologies of selves” entangled in complex relations of interdependency, symbiotic as

well as predatory, collectively making meaning through relations of living and dying<sup>598</sup>.

However, while it is important to reinvigorate the place of the nonhuman and the material in accounts of power, it is important not to do so at the expense of a detailed understanding of human institutions and the uneven power relations they build into the ways we see, think about, act in and move through the world. All watershed knowledge is produced through power-laden practices and on uneven terrain, that is, unequal relationships among humans and nonhumans. In Eduardo Kohn's example, the river drainage network materializes a kind of "emergent form", a pattern or regularity as a certain configuration of constraints on possibility, rather than something humans impose on a world otherwise devoid of pattern. Though this "emergent form" is neither alive nor merely a "thought", life and thought do harness this form and are "everywhere made over by its logics and properties"<sup>599</sup>. Though neither alive nor merely a thought, the drainage network enrolls action around itself and brings rubber trees, rivers and economies into relation with one another and makes possible a distinct pattern of resource extraction and exploitation.

In showing how knowledge, nature and forms of social life are "co-produced" in watershed democracies, it is imperative to show exactly how they are linked, how benefits and burdens are redistributed and, more importantly, who wins and loses when institutions, knowledge practices and material formations stabilize in particular configurations. Though knowledge-power in a co-productionist account is figured as "compositional", a "composition made by made by many people and things", a composition always entails strategic inclusions and exclusions, which in turn result in uneven distributions of goods and harms, as was shown in the Fish Kill example<sup>600</sup>. In the next section, I explore debates in political ecology and geography about the performativity and materiality of scale in order to focus on the embodied and emplaced practices that bring particular watershed ecosystems and communities into being. I use this framework to analyze the emergence of the first collaborative watershed management institution in the Klamath, the Klamath Fisheries Task Force, in which the different Federal, State and local agencies and the fishing, farming, and tribal communities of the Klamath came together to manage resources collaboratively at the watershed scale for the first time.

## **5. Watershed performances and materialities**

As Turnbull argues, "performativity" draws attentions to the ways "meaning, understanding, and knowledge" emerge from embodied and relational practices that both "take place" in particular biophysical and socio-cultural/political geographies

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<sup>598</sup> Kohn, Eduardo. *How forests think: Toward an anthropology beyond the human*. Univ of California Press, 2013.

<sup>599</sup> See Kohn 2013, p 162-163.

<sup>600</sup> Latour 1986.

and “make place” as they are materially built into those geographies<sup>601</sup>. Harris and Alatout (2010) have argued for a performative approach to questions of scale in watershed governance that both builds upon and moves beyond the “cultural politics of scale” framework (see Ch 1) and sees water flows and patterns of social relations as co-constitutive<sup>602</sup>. While drawing attention the “politics of scale” avoids assuming the “watershed” as a pre-given ontological or scalar formation, they argue that attempts to denaturalize scale go too far in portraying scalar and spatial formations as purified “social constructions”, with some going so far as to suggest we abandon the scale concept in socio-spatial analysis altogether<sup>603</sup>.

Drawing attention to the “performativities of scale”, by contrast focuses attention on embodied, emplaced and power-laden practices that materialize particular scalar formations such as the watershed as spaces of knowledge generation, loci of governance and patterns of nature-society relations. A performative approach uncovers how different territorial assemblages such as the watershed emerge through discursive regimes which are sedimented and naturalized through iterative citational practices. Placing emphasis on the continually contested dynamics of scalar constructions highlights the diverse everyday practices that maintain the watershed as a territorial, ideological or institutional component of State formations. However, while Harris and Alatout’s account is a helpful development of the “cultural politics of scale” framework, it does not tell us much about the particular relations between the bodies, places or relations between them implicated in different scales of resource governance such as the watershed.

Numerous scholars have pointed out the ambivalent relationship between discourse and materiality in performative frameworks. For example, science studies scholar Donald MacKenzie describes two types of performativity in knowledge-making<sup>604</sup>. One, generic performativity, follows from Michel Callon’s actor-network approaches to market-making to show how the categories of scientific thought are not natural forms interpreted by experts, but are actually the result of endless “performances” by human beings and non-humans who create linkages and stabilize in particular configurations and networks<sup>605</sup>. The other, MacKenzie terms “Austinian performativity”, in honor of J.L. Austin’s notion of “performative utterances that make themselves true” such as the king labeling someone an outlaw and thereby interpellating them in a web of juridical-social relations and subjecting them to

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<sup>601</sup> Turnbull 2007.

<sup>602</sup> Harris, Leila M., and Samer Alatout. "Negotiating hydro-scales, forging states: Comparison of the upper Tigris/Euphrates and Jordan River basins." *Political Geography* 29.3 (2010): 148-156.

<sup>603</sup> Marston, Sallie A., John Paul Jones, and Keith Woodward. "Human geography without scale." *Transactions of the Institute of British Geographers* 30.4 (2005): 416-432.

<sup>604</sup> MacKenzie, Donald A., Fabian Muniesa, and Lucia Siu. *Do economists make markets?: on the performativity of economics*. Princeton University Press, 2007.

<sup>605</sup> Callon, Michel. "Introduction: the embeddedness of economic markets in economics." *The Sociological Review* 46.S1 (1998): 1-57; Callon, Michel. "The laws of the markets." *Sociological review monograph* (1998).

specific forms of power<sup>606</sup>. In Callon's version, performances are distributed across vast collectives of humans and non-humans, stabilizing in certain patterns that hide their histories and circulate widely, while in Austin's version, powerful actors direct the world through will and language; the world "lives-up" to the command.

Applying the discussion of performativity and materiality to the debate around scale in geography, Kaiser (2008), for example, draws on Judith Butler's theory of performativity and materiality to launch a performative approach to the question of the "materiality of scale", or why and how scale *matters*<sup>607</sup>. Extending Butler's notion of performativity as "the reiterative and citational practice by which discourse produces the effects that it names", Kaiser describes the ways "scale effects" are produced as through a repetitive and cyclical process of citation and signification. Seeing performativity as the "power of discourse to produce the phenomena that it regulates and constrains" in this context means that scale is a discursive effect projected into the world, (Butler 1993, p. 2); a "process of materialization that stabilizes over time to produce the effect of boundary, fixity, and surface we call matter"<sup>608</sup>.

Scales in this account are shaped in the image of discourse; they "materialize through the repetition of sets of citational practices that stabilize as well as challenge the boundary, fixity, and surface effects that materialize"<sup>609</sup>. While scales do eventually come to matter, emerging from reiterative sets of embodied or emplaced practices, the way they come to matter in such an account is through discourse "producing the effect that it names". Discourses matter above all else in such performative accounts of scale; "discourses are the facts"<sup>610</sup>. Discourses work over time to produce 'scalar effects' by materializing them into being through embodied everyday practices that simultaneously naturalize them as ways of seeing the world. However, this "Austinian" version of performativity does not accurately describe the relationship between materiality and discourse in watershed governance.

One could gesture at the performativity of the watershed, in the sense that, beyond merely representing that human and ecological communities that exist before them, watersheds actually perform sets of social and natural relations according to "scripts" provided by discourses, narratives, institutions, norms, and race-class-

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<sup>606</sup>Austin, John Langshaw. *How to do things with words*. Vol. 367. Oxford University Press, 1975.

<sup>607</sup>Kaiser, Robert, and Elena Nikiforova. "The performativity of scale: the social construction of scale effects in Narva, Estonia." *Environment and planning. D, Society and space* 26.3 (2008): 537.

<sup>608</sup>Butler, Judith. *Bodies that matter: On the discursive limits of sex*. Taylor & Francis, 2011 (1993), pg. 9.

<sup>609</sup> Kaiser and Nikiforova 2008, p 542.

<sup>610</sup> Karen Barad's critique of Butler's treatment of materiality and performativity is that it "is limited by its exclusive focus on human bodies and social factors, which works against her efforts to understand the relationship between materiality and discursivity in their indissociability". Barad, Karen. *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. duke university Press, 2007, p 34-35. Barad's "Agential realism" - "avoids privileging of discursive over material concerns and the "reinscription of the nature-culture dualism that Butler's account inadvertently enacts".

gender-species hierarchies, etc. These scripts direct the formation of certain social-ecological-hydrologic relations and pattern their collective interactions and actually bring particular kinds of watersheds, flow regimes and watershed relations into being through iterative embodied and emplaced practices. Some performances are extremely subtle such as when a natural resource economist uses computer models to simulate the potential effects of watershed restoration projects on fish habitat and job growth (See Ch 4). However, even the most “objective” seeming calculations such as minimum flow recommendations or risk-analyses for dam-relicensing are often the most elaborate performances spanning vast networks of actors, multiple public and private agencies, rounds of public scoping and comment sessions and complex technical apparatus such as satellite imagery, models and laboratories at universities, Federal facilities and private consulting firms<sup>611</sup>.

To my thinking, this version of scalar performativity is inadequate for understanding the politics of knowledge in Klamath watershed governance, as it seems to take a *hylomorphic* perspective, whereby discourse “produces the effect that it names” by inscribing itself at will on top of or into a passive nature<sup>612</sup>. To say that watersheds are performed is not meant to deny their materiality or reality, but to draw attention to the complex ways that watershed knowledges, narratives and discourses both shape and are shaped by flows of water through Klamath watershed ecosystems and communities. However, this must be done with great precision, because it risks the perception that watersheds flows, forms and functions are “merely” performed, by institutions for institutions, and this treads dangerous water in the Klamath.

Up-slope practices such as fire-suppression, logging, and mining, and up-stream practices such as irrigated ranching, farming, and hydropower generation have undeniably real and material impacts on downstream water quantity, quality and temperature. These water quality impacts, in particular low temperatures and algae blooms, in turn have undeniably real and material impacts on downstream fisheries and the livelihoods and cultural practices that depend on them, as was seen in the Fish Kill incident. The inability to come to closure on the precise links between upstream/upslope practices and downstream/in-stream processes has actually

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<sup>611</sup> The Austinian frame would see certain powerful forms of discourse such as hydrologic models, GIS overlays, cost-benefit and risk-analyses as “acting-out” watersheds by enrolling action around themselves and eventually materializing action to the extent that material watershed processes, or “flow regimes” begin to “live-up” to the watershed models. A Callonian perspective would see watershed boundaries, universal soil loss equations, hydrographs, cost-benefit calculations as vast distributed performances stabilizing in particular material-semiotic formations able to circulate widely and erase their histories of production.

<sup>612</sup> On hylomorphism, see Protevi, John, ed. *Political physics: Deleuze, Derrida and the body politic*. Vol. 1. Bloomsbury Publishing, 2001; Deleuze, Gilles, and Félix Guattari. *A thousand plateaus: Capitalism and schizophrenia*. Bloomsbury Publishing, 1988. Both perspectives seem to do exactly the opposite of what made the concept of performativity interesting, that is, acknowledging the distributed forms of agency in knowledge generation and material world-making, showing the complex, emergent, multi-directional and polyvalent relationships between binary terms such as materiality and discourse, meaning and matter, or nature and culture.



resulted in the inability of downstream residents and regulatory agencies to influence upstream water-use practices. Without incontrovertible proof, “environmental degradation” remains mere ideology in the eyes of Courts and administrative agencies while it continues to be a lived reality for downstream inhabitants. How, then can we build a collective process for producing dependable knowledge about Klamath watershed processes that does not rely on “neutral” expert scientists to supply the “magic number” and end back up in endless rounds of combat biology in the courts? A notion of performativity and materiality where nature matters only as putty for the omnipotent will of discourse is not suitable to understanding the unfolding of watershed democracy in the Klamath. A notion of performativity that focuses on the embodied and emplaced practices of multiple human and more-than-human others that bring watersheds and waterscapes into view, however, might be more suitable for understanding watershed democracy in the Klamath.

Instead of an “Austinian” version of performativity, I borrow from Andrew Pickering’s conceptions of performativity to suggest that the watershed is a site of “Ontological theatre”- “a place of continuing interlinked performances and interaction with other(s) in a dance of agency”<sup>613</sup>. Pickering’s version of performativity moves the conversation beyond representationalism and ontological distinctions between watershed knowledge and watersheds “out there waiting to be represented”<sup>614</sup>. This kind of performative approach shifts focus from the correspondence between human representations of watersheds and the “nature” of real watersheds to the matters of practices, doings or actions that bring material watersheds and their relations, forms, functions and processes into being. Not obsessed with collapsing the divide between watershed representations and watershed realities or embroiled in a frantic search for the “magic point”, this approach to studying knowledge practices is more suitable for studying the unfolding of Klamath watershed democracy. This kind of performative approach can remain committed to better, fuller and more democratic and responsible accounts of natureculture while avoiding privileging any mode of knowledge production as able to explain all the others and at the same time avoiding writing-off knowledge as merely in ideological service of power. Scale performativity can help make sense of Klamath collaborative watershed governance, not to describe powerful humans of imposing their will into nature, but to portray a collective and distributed, yet always power-laden, sometimes contestatory, sometimes cooperative, dance with others.

As we will see in the next chapter, the watershed emerged as a unit of knowledge production and resource governance numerous times and for numerous reasons in the Klamath. Surveying the epistemic diversity of Klamath watershed governance is therefore a complex task. Each time the watershed was operationalized by actors attempting to manage resources, it entailed different relationships among humans and between humans and the hydro-social-ecological dynamics in which

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<sup>613</sup> Pickering, Andrew. *The cybernetic brain: Sketches of another future*. University of Chicago Press, 2010, p. 319.

<sup>614</sup> Barad 2007, p. 49.

their livelihoods were imbricated. The Klamath Fisheries Task-Force, chartered by Congress in 1986, was the first attempt at democratizing the watershed and scaling representative governance institutions at Basin and Sub-Basin scales. As we saw last chapter, narratives *matter*- choices regarding where to start and finish and the meaning they make in between have implications for the ways watersheds are managed. I therefore have to be careful how I situate my own narrative and the relations I posit between Klamath watershed inhabitants, their knowledges and the material watershed ecosystems they live in. Fortunately for the sake of this discussion about the relationships between performativity and materiality, watershed democracy begins in the Klamath in an actual performance. In what follows, I convey a story that comes out of conversation with one my community partners about the origin of the Klamath Fisheries Task Force, the first collaborative watershed management body in the Klamath.

## **6. Klamath Fisheries Task Force: from watershed theatre to watershed-scale planning and Basin-wide watershed restoration**

Uncertainty around tribal fishing rights and rights to water to effectuate those fishing rights formed one set of pressures for establishing the first basin-wide collaborative body in the Klamath. After many of the Klamath tribes were terminated by Congress in the 1950s, the Hoopa, Yurok, Karuk and Klamath tribes began to regain their sovereignty in the late 1970s. When tribes began asserting their sovereign fishing rights, it sparked a battle, known as the “fish wars” involving local tribes, recreational anglers, commercial fishermen, State and Federal agencies, the FBI and the Coast Guard. The BIA’s harvest regulations for 1977 had allowed tribes to take fish for commercial and subsistence purposes without specifying the tribal take numbers<sup>615</sup>. This infuriated the commercial fishermen who feared that Indian gillnetters would deplete the salmon runs, even though the Department didn’t limit the number of licenses they issued to commercial ocean trawlers, responsible for the majority of the catch.

Indian fishermen had developed a complex set of guidelines for their fisheries based on the salmon spawning and reproduction cycle, tides, escapement goals, seasonal hydrology and watershed characteristics<sup>616</sup>. However, the Interior department intervened in 1978 with a new harvest plan that didn’t figure in the tides or seasons, required identification markers on gillnets and authorized wardens to closely monitor the Indian catch. Tribes and their allies were outraged at this breach of their sovereignty and so they staged “protest fish-ins” at traditional fishing spots in the Klamath such as Tish Tang on the Trinity and Ishi Pishi falls near the mouth of the Salmon. Fish and Wildlife Service wardens clashed with gillnetters in the Klamath and off the Coast and eventually, the Coast Guard and FBI were called in. One

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<sup>615</sup> Most, Stephen. *River of renewal: Myth and history in the Klamath basin*. Oregon Historical Society Press, 2006, p. 110.

<sup>616</sup> See e.g. Salter 2004; Swezey, Sean L., and Robert F. Heizer. "Ritual management of salmonid fish resources in California." *Journal of California Anthropology*, The 4.1 (1977).

colleague recalled protest fishing at Ishi Pishi with FBI sniper rifles trained on him from the bluffs above<sup>617</sup>.

The other motivating factor forming the fist basin-wide deliberative body came from debates over the effects of aerial herbicide spraying in National Forests on community drinking water supplies. This strand of the story must be unwound back to 1968, when a group of hippies from Berkeley and San Francisco decided to pool their money and buy property in Northern California in order to “go back to the land, get out of the city and start a new life together in the mountains”<sup>618</sup>. They decided that the Salmon River afforded the ideal setting for their experiment in communal living and they bought up the old Black Bear mining claim. Still in existence today, Black Bear has been training grounds for watershed activists since its early days. Leading figures of the environmental activist, back-to-the-land and counter-culture movement such as Gary Snyder, Peter Coyote, Stuart Brand, and Peter Berg all spent time at Black Bear. Many thinkers that contributed to the bioregionalist movement and the so-called “third-wave” of watershed management passed through Black Bear and the Salmon and mid-Klamath river communities in the 60s and 70s. Many of the eventual leaders of the watershed movement in California first cut their teeth in activism around Forest Service’s aerial herbicide spraying activity in the late 1970s.

The Forest Service ran an intensive “aerial spray operation” in the Salmon timber plantations for over a decade, beginning in the early 1970s. The herbicide, 2-4-D, was cycling through local watersheds to the detriment of ecological and human health. Mavis McCovey, a Karuk medicine woman and tribal health practitioner noticed “clusters of birth defects in Orleans... with the timing linked closely to the heaviest use of herbicides in the timber plantations”<sup>619</sup>. Residents in Black Bear detected herbicides in the creeksheds that produced their drinking water. The Forest Service’s risk analysis downriver, however showed no human or environmental health effects of exposures. Black Bear residents immediately began organizing crews to manually pull spotted knapweed out of nearby plantations to get them off the Salmon River District spray plan. They formed blockades to prevent spray trucks from heading up the Salmon River Road. In retaliation, the Forest Service began evicting “squatters” on abandoned or unpatented mining claims. The activists quickly realized that “torches and pitchforks community organizing” and direct action would only work up to a certain point<sup>620</sup>.

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<sup>617</sup> Eventually, the California Department of Fish and Game, at the request of the BIA, began allocating a tribal harvest at Ishi Pishi in 1979, and by 1985, the California courts had recognized the Karuk’s right to fish at Ishi Pishi falls for ceremonial and subsistence purposes. However, the Federal government to this day has not explicitly recognized the Karuk fishery, putting it in the precarious position of being the only tribal fishery that is recognized by the State and not officially by the Federal government.

<sup>618</sup> See Allegra, 2009. <http://blackbearranch.org/> last visited 6/1/15. “Black Bear Ranch is much more than a piece of land in the middle of the mountains of the Salmon River. Black Bear Ranch is a community, a family, a home for your heart, a place to nourish your body and your soul.”

<sup>619</sup> Terence, Malcolm. “Herbicides”. 4/10/2005, p. 2.

<sup>620</sup> Terrence 2005.

The Salmon River Concerned Citizens organized in the early 1980s with a bit of funding from a family foundation and began lobbying State and Regional Foresters. They challenged the Forest Service's Environmental Impact Statements for their "vegetation management plans" and eventually sued the USDA over its methods of risk assessment<sup>621</sup>. While the herbicide debates played out in the courts and the "Fish Wars" played out in regulatory hearings and court cases, the Concerned Citizens turned to political theatre and grassroots activism. At one of their meetings, the Salmon River Concerned Citizens managed to convene representatives of the Karuk Tribe, the US Forest Service, the CA Department of Fish and Game, the commercial fishermen's association, timber contractors, and local landowners. The director of the Concerned Citizens had all of the representatives put on whigs and costumes and act out the relationships between the different watershed characters- the timber contractors, district foresters, traditional dip-net fishermen, salmon, and wildlife- and perform the movement of herbicides through the watershed communities of the Klamath. The play was such a hit, they were asked to perform it all around the Basin. According to a few people I interviewed, this improvised performance marked a major turning point in inter-agency relations on the river. It led to the formation of the Salmon Education talks, Klamath Salmon Management Group, the Salmon River Restoration Council and attempts between State, Federal and Tribal agencies to coordinate their fisheries management responsibilities. These cooperative efforts peaked congressional attention and were eventually sponsored by Rep. Wally Herder (R, CA, 2) in the 1986 Klamath River Basin Fishery Resources Restoration Act<sup>622</sup>.

Through the 1986 Klamath Fisheries Act, Congress chartered the first "collaborative watershed management institution" in the Klamath by creating an inter-agency management council and a "Task Force" advisory body made up of tribal representatives, fishermen, foresters, and local environmental groups. Congress charged the Task Force with developing restoration plans for the entire Basin and appropriated \$40 million dollars over 20 years for watershed restoration initiatives. However, the formation of the new governing body was controversial from the beginning. Immediately after they were formed, the composition of these bodies was called into question by the Karuk Tribe, who had been left out of both the management council and the Task Force. Members of the Tribe pulled on their allies in the Task Force to petition Congress for an amendment and were finally, in 1988, awarded one seat out of fourteen on the Klamath Fishery Task Force.

Even once the composition of the advisory body was considered relatively "balanced", the division of the Klamath watershed into management units brought up controversial issues of territory, jurisdiction and sovereignty in some of the very first Klamath Fisheries Task Force meetings. Though the Task Force members all agreed

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<sup>621</sup> see e.g. *Salmon River Concerned Citizens, et al. v. Robertson*, 798 F.Supp. 1434, 1442 (E.Dist.Cal.1992).

<sup>622</sup> 1986 Klamath River Basin Fishery Resources Restoration Act (16 U.S.C. sec 460ss, oct 27, 1986, amended 1988).

on a watershed-based approach to restoration in the “Long Term Plan”, they couldn’t agree on how exactly to divide up the watershed into Sub-Basin management areas. In a 1990 Task Force meeting, the Karuk representative objected to a table that displayed agency jurisdiction over specific sub-basin watersheds. He remarked, “This Plan is not the proper forum to discuss jurisdictional issues, nor should the author interpret who has jurisdiction”<sup>623</sup>. He also took issue with the title of a column that showed the Karuk “*claiming* jurisdiction” over a site, which “implied that tribes do not play a role with management authority, participation nor jurisdiction”<sup>624</sup>. The Karuk Representative argued “there is not only overlapping jurisdiction, there is *unresolved* jurisdiction. It is so complex and interpretable in so many ways”<sup>625</sup>. The head of the consulting firm thought that sovereignty over sub-basins was obvious: “My problem is that this makes us look stupid. We know precisely what the jurisdiction and authorities are. For us to say that there is confusion regarding this issue makes us look stupid”<sup>626</sup>.

The Karuk representative was eventually able to convince other members of the Task Force not to specify jurisdiction over sub-basin watersheds by arguing that sovereignty was complex and contested and did not neatly map onto drainage basins. In the end, the Task Force opted to let the Tribal representatives draft up language regarding jurisdictional issues in the final Long Range Plan, the Task Force devoted an entire section to the issue of jurisdiction (7-13 to 7-25). Instead of a table, the Plan presents a list of Agencies and Tribes, followed by a brief narrative description of each of their jurisdictions with a disclaimer reading:

*“Tribal jurisdictions will undoubtedly be further clarified and the tribes’ active participation in the restoration planning process under the Act is with the understanding that nothing in this Plan is intended to, or shall, affect the jurisdiction or rights of any Indian tribe; including any claims to jurisdiction which may be contrary to Indian law made by other entities.”*

In this example, we see how sovereignty, territory and jurisdiction were articulated and contested through the process of deciding how to collectively manage and restore Klamath watersheds. While jurisdiction was eventually detached from the sub-Basin watersheds drawn-up by the Task Force in their “Long Range Plan” (1991), those watershed divisions were partially institutionalized as planning, implementation and monitoring units through the Task Force restoration process. The Klamath was divided into 6 sub-divisions: the upper, mid and lower sub-Basins, with major watersheds like Salmon and Scott and Trinity remaining their own autonomous units. Hybrid creations like the middle-Klamath include all watersheds draining into the mainstem of the Klamath, defined as the portion of the Klamath

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<sup>623</sup> Meeting minutes. Klamath River Basin Fisheries Task Force Meeting, Yreka, Ca. Dec. 4-6, 1990, pg. 23.

<sup>624</sup> *Ibid*, pg. 23.

<sup>625</sup> *Ibid* p. 24.

<sup>626</sup> *Id.* p. 25.

River watershed and its tributary watersheds between Iron Gate Dam and the Trinity River confluence, excluding the Shasta, Scott and Salmon Rivers. These lines, once drawn on a map, were materialized through management practices and restoration projects.

The Long Range Plan was eventually issued in 1991 and ended up authorizing and directing nearly all of the \$40 million promised to restoration projects in the Klamath over the course of 20 years<sup>627</sup>. Restoration planning, monitoring and community building activities were all operationalized around the sub-basins. Watershed councils formed up around sub-basin divides, largely supported by grants from the Task Force for water quality monitoring, community fish-counts, and community-building activities such as workshops, planning sessions and social learning activities. As we will see in the next chapters, The Upper and Mid-Klamath, Salmon and Scott watershed councils became powerful players in Klamath watershed science, policy and governance networks as well as important allies for local Tribes. Many of the watershed councils, as well as Tribal watershed and fisheries departments, received a significant amount of funding and support for monitoring, education, and community workshops from the Task Force. The Klamath Fisheries Task Force spawned a federated republic of watershed democracies in the Klamath.

The Task Force significantly changed the epistemic and governance landscape in the Klamath. For the first time, Tribes, government officials, ranchers, fishermen were all sitting around the same table, exchanging viewpoints, pooling their knowledges and debating important watershed issues, often times with trained facilitators leading discussions. All Task-Force meetings were, in principle open to the public. All planning documents and meeting minutes were put onto a publically available CD and an online database, the Klamath Resource Inventory System (KRIS) was developed to store and share data across the whole basin. This was the first time, in California at least, that an online water quality data-base was created. Remember, this was the late 90s, so having an online database and a CD was considered cutting-edge. In addition to the powerful political and ecological impacts of “performing” watershed-relations, the Task Force is also an example of the co-production of knowledge, nature and society- through the Task Force, new ways of generating interdisciplinary and inclusive knowledge, new ways of formulating management and restoration plans, and new ways of implementing ecosystem restoration were pioneered.

Though most meetings were technically open to the public, only Task Force representatives had final say in planning and funding decisions and ultimately, Task Force recommendations, as voiced in the long-range plan and mid-term evaluation, were not binding. The management council and the federal and agencies ultimately called the shots. Though the Task Force charted significant departure from the top-

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<sup>627</sup>Klamath River Basin Fisheries Task Force. *Long range plan for the Klamath River basin conservation area fishery restoration program*. US Fish and Wildlife Service, Klamath River Fishery Resource Office, 1991.

down, centralized, expert-driven resource management that had characterized the basin since the 1850s, power largely still operated through same channels. Those channels had been perforated a bit, opened up for new voices such as the Karuk and Yurok representatives and environmentalists who had, up until that point not been able to participate in US Government-sponsored Klamath resource governance. The collaborative watershed body also brought different communities together for the first time. Through the Task Force, farmers, fisherfolk, environmentalists, Tribes and State and Federal agencies were producing knowledge and planning documents and acting collectively at the scale of the drainage basin for the first time. However the composition of this body, the division of the planning area into subdivisions, and issues of territory and jurisdiction, sovereignty were all called into question through the watershed restoration planning process.

In the formation of the Task Force, we see a great example of the direct links between performativity and materiality: a theatrical performance of watershed linkages leads to a transformation of hydrosocial relations, aspects of which are institutionalized and then to some extent even materialized through management and restoration practices and their ensuing “flow regimes”. The theatrical metaphor can be misleading, though, if we think of watershed actors and actants blindly following a script written only by powerful human actors. For example, studies scholar Stephen Hilgartner has relied on the analytic of performance to depict the production and legitimation of expertise in National Academy of Science advisory committees as staged public drama<sup>628</sup>. The dramaturgical perspective allows Hilgartner to follow how scientific authority is achieved through a series of routines, performances, protocols and textual practices. In his account, these performances of objectivity, credibility, and authority work to legitimize expert knowledge and mystify the social and political origins of facts. In Hilgartner’s words, “Science advice is a series of morality plays designed to guarantee textual and social credibility in ways that foreclose dissent, and thus reproduce the institution of the NAS as a source of consensual expertise”<sup>629</sup>.

In the Klamath case, the Task Force was not *just* staging watershed democracy, masquing collective knowledge and public decision-making merely for the sake of reproducing their institutions, expertise or positions of power, but were also attempting to find more inclusive ways of collectively producing knowledge and managing resources that were more in tune with the Klamath and its inhabitants. The way knowledge was generated and power operated was not a straight-forward case of cooptation, a false affectation of public participation for the sake of sequestering power, but neither was it a perfectly equal and all-inclusive process, but rather a negotiated compromise between the various groups with interests at stake in Klamath watershed processes. The representative watershed body and its restoration plans emerged as the compromised outcome of knowledge conflicts and resource struggles. These restoration plans authorized funding streams that mobilized

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<sup>628</sup> Hilgartner 2000, p 8.

<sup>629</sup> *Ibid*

collective action around certain restoration activities, which in turn shaped eco-cultural landscapes and unevenly re-distributed watershed-ecosystem benefits and burdens in particular patterns.

In the Klamath, collaborative watershed governance came into being at a particular historical moment as a result of a distributed performative effort springing from multiple conflicts that, for a number of number of reasons, provisionally patterned representative institutions and materialized social relations around the watershed. To say that the Task Force “performed” the Klamath watershed, in the sense that ‘discourse produced the effects it named’ is not true if we view discourse as a solely human affair emanating from calculating centers or powerful elites commanding the world into being. However, through the Task Force was routed complex traffic between human discourse and biophysical dynamics that did materialize the watershed as a space of collective action and collaborative watershed-ecosystem governance. If we look into the etymology of the term “*to perform*”, we see that it originally meant, “to carry out, effect, fulfill, discharge, finish or accomplish” and also, “to make, construct, produce or bring about”<sup>630</sup>. In that sense, the Task Force did furnish or carry into effect a certain material and social embodiment of what I am calling “watershed democracy”- the inclusive and collective management of watershed-ecosystems directly by their inhabitants.

However, knowledge production, decision-making and material outcomes were all unbalanced in the Task Force, as seen in the initial omission of Karuk and Yurok representatives from the task force and the overall uneven distribution of jobs, benefits and resource access. On the other hand, the Task Force was not completely high-jacked by federal and state agencies, commercial fishermen or timber lobbies either. The science and policy was thoroughly contested, but still effective at achieving temporary closure and provisionary collective action aimed at achieving restoration at the watershed scale. The later meaning of the term “*to perform*”, in the theatrical or musical sense, is from around the turn of the 17<sup>th</sup> century at a time when “to perform” still retained a sense of “to come true”, as in dreams coming true. At that time, the phrase “*performen muche time*” was a common salutation meaning “I hope you live long”<sup>631</sup>. As we will see next chapter, following the watershed performances of the Klamath Fisheries Task-Force, the watershed became the primary locus of environmental democracy for around 20 years until community groups began experimenting with other scales of ecological governance.

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<sup>630</sup> Oxford online etymology dictionary (6/1/15).

<sup>631</sup> Perform (v.) c 1300: “to carry into effect, fulfill, discharge,” via Anglo-French *performer*, altered from Old French *parformir* “to do, carry out, finish, accomplish”. Theatrical/musical sense is from c.1600. The verb was used with wider senses in Middle English than now, including “to make, construct; produce, bring about;” also “come true” (of dreams), and to *performen muche time* was “to live long”.



## 7. Conclusion:

In the Klamath, it turns out that watershed performances, rather than mere ideology in service of power or discourse inscribing itself into a passive nature, are actually an important medium for producing and communicating knowledge as well as for materially transforming social-ecological systems. From fish-ins to road blockades, bucket-brigades and salmon cook-outs, to perform Klamath watershed relations is to enact a waterscape and embody its hydro-social relations. This sense of performativity draws attention to the fact that the making of watershed knowledge and the management of watershed processes always *takes place* through embodied and situated relations. As a last example of political theatre playing an important role in Klamath watershed governance I will briefly mention the 2006 play “Salmon is Everything” by Dr. Dr. Theresa May, professor of Theatre, Film and Dance at Humboldt State University<sup>632</sup>. The play grew out of a conversation between concerned students and community members attempting to bring awareness to ecological and cultural impacts of the Fish Kill. May and colleagues organized a participatory theatre project, where they interviewed Klamath inhabitants about the impacts of the fish kill and worked with them to develop a script. They then performed the play with a cast made up of all local actors around the Klamath. Adriana Guzman, who helped with the project and interviewed the crew for her Master’s project at HSU, argues that “Salmon is Everything” illustrates participatory theatre’s effectiveness as a tool for personal, social and ecological change through its processes and performances<sup>633</sup>.

Watershed performance in this light is a pedagogical tool that encourages people to think critically about social and ecological conditions while empowering them to “act-out” and do things with the knowledge they collectively build. As seen in this and many other examples in the Klamath, watershed theatre can build community through an awareness of the interconnectedness of multiple ways of making a living in the Klamath<sup>634</sup>. Kochhar-Lindgren (2013) highlights the importance of “dramatizing water” as a route to a more sustainable and democratic practice and a more engaged cartography of water<sup>635</sup>. They argue that “dramatizing water”- in the everyday, through ritual, and through staged performance- provides a platform for building alliances around our many stories about our many relations to water. Through the right kind of performative lens, the watershed can be seen as a complex choreography of knowledge-making, resource governance and collective action. Theorizing watersheds must be seen as a deeply material practice undertaken by thousands of people who live and work in the Klamath and attempt to get “in-touch”

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<sup>632</sup> See e.g. Guzman, Adriana. *Salmon is Everything: The Emergence and Development of Eco-Drama in the Context of the Klamath Salmon Crisis and an Examination of its role as a Pedagogical Tool*. Master’s Thesis, Humboldt State University, December 2012.

<sup>633</sup> Guzman 2012

<sup>634</sup> Kochhar-Lindgren, Kanta, and Thaneer Thaneer. "Dramatizing Water: Performance, Anthropology, and the Transnational." *Special Issue on Performance Studies* (2013): 22, p. 126.

<sup>635</sup> Kochhar-Lindgren 2013, pg 10.

in various ways with the watersheds and watershed inhabitants around them, always transforming the watershed as they touch it<sup>636</sup>.

As we will see next chapter, whether it's dam operators calculating power potential or environmental activists arguing that low flows are dangerous for fish, watershed knowledge is always produced in connection with ways of living and acting in the world. Each instrument or model operates through complex social and material-semiotic networks that stabilize flows of knowledge and meaning, but are always open to contestation and reinterpretation. For example, early flow gauges were first used to measure water flows in order to divert streams to blast hillsides for gold, then to estimate power-potentials at dam cites and then, nearly a century later, by Tribes to sue suction-dredge miners for disrupting stream bottoms. Aerial photos taken during World War II to prospect for platinum and timber resources were repurposed in the last decade to demonstrate the long-term ecological and cultural impacts of fire suppression.

I also relay my experience participating in the annual "Spring Salmon dives", which entail a complex choreography of encounters of community volunteers and one of the last remaining spring Chinook runs in California. This way of producing knowledge about the watershed brings forth a way of seeing the watershed through direct encounters that both represents and transforms what it represents through the act and performance of representing. The dive trains volunteers to train their attention around a particular non-human and the flow regimes and sensitive habitat conditions which sustain their endangered population and which are in turn sustained by human land and water-use practices. The Spring dives have both generated useable data for the USFS over the past decade and have provided a vehicle for collective meaning-making and community building around the Salmon watershed.

The next chapter examines the history and cultural politics of watershed governance in the mid-Klamath and Salmon River sub-basins, which lie mainly within Karuk ancestral territory. Following the history of watershed based governance in the mid-Klamath and Salmon watersheds, I demonstrate how knowledge of Klamath watersheds has been built through power struggles, resource conflicts, and disputes over sovereignty and territory. I portray the arrangement of resource governance institutions around the watershed as the result of negotiations and compromises that

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<sup>636</sup> See Barad, Karen. "On touching- The inhuman that therefore I am." *differences* 23.3 (2012): 206-223. For Barad (2007, 2012), theorizing and measuring are forms of making contact with and "touching" reality. As touch always "moves and affects what it touches", figuring the practice of theorizing as a form of touching affirms that "we are part of that nature that we seek to understand". No form of touching is neutral or apolitical, as touch is always attached to particular embodied ways of living in the world populated by significant others. Theories, in Barad's account are "living and breathing reconfigurations of the world" (2012, p. 207). Instruments such as stream gauges and piezometers don't fabricate data without reference to material reality, but through precise ways of "touching" that reality and registering certain significant characteristics of its being through material, social and textual enactments.

occasionally find closure along drainage boundaries. After showing how watershed boundaries formed the basis of county and Forest District boundaries in early US state-making practices, I show how, beginning in the late 1980s, the watershed became a primary arena through which issues of sovereignty, representation, property and cultural difference were worked out in the Klamath. The experiments in collaborative watershed initiated in the mid-1980s inherited institutions riddled with over a hundred years of resource conflict. Only after hippie back-to-the-land movements, herbicide wars, “fish-ins”, armed occupation of sacred sites, political theatre and an elementary school “watershed ed.” program did the watershed take center stage in Salmon and Mid-Klamath environmental politics. In Chapter 5, I describe how, beginning around 2005, concerns related to wildland fire led the inter-agency collaborative efforts of the mid-Klamath away from the watershed framework and towards a regional governance network model centered around firesheds and firescapes.

## Chapter 4

### *Closure along drainages: the history and cultural politics of watershed governance in the Salmon and Mid-Klamath Sub-Basins (1851-2014)*

#### **1. Intro**

After wrapping up treaty talks at the confluence of the Klamath and Trinity Rivers on October 6<sup>th</sup>, 1851, Colonel Redick McKee and his party headed up the Klamath to sign treaties with the indigenous communities living upriver<sup>637</sup>. In his journal, he remarked that the “band” he was to meet lived along the Salmon River and the middle stretch of the Klamath River and spoke “a different dialect than those below them”<sup>638</sup>. As the regimen moved upriver from Weitchpech, they passed out beef, flannel shirts, beads, shawls and handkerchiefs to demonstrate the good intentions of the Government and impress upon those they met the importance of maintaining peace on the Salmon, Scott, and Klamath Rivers<sup>639</sup>. On the afternoon of October 11<sup>th</sup>, after losing mules over treacherous trails and river crossings, the party finally arrived at the confluence of the Salmon and Klamath rivers. Immediately upon arriving, McKee sent out runners “to the Indians in this vicinity to have them assembled at this camp tomorrow morning”<sup>640</sup>. It is likely the runners conveyed a similar message to the one broadcast downstream, that the “treaty maker from the Great White Father in Washington” had arrived to make reconciliations for the past years’ bloodshed and establish a lasting peace on the river<sup>641</sup>.

The following morning, over a hundred Indians from nearby villages showed up at McKee’s camp<sup>642</sup>. However, government agents in attendance later conveyed misgivings about the poor turnout. Similar to conditions both upstream and downstream, many locals were either sick or busy caring for the ill and unable to attend. As McKee’s journal records on October 14<sup>th</sup>: “In almost all of their huts there are more or less Indians sick; they complain of hunger, and that they are not able to seek food in the mountains or fish in the stream”<sup>643</sup>. In addition, many were

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<sup>637</sup> McKee, John. *Minutes Kept by John McKee on the Expedition From Sonoma through Northern California*, August 1851, Sen. Ex. Docs., 33 Cong., Spec. Sess., Doc. 4, pp. 134-180 (688). See esp. October 7-11.

<sup>638</sup> McKee 1851, See esp. October 9<sup>th</sup>, also October 8, 10, 11 for his descriptions of Salmon River “bands”.

<sup>639</sup> McKee 1851, October 7, 8, 9.

<sup>640</sup> *Ibid* October 11<sup>th</sup>.

<sup>641</sup> See eg. Raphael, Ray. *Little White Father: Redick McKee on the California Frontier*. Humboldt County Historical Society. Eureka. 1993; Hoopes, Chad L. Redick McKee and the Humboldt Bay Region, 1851-1852; *California Historical Society Quarterly*, Vol. 49, No. 3 (Sep., 1970), pp. 195-219 .

<sup>642</sup> *Pacific Northwest Letters of George Gibbs* ed Vernon Cerstensen Oregon Historical Society: 1954, Oct 11, 12.

<sup>643</sup> See also McKee 1851, Oct 6, 11, 14.

busy obtaining food and with fall ceremonies, while others were wary of going near a white camp due to a recent string of murders, kidnappings, village burnings and lootings<sup>644</sup>. In addition, the indigenous political systems were unintelligible to McKee, who assumed he could easily identify the “chiefs” capable of speaking and standing for the entire “upriver neighborhood”<sup>645</sup>.

McKee, who was directed by President Fillmore and Congress to make peace with tens of thousands of natives scattered thorough 25,000 square miles of remote country, had only budgeted ten days for the Klamath<sup>646</sup>. His method of gathering all the “chiefs” of the region and convincing them to sign a document to ensure ever-lasting peace, though expedient on the Eel River, proved much more difficult on the Klamath. As Heizer put it, “none of the Commissioners had any knowledge whatsoever of California Indians or their cultural practices, especially those regarding land ownership and use”<sup>647</sup>. Yurok and Karuk political structures evade attempts at schematization such as bands or clans and even those, such as Kroeber’s, that characterize them as an “anarchic aggregation of individuals”, which are also too simplistic and ignore the importance of dance and ceremony cycles, family groupings and systems of land tenure<sup>648</sup>. How could McKee convene a council of “chiefs” when, to borrow Kroeber’s caricature: “government being wanting, there is no authority, and without authority, there can be no chief”<sup>649</sup> Put simply by McKee’s biographer, Ray Raphael, “how could he negotiate a treaty, a political document, with these people who had no body politic?”<sup>650</sup>

However, it wasn’t that the Klamath indigenous communities didn’t have a body politic- in fact they had a very complex system of political relations among families, family groups and villages connected through ceremonies and dances that were woven into the tapestry of Klamath eco-cultural landscapes. They just didn’t have a political system that was intelligible to McKee and his translators<sup>651</sup>. Despite his ignorance of the political systems, languages and cultures, however, McKee was determined to sign treaties with “chiefs” all the way up the Klamath<sup>652</sup>.

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<sup>644</sup> See e.g. McKee 1851, October 6, confluence of Klamath and Trinity rivers: “They are, as well as all the Indians here, very impatient to be gone (form the treaty talks), saying that many of their people at home were sick; that this is the fishing time, and fish must be caught for food in the winter.” See Oct 11 for grievances against a particular man called “Wooly” or Tom Hinton.

<sup>645</sup> Gibbs, George. *George Gibb’s Journal of Redick McKee’s expedition through northwestern California in 1851*. Archaeological Research Facility, Dept. of Anthropology, University of California, 1972.

<sup>646</sup> Raphael 1993 pg 68-70

<sup>647</sup> Heizer, Robert Fleming. *The eighteen unratified treaties of 1851-1852 between the California Indians and the United States government*. Archaeological Research Facility, Dept. of Anthropology, University of California, 1972, pp. 3-5.

<sup>648</sup> Kroeber, Alfred. 1925. *Handbook of the Indians of California*, p 3, 13. See also Raphael 1993, p 68-69.

<sup>649</sup> Kroeber, 1925, p 3.

<sup>650</sup> Raphael 1993, p 69.

<sup>651</sup> see e.g. Salter 2003; . Karuk Tribe Department of Natural Resources 2011.

<sup>652</sup> Raphael 1993, p. 69.

In a letter to Charles Mix, the Chief Clerk of the BIA a week earlier, McKee had outlined his vision for peace and order in the Klamath:

“If I can effect a treaty here, its moral influence will extend to the ocean on the one hand and to the headwaters of the Klamath on the other”<sup>653</sup>

This is the first documented evidence of the Klamath watershed imaginary, the idea that the lands, people and waters of the Klamath should be fused under a unified political, legal and moral order under the authority of the United States government. Though indigenous communities of the Klamath had complex systems of political and ecological relations linking the lower and upper basin through ceremonies, marriage and commerce, the watershed was parceled out between political districts, state lines and county boundaries beginning in the 1850s. It would be over 100 years for the watershed imaginary to fully take hold in the Klamath and drive integrated and democratic resource management. The scientific grounds for watershed-based governance were still in formation and would not be articulated with notions of democracy or collaborative resource management discourse in the Klamath until the mid-1980s. As we will see in this chapter, only after violent confrontations between Karuk tribal members and Federal agencies, militant occupations of sacred sites, activism around pesticide spraying, timber gridlock and political theatre did institutions provisionally converge around the watershed in the Klamath.

In this chapter, I look in depth at how understandings of watershed processes have changed over time and influenced strategies for managing land and water resources in the Salmon and mid-Klamath sub-Basins of the Klamath. I look in particular at the ways different watershed management paradigms have influenced the ability of Tribal community members to participate in knowledge production and decision-making for resource management in their ancestral territory. I will demonstrate that, though the watershed indirectly guided resource management from 1850 onwards, it wasn't until the late 1980s that it began to be articulated with discourses of democracy and community-based resource management. From around 1986 to 2008, the watershed became the primary arena for negotiating knowledge and resource conflicts and organizing collaborative and integrated resource management. I demonstrate in this chapter how Karuk scientists and representatives both leveraged and challenged the spatiality of the watershed as a unit of collaborative environmental governance. Through knowledge conflicts in Klamath collaborative watershed governance forums, the ability of the watershed to accurately represent both people's knowledges and values and the biophysical particulars of place was called into question.

Rather than guiding their treaty tour from the beginning, the idea of the Klamath Basin as a bioregion and a political unit came on the heels of McKee and

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<sup>653</sup> McKee to Mix Oct 7, 1851.

Gibbs' journey. It is unclear exactly what persuaded McKee to choose the confluences of three major tributaries, the Trinity, Salmon, and Scott Rivers, as strategic points to negotiate treaties with Tribes. Based on his minutes and his interpreter George Gibbs' field notes, they were completely unfamiliar of the landscape they were moving through and the people they were negotiating with. In addition to a treaty making tour, the McKee expedition was, from the very beginning, also an attempt to gather information about the people, land and waters of northern California, about which virtually nothing was known in San Francisco or Washington at the time. Knowledge was at the very top of the original set of instructions to McKee from the Office of Indian Affairs:

“The object of the government is to obtain all the information it can with reference to tribes of Indians within the boundaries of California, their manner, habits, customs, and extent of civilization”.<sup>654</sup>

Not only are the field notes of George Gibbs the first attempts of the Federal government to gather information about the human inhabitants of the Salmon and Mid-Klamath basins, they are also its first major Federal attempt to produce knowledge about the Klamath river itself. Gibbs, while taking notes on native culture and language, was also attempting to collect what he could of the landscape, geology and river geography of the Klamath in his field notes<sup>655</sup>. Gibb's journal contains the first “official” US government descriptions of the Klamath, Salmon and Scott Rivers<sup>656</sup>. In addition to describing the mining operations and trail networks in the headwaters of the Salmon, Gibbs also penned some of the first ethnographic descriptions of the indigenous cultures of the Klamath.

Rather than a rigorous technical survey, Gibb's rambling, romantic description of the Klamath is more that of an amateur naturalist attempting to re-invent themselves as a cartographer and an expert on native language and culture. Gibbs was a Harvard trained lawyer who moved out west to Oregon with the Mounted Rifle Regiment in the 1840s<sup>657</sup>. After acting as a customs collector in Astoria, he worked with the Oregon Indian Commission and learned “Chinook”, the regional trade jargon. We do not know when or why he came to California, but somehow he showed up in Sonoma in July, 1851 and got hired by McKee as interpreter for a tour through regions and languages he was unfamiliar with<sup>658</sup>.

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<sup>654</sup> “and to make such treaties and compact with them as may seem just and proper.....conciliate the good feelings of the Indians and to get them to ratify those feelings by entering into written treaties, binding on them, towards the government and each other”. AS Loughery, Acting Commissioner of Indian Affairs to McKee, Barbour and Wozencraft, Oct 15, 1850, Senate Exec. Doc 4, Serial 688, p. 9, Raphael 1991, pg. 19, ft nt 12.

<sup>655</sup> Gibbs 1972 (1851)

<sup>656</sup> E.g. Gibbs 1972, Oct 11: “The Salmon river, or as it is called by the Indians, the “*Quoratem*,” is the largest of the affluents (*sic*) of the Klamath... it has two principal branches, which unite about fifteen miles from its mouth; the northernmost heading in the mountains, near Scott's river, the southern in the Trinity range”.

<sup>657</sup> Heizer 1972.

<sup>658</sup> *Ibid*.

Gibbs was fabricating a geographical sensibility and inventing ethnographic methodologies as he went. As he described the Klamath, he went to great lengths to correct the errors of Cpt. Wilkes, Col. Fremont and Jedediah Smith's earlier attempts to map the Klamath<sup>659</sup>. He also attempted to record the spatial distribution of languages and what little he could glean about indigenous culture and political systems as he went. When he returned from the tour, he touted his mapmaking skills compared to those of his predecessors, "as far wrong as if they had been of the kingdom of Timbuctoo (sic)"<sup>660</sup>. He speculated in a letter to his mother that "in my new trade as geographer I shall succeed pretty well"<sup>661</sup>. While waiting for the publication of his maps and journals by Congress, he trekked back up to the Salmon to try his hand in the gold mines. After neither fortune nor fame came quickly, he finally got hired as a geologist for the Northern Railroad survey and went on to eventually publish some of the earliest ethnological reports on the Yurok, Wiyot, and the Indian tribes of the Washington territory<sup>662</sup>.

Col. McKee, who was relying on meager and faulty information about the people he was dealing with and the geography he was moving through, also had to improvise his strategy as he went. As he learned more about the complexities of Klamath, he and others in his party began to worry about the representativeness of their assemblies and the reach of their treaties. At each treaty talk, he had to convince those assembled of the propriety of signing their marks on his piece of paper. Many weren't familiar with this ritual, thinking that the negotiations had been concluded verbally, as was customary in local political negotiations, and left without leaving any ink on the treaty documents. Of those who did leave their marks, according to Maj. Wessels, "it is hardly probable that they had a very clear conception of the character of the instrument to which their marks are affixed"<sup>663</sup>. McKee was constantly worrying about those who were absent from his assemblies, encouraging those he was able to speak with to spread the "good news" of the peace settlement. Along the trail, he sought to enroll as many possible tribal members, miners, shopkeepers, influential citizens, and other allies in maintaining peace and order in the Basin. He left copies of the treaties with influential land-owners and mailed copies to others. He posted it in prominent places and talked about it with whomever he passed. He even passed out gifts in order to "conciliate the good feelings of the Indians" towards the government and demonstrate the benefits of heeding the terms of the treaty<sup>664</sup>.

McKee was convinced that, if he could get Tribes to sign treaties, he could "speak with the pen rather than the sword, to establish a lasting truce between

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<sup>659</sup> Heizer 1972, p. 136.

<sup>660</sup> Gibbs, George. Letter to his Mother. July 17, 1852.

<sup>661</sup> *Ibid*,

<sup>662</sup> Gibbs, George. *Two nineteenth century ethnographic documents on the Wiyot and Yurok of northwestern California and the Comanches of New Mexico and Texas*. Berkeley, CA : Archaeological Research Facility, Dept. of Anthropology, University of California, 1973.

<sup>663</sup> Raphael 1993, p. 76, ft nt, 26.

<sup>664</sup> See McKee minutes Oct 8, 10, 12.



alien and disparate cultures”<sup>665</sup>. As a deeply religious, southern Whig, carrying out orders under Fillmore’s administration, McKee was attempting to chart new territory in Indian-white relations and steer the country away from the Jacksonian policy of extermination and removal<sup>666</sup>. The Whigs intended to use California as a “testing ground for a new, experimental and ‘humane’ Indian policy”. By securing the gold mining regions to the settlers and reserving a few choice locations for tribes, McKee hoped to avoid bloodshed, gain the trust of the tribes, and preserve what he saw as the essential character of the United States, a “civilized and Christian nation”, in the the newly acquired American west<sup>667</sup>. The Salmon River drained a watershed whose headwaters in the Scott, Salmon, and Trinity alps were gold bearing and home to new strikes almost every week. McKee, accordingly, intended to move the Klamath indigenous communities onto one of two reservations on either side of the gold region.

It is doubtful that those who actually made it to McKee’s camp near the Salmon on October 12<sup>th</sup> and signed the Treaty of Coratem understood that McKee was asking them to relocate far downriver. Even if the treaties had been ratified, which as we will see they were not, applying the Canons of Construction to this treaty-making process to attempt to understand what parties to the treaties intended at the time they signed them, it is unclear exactly what the indigenous inhabitants of the Salmon and Mid-Klamath thought they were being promised by the US Government. McKee was speaking through a white translator, Clark Durkee, who in turn spoke through a Yurok translator from Weitchpech, who attempted to convey McKee’s words and ideas in Karuk<sup>668</sup>. As Raphael (1993, p 41) asks, “how well did the Indians understand the jargon which required them to relinquish their homes?” What is recorded in McKee’s minutes is that he “dwelt upon the advantages the Indians would derive from having a home of their own, where they could live under the protection of the government... where whites would not be allowed to interfere with them”<sup>669</sup>. One of the locals responded that “they were disposed to be friendly with the whites, but that sometimes the whites would threaten to shoot them and steal their women, and that now an Indian was afraid to go on the mountains after game and nuts alone”<sup>670</sup>. McKee promised he would

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<sup>665</sup> Raphael 1993, p. 2.

<sup>666</sup> Raphael 1993, p. 18-19.

<sup>667</sup> “It will be our earnest endeavor to quiet the difficulties which now exist, and afford to both whites and Indians, throughout California, such protection of property as their good conduct may entitle them to. It is essential to the character of the State, and indeed of the US, as a civilized and Christian nation, that a stop should be put to the shedding of blood.” Redick Mckee, George Barbour, OM Wozencraft, Jan 14, 1851.

<sup>668</sup> McKee 1851, Oct 12<sup>th</sup>: “At 10 o’clock about 150 men and women were assembled. Each band arranged separately-communicating with them through Mr. C.W. Durkee, and he through the Wetchpeck (sic) Indian from the junction of Klamath and Trinity”.

<sup>669</sup> *Ibid* Oct 12<sup>th</sup>.

<sup>670</sup> *Ibid*, Oct 12<sup>th</sup> minutes: In particular, they “complained loudly bout the acts of a man called “Wooly” (Tom Hinton). The Indians everywhere on this river have complained of this man and the agent has learned, that many of the Indian outrages can be attributed to outrages committed upon the Indians by him.”

prevent the whites from interfering with them, as long as the Indians would “peacefully permit white men to pass through their country unmolested”. This, the “several chiefs said they were willing to do”<sup>671</sup>. The Weitchpech treaty was then recited, the “chiefs expressed themselves willing to unite in it, and it was signed by the agent and the several chiefs and braves”<sup>672</sup>. At 4:30, the council was adjourned and McKee passed out blankets, shirts, pants, hats, sashes, handkerchiefs, beads, bread, and sugar. A bullock was killed and divided among them, “as an evidence of the desire of the government to act in good faith with the Indians”<sup>673</sup>.

Both McKee and Gibbs were complete amateurs. McKee was a religious Whig from western Virginia in his first political appointment with absolutely no experience working with Indians or negotiating treaties. Gibbs was a Harvard-trained lawyer who spoke an irrelevant Indian dialect and dabbled in the human and natural sciences. Their maps were off and they didn’t speak the languages. They couldn’t comprehend the culture or political systems of the people they were negotiating with. Yet here they were: the amateur geographer and statesmen, voyaging in step up the Klamath, documenting nature and culture, signing treaties on behalf of the Nation with whoever showed up. Together, they clumsily fabricated the beginnings of the new disciplines of geography and anthropology and traced the outer borders of a new State. Both were attempting to create order in the Klamath: McKee a political and moral order and Gibbs a rational ordering of nature and culture in what he saw as a “wild, savage country”<sup>674</sup>. While McKee attempted to assemble Indian men and gather their marks in his treaty documents, Gibbs was attempting to gather what he could of the rivers and landscapes of the Klamath and the “manner, habits, customs, and extent of civilization” of its people in his journal<sup>675</sup>. Both were genuinely hoping that the documents they assembled would help preserve “peace inviolate on the river”<sup>676</sup>.

However, McKee’s treaties were never ratified by Congress. They were deliberately buried by California senators who classified them and hid them away in senate files in 1852<sup>677</sup>. Significantly, the beef and cattle that were sent to the treaty signatories was rejected, with tribal members claiming to prefer local

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<sup>671</sup> *Ibid.* Oct 12<sup>th</sup>.

<sup>672</sup> *Ibid.*

<sup>673</sup> *Ibid.*

<sup>674</sup> Gibbs 1851.

<sup>675</sup> *Ibid.*

<sup>676</sup> Raphael 1993.

<sup>677</sup> See Miller, Larissa K. *The Secret Treaties with California’s Indians*. National Archives and Records Administration. 2013 p. 39: “When the treaties came up in executive session of the U.S. Senate, the senators found them problematic. It was unclear if Mexico-from which California was acquired-recognized native land titles. If Mexico did not, then Indians in California came under U.S. sovereignty without legal claims to the land. Furthermore, the commissioners’ appointments were irregular, and in the wake of the gold rush, white Californians strongly objected to the treaties. With the treaties rejected, Indian title to the land was left unresolved....For these reasons, the Senate rejected the treaties and, following Senate rules, imposed an injunction of secrecy on them.”

traditional foods<sup>678</sup>. The Red Cap wars between the indigenous and settler communities broke out soon after, in 1855. The grand peace from headwaters to mouth McKee envisioned turned out to be short lived.

Due to uncertainty about the executive department's authority to sign treaties with Tribes, Congress was refusing to ratify military treaties at the time. California Senators, for their part, did not want to let go of treaty lands, valued at over a hundred million dollars, so they deliberately buried them in classified Senate files, which were not opened until 1909, when they were recited in a closed session of the Senate and no action was taken<sup>679</sup>. Berkeley anthropologist Robert Heizer sums up the California treaty-making debacle with his quote:

“...taken all together, one cannot imagine a more poorly conceived, more inaccurate, less informed and less democratic processes than the making of the eighteen treaties in 1851-1852 with the California Indians”.<sup>680</sup>

During this time of legal uncertainty around ownership, Karuk lands were simply appropriated, first illegally by miners, prospectors, homesteaders, then by the US government in the form of National Forests and Wilderness Areas. To this day the Karuk Tribe does not have a reservation and their ancestral territory is about 95% co-terminus with US Forest Service lands on paper<sup>681</sup>. However, as we will see in this chapter, to some extent the Karuk Tribe has regained rights over ancestral lands and control over and access to natural and cultural resources. Collaborative watershed management forums have provided significant opportunities for Karuk representatives to participate in resource management and work towards restoring ecological processes and revitalizing cultural practices in their ancestral territory. I demonstrate in this chapter how Karuk representatives and scientists have both leveraged and challenged the watershed as a way of conceptualizing and managing eco-cultural landscapes.

I attempt to chart the emergence of the watershed as a unit of knowledge production, resource management and democratic environmental governance in the Klamath. Following in the footsteps of Gibb's fumbling river ethnography, the practice of watershed science in the Klamath has been shaped by myriad personal, historical, social, political and economic factors. The generation of knowledge about Klamath watersheds did not progress linearly, with more knowledge accumulating over time and resulting in more accurate representations of Klamath watershed processes and communities. More watershed science also did not force a

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<sup>678</sup> See e.g. McKee letter to Durkee on Oct 12<sup>th</sup>, 1851 ordering beef: “...If you think proper to gratify the wish expressed by the Indians, in giving them elk or deer meat for the beef, pound for pound, I have no objection to your making the exchange”.

<sup>679</sup> Heizer 1972.

<sup>680</sup> Heizer 1972, p 5.

<sup>681</sup> Tripp, Bill. Understanding the Indian Connection to Land and Place. *Evergreen Magazine*. Spring 2014, p. 12.

natural evolution of institutions towards the watershed scale, with better science leading linearly over time to more “resilient” institutions scaled to bioregional units and better adapted to local biophysical processes and community values<sup>682</sup>. This chapter threads together moments in the history of watershed management in the Salmon and Mid-Klamath to demonstrate the pulls and tugs in the movements towards watershed-based science and governance.

Following Donald Moore’s notion of an “*entangled landscape*” in which “multiple spatialities, temporalities, and power relations combine”, this chapter will lay out episodes that demonstrate the messy entanglements of watershed science, watershed institutions and the materialities of the Mid-Klamath and Salmon waterscapes and ecosystems<sup>683</sup>. It attempts to present a history of watershed-based governance that portrays the movement towards the watershed as the result of political maneuvers, negotiations and compromises that occasionally find closure along drainage boundaries. As with Gibb’s account, the watershed looms conspicuously in the background of much of the natural and social science of the mid-Klamath and Salmon, emerging as conflict resolution mechanism and an organizing concept for gathering data and representing biophysical processes beginning in 1986. The watershed then provided the primary unit through which knowledge sharing, conflict resolution and collaborative environmental governance operated in the Klamath and Salmon sub-Basins for around 20 years. The use of the watershed to guide integrated and collaborative resource management among Federal, State, Tribal, and private institutions peaked in the mid-1990s and remained high until around 2005, when concerns around wildfire influenced many individuals and institutions to step away from the watershed in favor of a “firedshed” concept. Chapter 5 then analyzes the turn in the Western Klamath to firedshed and foodshed-based spatial frameworks for managing natural and cultural resources.

## **2. The shifting shapes of government in the Klamath (1850-1905)**

The gold rush was in full swing long before McKee and his party arrived to the Klamath in October of 1851. Following the initial rush of gold-seekers to the Sierra foothills, a number of parties ventured into the Salmon over the Trinity Alps and upriver from the mouth of the Klamath. By the summer of 1849, prospecting had begun along the Salmon and Klamath<sup>684</sup>. In June of 1850, gold was discovered near the forks of the two branches of the Salmon by a party of men who had come over the ridge on the north fork of the Trinity<sup>685</sup>. The early gold strikes in the Salmon occurred along the river in the placer deposits along river bars and meanders, where the so-called “easy gold” was located. At this point, little was

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<sup>682</sup> cf. Ian Calder *Blue revolution : integrated land and water resource management*. Earthscan, 2005.

<sup>683</sup> Moore, Donald. 2005. *Suffering for Territory: Race, Place, and Power in Zimbabwe*. 2005, p. 44. See also pgs. 9, 32, 149, 300, 313.

<sup>684</sup> Stumpf, Gary. 1998. *Gold Mining in Siskiyou County 1850-1900*, Siskiyou County Historical Society, Occasional Paper No.2.

<sup>685</sup> *Ibid*, p 4.

known about geology, minerology or geomorphology, and it was widely assumed among miners that “the gold in the streams and gulches had simply been washed down from ...some wonderful region”<sup>686</sup>. The miners therefore haphazardly scoured river systems up and down their drainages, from their headwaters down to their mouths in search of shimmering fortune.

The first expeditions into the Klamath and Salmon were undertaken blindly. Though Smith, Wilkes and Fremont had all attempted to map the region, they all assumed that the Trinity River emptied into the Bay of Trinidad. Only after a year of fumbling around did the gold seekers follow the Trinity all the way down to its confluence with the Klamath and figure out the true course of the river. The entire region was declared *terra incognita* by the newly formed State legislature and divided arbitrarily into two counties whose boundaries were to be later refined. In the first division of the State into counties on Feb 18, 1850, the entire region of Northern California was carved up into two counties between the 40th and 42<sup>nd</sup> degree parallels, with Trinity County to the West of the summit of the Coast Ranges and Shasta County to the East<sup>687</sup>. As it was considered an uninhabited wilderness, Trinity was joined to Shasta for judicial and administrative purposes and the county seat and courthouse were placed in Shasta City<sup>688</sup>. As miners poured into the region in search of gold, the legislature responded by creating “Klamath County” in April of 1851 out of that portion of Trinity County west of the Coast Ranges and north of the mouth of Mad River<sup>689</sup>. However, the complex geology of the Coast Ranges and the erratic swings of the Klamath made it impossible to chart the boundaries between Klamath, Shasta, and Trinity counties<sup>690</sup>.

According to Owen C. Coy, a historian hired by the California legislature to research the history of the State’s county boundaries in 1919, the Klamath watershed boundary became the *de facto* political division in the face of geographical uncertainty: “Facts seem, however, to make it certain that all of the Klamath watershed, west of Rhett Lake (now Tule Lake) was in Klamath County<sup>691</sup>”. As evidence, he cites a decision of the State Assembly in the case of a contested election, that of *Coates vs. Hawks* in 1852, for the state Senate seat of Klamath-Trinity<sup>692</sup>. The election was so close that it hung on the position of the town of Scott’s Bar relative to the summit line of the Coast Ranges<sup>693</sup>. The assembly eventually decided that since the Scott River flowed through Scott’s Bar into the

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<sup>686</sup> Bancroft, H.H. *History of California*, Vol VI. 1848-1859. San Francisco, p 87, see also Stumpf 1998, Gold Mining in Siskiyou, reference 14.

<sup>687</sup> Coy, Owen C. *The Genesis of California Counties*. CA: 1923.

<sup>688</sup> Coy 1923, p 278.

<sup>689</sup> *Ibid*, p. 123.

<sup>690</sup> Coy 1923, pp. 123, 278.

<sup>691</sup> *Ibid*, p. 123.

<sup>692</sup> *Ibid*, p. 123, ft note 2, see Assembly Journal, 3d Sess. 1852, 99, 114.

<sup>693</sup> If the township were found to be east of the coast range, Hawks would be entitled to the seat and if it were west, Coates would get it. See Daily Alta California, Volume 3, Number 23, 24 January 1852, p. 2.

Klamath and then out to the Pacific, the township was west of the Range and Mr. Coates was entitled to the seat.

The location of the Northern boundary of the County along the 42nd parallel also gave trouble to those attempting to set up townships and governments along the California-Oregon border. Though the parallel had long served as the territorial boundary between the Spanish colonies and the American territories, it wasn't until 1868 that Daniel W. Majors actually surveyed the parallel. Legend has it he did so drunk on champagne, taking astronomical readings with a sextant only three times along his journey<sup>694</sup>. As a result, his borderline veered back and forth across the true line by up to half a mile at points<sup>695</sup>.

The point that Coy illustrates in his study is that, as settlers became more familiar with the region, the drainage divides of watershed boundaries became more expedient templates than parallels for dividing up the region politically, judicially and administratively into counties. By 1852, the gold discoveries in the Salmon were old news and discoveries in the Scott and Shasta were bringing in miners by the thousands. The legislature responded by creating yet another new county, Siskiyou County, out of portions of Shasta and Klamath Counties. The boundary between Siskiyou and Klamath counties was described as running from a point across the mouth of Indian Creek: "in a southeasterly course along the summit of the mountains dividing the waters of Scott's and Salmon rivers". The compromise between Klamath and Siskiyou counties over the gold of the Salmon and Scott river valleys found closure along the drainage divide between the Scott and Salmon and institutionalized the Salmon/Scott watershed boundary for the first time. The watershed boundary of the southwest side of the Salmon drainage also became a county boundary four years later in the adjustment of the Klamath-Trinity-Humboldt boundary.

The original boundary between Klamath and Trinity counties, which ran straight East from the mouth of the Mad River, ended up cutting off all of "the headwaters of the main Trinity and its northern tributaries" from the rest of Trinity county, "to which it belonged more naturally"<sup>696</sup>. Those mining in the Salmon-Trinity alps along the North Fork of the Trinity were stranded politically, separated by mountainous terrain from the political capital and district courts. Tributaries to the South Fork of the Trinity were cut off as well by the creation of Humboldt County in 1853. The line dividing Trinity and Humboldt was the result of a compromise between the mining districts in the Trinity headwaters and the newly

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<sup>694</sup> Glionna, John. "Straddling a line in Oregon (or is it California?) Blurred border complicates life for small town". *Los Angeles Times*, September 4, 2005

<sup>695</sup> Confusion over the precise location of the border resulted in a dispute between the two states over off-shore oil and gas revenues in 1976 and is still the source of an ongoing battle between citizens in the town of Pine Ridge who are split into two states by Major's line. Glionna. "Townfolk Reside in States of Confusio: The simple country life is actually quite complicated in New Pine Creek, split in two along California's border with Oregon". *Los Angeles Times*. June 26, 2005.

<sup>696</sup> Coy 1923, p 279.

forming population centers on the coast at Eureka and Union town. The geopolitical stranding of the Trinity Alps was finally remedied by an act of the State legislature in 1855, “placing the headwaters of the Trinity River once again in Trinity County”. The boundary gave institutional form to the southwest drainage divide of the Salmon by drawing the boundary between Klamath and Trinity counties on the “*summit of the range of mountains dividing the waters of the Trinity River from the waters of Salmon River*”. Through this act, Trinity County was squared with most of the drainage of the Trinity River to the confluence of its forks. The Salmon watershed drainage was placed squarely within Klamath County, where it would remain until the dissolution of Klamath County in 1875.

Klamath County has the distinction of being the only county in California to be “*disorganized*”, the formal process whereby a political body is dissolved and its assets and debts, courts, representative bodies, and citizenry are metabolized by the surrounding counties. Its legal disorganization was largely the result of its functional disorganization. From its origin in the spring of 1850 to its dissolution, Klamath was for the most part overrun with mobs of transient miners, hopping from claim to claim, never staying in one place long enough to vote, buy property, or be assessed. The mountainous county was also far too large and rugged to facilitate communication, travel, or a sense of unity among its inhabitants. The county seat and its courts moved three times, from Trinidad to Crescent City, and finally to Orleans Bar in 1855. Upset with the capital’s relocation, the coastal region of the County seceded to form Del Norte County in 1857. From 1855-1857, Klamath County stumbled along from its seat in Orleans Bar. As its population was transient and Orleans Bar was separated by steep mountains from the Salmon Mines, the County had a difficult time assessing its constituents and keeping up with its debt. As its debt rose to \$23,950 in 1871, the question of “disorganization” was raised in the legislature<sup>697</sup>.

The question of the dissolution and annexation of Klamath County was put to vote on May 30, 1874 in Humboldt, Siskiyou, and Klamath Counties. Of the one thousand and twenty one votes cast, 529 were for annexation and 492 against, carrying the proposal by a slim 31 votes<sup>698</sup>. The vote was challenged in front of the California Supreme Court, on the grounds that the legislature putting the question of “disorganization” to vote was an unconstitutional delegation of its powers<sup>699</sup>. The court upheld the election and definitively set the boundary between Siskiyou, Humboldt and Trinity:

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<sup>697</sup> Klamath County, CA, Coy 1923, p 271. Two attempts to kill Klamath County first failed in the State legislature. Though Humboldt County representatives favored annexation of the western portion, Siskiyou County Republicans perceived the annexation of the eastern portion of Klamath as an attempt by Siskiyou County Democrats to increase their control of Siskiyou. The annex included the large Democratic majority of Salmon and Scott basin townships and the eastern townships feared that the center of power would move away from Yreka and the Republican-leaning eastern townships

<sup>698</sup> Calif. Stats., 1874, p. 755.

<sup>699</sup> People v. Nally, 49 Calif. Repts., 478.

“...where the Salmon River enters the Klamath Rivers, thence in a southerly direction following the ridge of the mountain that divides the waters of the Salmon and its tributaries from the waters of the Klamath and Trinity rivers, and their tributaries”<sup>700</sup>

The watershed boundary of the Salmon remains the boundary between Siskiyou, Humboldt and Trinity Counties to this day. Other than this relic, nothing much remains of Klamath County, California. Its debt was apportioned between Humboldt and Siskiyou and its causes were transferred to the courts of Humboldt County. Finally, in March of 1876, “after a period of approximately two years of virtual anarchy, there was again government in the area that was once Klamath County”<sup>701</sup>. By the time Klamath was disorganized, most of the gold had been taken out of the Salmon River and the annexed region has since been a financial and political burden to the eastern part of Siskiyou County, where the gold strikes on the Scott River were still bringing in gold by the fistfuls. Many contemporary residents of the Salmon are more closely aligned with Democratic Humboldt County than “the State of Jefferson” libertarians of eastern Siskiyou County. As we shall see later in this chapter, the fact that the Salmon watershed ended up in “red” Siskiyou county has many frustrating implications for those Tribal and environmental organizations attempting to reverse the legacy of mining and further watershed restoration and cultural repatriation in the Salmon and Mid-Klamath watersheds.

I disagree with historian Owen Coy’s interpretation that the movement towards watershed boundaries as county boundaries was the “natural” result of better understandings and representations of the regions’ geography. His own evidence points to the fact that the county boundaries were rather the result of a series of complex negotiations between townships, mining districts, and ports attempting to control resources and politicians attempting to gerrymander votes. Drainage divides simply served as convenient devices for apportioning the human, mineral and water resources of the new territory. The shape that early government took in California did not follow a plan ordained by nature and revealed by science, but was rather the outcome of power struggles and compromises that occasionally found closure along drainage divides<sup>702</sup>.

### **3. Rivers of gold: early Water Law in the Klamath**

While the California legislature was playing around with the shapes of county governments, the miners on the Salmon, Scott and mid-Klamath were busy laying down their own laws for the apportionment of resources. Mining, land and

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<sup>700</sup> Statutes, 1873-74: 756

<sup>701</sup> Coy 1923, p. 272.

<sup>702</sup> The evidence lies in the current boundaries between Del Norte, Humboldt, Trinity and Siskiyou Counties, which contain this contested history in a compromised conglomerate of parallels, summits, and river confluences, as well as drainage divides.



water laws were left largely to the locals, as both Congress and the State legislature refused to regulate mining claims activity, or even authorize a survey of the newly acquired mineral lands<sup>703</sup>. The military government abolished all Mexican mining laws and customs, and the first legislature followed suit, legitimizing the “customs, usages or regulations established and in force at the bar or diggings”<sup>704</sup>. As a result, mining laws varied tremendously across California, with each mining camp following its own customs.

With regards to early water law, some historians have argued that the riparian doctrine “snuck into California through the back door” when the first legislature adopted the common law of England as the foundation for the State’s legal order<sup>705</sup>. However, water historian Donald Pisani makes the argument that, even though water laws were not an urgent matter in 1850 due to the “infancy” of mining and agriculture, the legislature was well aware of the arid climate of California<sup>706</sup>. That they did not abrogate the riparian doctrine “testified to a faith in the ability of the common law to adapt to new circumstances and needs<sup>707</sup>.” As the legislature refused to direct the development of water law, it was left up to the mining camps to figure out while the courts attempted to stretch the riparian doctrine to accommodate new water uses and protect traditional ones.

The miners who entered the Salmon in the 1850s came from all over the world, from Peru, Chile, Europe, China, and the eastern United States<sup>708</sup>. They brought their laws and customs with them as well as their technologies and sciences. Though strategies varied slightly from camp to camp, most law and technology was targeted exclusively at getting the gold out. For the most part, the law of “first in time, first in right” governed claims to the “easy gold” on the placer deposits in bars and banks along river corridors. As the easy gold was scooped up, more complex rules developed to regulate the transfer and forfeiture of old claims and the staking of new ones<sup>709</sup>. Here it is important to note, following Pisani, that the development of early water law in California did not evolve linearly alongside developments in hydrologic and geologic sciences or advances in hydraulic mining technologies. Neither water science, technology, or water law develop linearly or progressively in Pisani’s account of early California water law. Early California water law in his account is a jumbled collection of mining customs, English riparian law, and Spanish and Mexican water law assembled together in the tug-of-war between mining, farming, ranching, fishing and urban uses of water.

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<sup>703</sup> Littlefield, Douglas. Water Rights During the California Goldrush: Conflicts over Economic Points of View. *Western Historical Quarterly*, 18, Jan 1987.

<sup>704</sup> Pisani, Donald. *To Reclaim a Divided West*. University of New Mexico Press: 1992. p 13, ft note 9

<sup>705</sup> Pisani, Donald J. *From the Family Farm to Agribusiness: The Irrigation Crusade in California and the West, 1850-1931*. Univ of California Press, 1984, p28-29.

<sup>706</sup> Pisani, 1992, p 14.

<sup>707</sup> *Ibid.*

<sup>708</sup> Stumpf 1998; Pisani, Donald J. *Water, Land, and Law in the West: The Limits of Public Policy, 1850-1920*. Univ Pr of Kansas, 1996.

<sup>709</sup> *Ibid.*

In the Salmon and Scott Mines, the typical procedure was for each mining camp or territorial unit, such as a gulch or section of a river, such as a bar, to hold an open meeting and post notices. The camp would be declared a mining district and formal regulations would be drawn up. Districts were not a standard size or shape, but “simply coalesced about the most convenient assembly places and conformed to purely physical boundaries”<sup>710</sup>. In the Salmon and Mid-Klamath, mining district boundaries typically followed the boundaries around townships, such as Forks of Salmon, Sawyers Bar, or Liberty District, which had themselves formed up around specific mines, lodes, placer deposits, river segments, and sometimes even entire creeks or creek-sheds. Laws governing the apportionment and use of water in the Salmon and mid-Klamath also followed the customs and procedures developed in mining camps. With placer deposits, “bank claims” and “river claims” only considered water to the extent that it marked off a mining claim with bends or banks, high or low water marks. As the easy gold was immediately scooped up and miners turned to more intrusive methods to get at river bottoms and quartz veins, the water of the Klamath itself became subject to claim.

Techniques such as ground and bank sluicing involved damming up entire rivers and channeling their courses through rockers that would separate the gold out from the material dug up from the freshly exposed river bottoms and banks. With hydraulic mining, which began in the Salmon in the late 1850s, entire creeks were diverted hundreds of yards from their courses, and blasted at high pressure at bluffs and hillsides. Such massive operations entailed enormous expenditures of capital and labor, and investors made sure they were guaranteed enough water to keep their operations profitable. “First in time, first in right” was applied to water in specific quantities, priority rankings, locations, and times of year. For example, a deed to Indian Creek entitles the Empire Mine to “water franchises” on portions of the Indian Creek drainage as well as the entire flow of three of its tributaries, portions of the flow of Elk Creek in spring and winter months, and rights-of-way easements on all lands through which its ditches pass<sup>711</sup>. Since the court records of old Klamath County were split between three counties, the oldest surviving records of water rights and mining claims from Klamath County date to 1867. They are scrawled into an old notebook on a shelf in the Eureka county archives.

In one claim is scribbled: “the undersigned claim the waters of the right hand fork of Eddy's gulch for milling purposes”. One claims all of Donahue gulch and another “2000 yards of bed in Eddy's gulch”<sup>712</sup>. Another proceeding lays out the “Butterfield claim” for “Ben”, about two miles above the town of Orleans Bar on the east side of the Klamath and lays claim “together to all the ditches, flumes,

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<sup>710</sup> Stumpf 1998, p 111

<sup>711</sup> De Groot, Henry. *Report on the Eclipse Hydraulic Mining and water property*: lithograph reproduction, [187-?]. Bancroft History of Science and Technology Collection.

<sup>712</sup> Klamath County Records. On the shelf: Index to mortgages B& C, 1866-74; mortgages B; mortgages E, Deeds A, B, C; grantor index 1850-1874; grantee index 1850-1874; index to deeds B&C, 1866-74; miscellany B.

water rights privileges and appurtenant thereto to have and to hold forever”<sup>713</sup>. A third water rights record lays claim “to certify that we the undersigned have this day taken up and claim for mining purposes the water of “N---erville Gulch” and intend taking the same on to the “Fred Somes Bar”<sup>714</sup>. In this example, we see how racial formations and tensions of the time between miners coming from all over the world were sedimented in the law through names of local creeks and landmarks recorded in water rights claims<sup>715</sup>.

By the time the Salmon watershed was placed firmly in Siskiyou County in 1876, mining was dwindling down to a few large operations such as Black Bear, King Solomon, and the Slap Jack mines clustered near Forks of Salmon and Sawyer’s Bar. These mines’ water claims were already well established, and their titles were transferred to the Siskiyou County court house. As in many of California’s other mining regions, the “laws in force at the bar or diggings” that governed the use of water in the long-toms and sluices of the gold rush are still in force today. Water rights attached to old mining claims are still recognized in Siskiyou County. The Salmon was booming in the 1850s, with population estimates ranging between 2,000 and 10,000. By the 1870s, the population in the watershed had dwindled down to a few hundred, where it has remained since<sup>716</sup>. Though the larger mines continued operating through the 1930s, by the time it was annexed to Siskiyou, most of the gold had been taken out of the Salmon. When the mines dried up, so too did the towns that had sprung up around them to provide mines with supplies, food, wood, entertainment, and education.

Where there used to be 20 boomtowns dotting the Salmon watershed, only a few scattered settlements remained near the active mines at Forks of Salmon, Cecilville, Sawyer’s Bar, and Somes Bar. Towns like California City sprang up over night, with close to 3,000 people living near the old Bluff-Aikens river mouth, and were completely deserted two years later once the gold ran out<sup>717</sup>. Unlike the flat and wide valleys of the Scott, the Salmon and Mid-Klamath drainages are steep and precipitous. Rather than take up farming and ranching like those upriver, the few families who remained turned their attention largely to the trees. Therefore mining

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<sup>713</sup> “Witness our hands and seals this the 28<sup>th</sup> day of March AD 1868”. Another: “This is to certify that w the undersigned have this day taken up and claim for mining purposes the water of “Fennel Gulch” and intend using the same for mining purposes Said gulch is situated on th e south fork of t Salmon River, about one half mile from Cecilville in the state and county aforementioned. April 9<sup>th</sup>, 1868”

<sup>714</sup> “Said gulch is situated on the South fork of Salmoid River, about 5 miles above the forks of Salmon”. Dec 14<sup>th</sup>, 1867.

<sup>715</sup> See also Mann, Geoff. *Our Daily Bread: Wages, workers, and the political economy of the American West*. Univ of North Carolina Press, 2007 for an example of racial formation through labor law in the Shasta timber industry.

<sup>716</sup> Current population estimate in the nearly 500,000 acre Salmon Basin is 250 full time registered residents. See e.g. Salmon River Restoration Council. A Quick Look at the Salmon River Watershed”. <http://srrc.org/watershed/index.php> last visited 6/1/15.

<sup>717</sup> Rowley, Max and Wooden, Margaret. California City: Bluff Creek and Vicinity. *The Humboldt Historian*. Vol. 49, No. 2. Summer 2001.

interests never went head to head with ranching interests over water use in the Salmon and Mid-Klamath as they did in many other Klamath watersheds, such as the Scott and Shasta.

Though at last rough count (12/2014) there were at least 39 water right claims on file with the State Water Board in the Salmon watershed, and around 89 in the Mid-Klamath, there has never been a basin-wide adjudication of water rights in either Basin<sup>718</sup>. Unlike the Scott, where water rights have been allocated, prioritized and are monitored carefully by irrigation districts, Resource Conservation Districts, a “water master” and the State and Regional water boards (see Ch 6), water rights are not “perfected” in the Salmon or the Mid-Klamath. The water conflicts in the Salmon and Mid-Klamath, which began in the late 1970s, have related more to upslope logging, herbicide spraying, road building and fire suppression, mining along the stream channel, the quality and temperature of the water and its ability to support Salmon rather than the quantity of water diverted and used by water right holders.

However, both the laws and institutions created around mining as well as the material effects of the mining era have implications for contemporary actors attempting to influence the management of Klamath watersheds. The Mid-Klamath Watershed Council, the Salmon River Restoration Council and the Karuk Tribe’s Natural Resource department have been actively working for the past 10 years on closing and restoring the old mines in the Salmon and mid-Klamath to prevent “chronic acid mine drainage” of cyanide, mercury, and sulphites into the watershed<sup>719</sup>. Both groups are also attempting to restore fish habitat for endangered Coho and threatened Spring Chinook.

The creeks of the Salmon were turned “inside out” during the mining era. They were dammed, diverted and re-channeled. Their beds and banks were sluiced away and deposited hundreds of yards from their former channels. As a result, many river channels in the Salmon watershed are now separated from their flood-plains, depriving Salmon and steelhead of critical spawning and rearing habitat and thermal refugia. The Karuk Tribe, the Salmon River Restoration Council, the Mid-Klamath Watershed Council, the California Department of Fish and Wildlife and the US Forest service have been working collaboratively since the late 1980s on restoring the flood plain in old mining sites. Though the State and Federal agencies acknowledge old mining sites as priority restoration areas, they are hesitant to participate in restoration initiatives near mining claims, both active and in-active, for fear that the title holder might dust off the claim and file suit. They are hesitant to invest millions of dollars and hundreds of labor-hours in a restoration project on legally shaky ground.

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<sup>718</sup> <http://waterrightsmaps.waterboards.ca.gov/ewrims/gisapp.aspx>, last checked 6/19/15.

<sup>719</sup> See Karuk Tribe Department of Natural Resources. *Eco-Cultural Resource Management Plan*. Karuk Tribe: 2011.

As local Tribes and environmental groups attempt to reverse the legacies of the mining era, gold mining has been revived in the Klamath by the self-styled “New 49ers” on the basis of old mining claims<sup>720</sup>. Beginning in 1985, local entrepreneur Dave Mack began accumulating gold-bearing properties along the Klamath and its tributaries. He and his partners grew their portfolios of old claims over the years and eventually organized as “the New 49ers prospecting club” with a real-estate office and store-front in Happy Camp. In their properties, they began using old techniques of ground and bank-sluicing as well as new techniques of “suction-dredge” mining, which uses an engine-powered vacuum to suck up the river bottom and send it through a sieve.

In 2005, the Karuk Tribe filed law suits against the California Department of Fish and Game and the US Forest Service for permitting of suction dredging in the Klamath, Salmon, and Scott Rivers<sup>721</sup>. They were eventually successful in both cases, and there is currently a state-wide ban on suction-dredge mining. However, an appeal of the ruling is currently being heard in the 9<sup>th</sup> Circuit Court of Appeals<sup>722</sup>. The “New 49ers” have recently figured out a loop-hole in the ban in order to continue mining through techniques such as sniping, sluicing or high-banking, that technically avoid the “suction-dredge” mining classification of the State executive order. Such is the state of mining in the Salmon and Mid-Klamath basins today- a temporary stalemate between the Karuk Tribe, local environmental NGOs and their allies in State and Federal wildlife agencies attempting to reverse the legacy of the Gold Rush era and the “New 49ers” and their allies in State and Federal departments attempting to revive it. I will now turn to issues related to the management of “upslope” areas of Klamath watersheds, beginning with the creation of National Forests in Karuk ancestral territory.

#### **4. Incendiaries and Early California Anthropology**

Between 1905 and 1990, 95% of the Karuk ancestral territory became National Forest. This shift in land ownership entailed a movement away from the watershed and towards a more “rectilinear” system of resource management based on plots, timber plantations, and fire-response units. The 1897 Organic Act of the US Forest Service specifies two purposes for establishing forest reserves in the United States: securing favorable conditions of water flows and furnishing a continuous supply of timber. Historically, in the Klamath National Forest, the first charge was entirely eclipsed by the second. The Klamath National Forest was one of the first reserves set aside by Pinchot and Roosevelt after the Transfer Act in 1905. Within the first year of the new Forest, the Salmon River Ranger District was immediately carved out of the Forest along the Salmon watershed’s drainage

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<sup>720</sup> See the New 49er’s website: <http://www.goldgold.com>, last visited 6/19/15

<sup>721</sup> Karuk Tribe v USFS US Court of Appeals for the Ninth Circuit, 2012; Karuk Tribe of California et al v California Department of Fish and Game et al. 2005;

<sup>722</sup> Karuk Tribe et al v. Cal DFG et al 2006; Superior Court of the State of CA in and for the County of Alameda.

boundaries. The Salmon watershed became Klamath National Forest Service Ranger District 5. However, the Forest Service did not begin seriously looking at the watershed effects of its operations in the Salmon until they were forced to do so by the Northwest Forest Plan in 1995. Rather, the Forest spent the first 90 years of its history putting out fires and getting out the timber cut.

That fire might have served some purpose other than “superstitious ritual” for the indigenous inhabitants of the Klamath was overlooked by the first anthropologists as well as the first foresters. When Alfred Kroeber first visited the Klamath and Salmon Rivers in 1901 and 1902, he collected data on “Karok” ceremonies and dances, including a few notes regarding their use of fire in the ceremonies at Katimiin and Offield Mountain<sup>723</sup>. He was more interested in the formulas recited and rites performed by the “world-renewal priests” while they lit fires at certain sacred places than in the actual use of fire itself. His visit to the Salmon watershed occurred in a pivotal transition period for the young anthropologist, who was struggling to differentiate his style of anthropology from that of his predecessors by grounding it in what he thought of as a firmer, more “objective” and scientific basis. He was hot in pursuit of the data he needed to found his theory on the spatial distribution of culture and launch anthropology in a new direction. His principle goal was to extend his mentor Boas’ work on “culture areas”, but replace his concern with “cultural causality” with a sole focus on the “objective distribution of cultural content in space and time”<sup>724</sup>. For Kroeber, the native cultures of the Klamath provided the perfect laboratory to test out his new theories.

Because the Salmon and Klamath River mines boomed and busted so quickly, many of the surviving indigenous peoples were able to re-inhabit their ancestral lands and to some extent resume traditional lives once the miners left. Both Stephen Powers, who visited the Salmon in the 1870s for the Smithsonian, as well as Kroeber who visited at the turn of the Century remarked how quickly the ceremonies and dances were revived. Both anthropologists saw the Karuk communities of the Salmon and Klamath rivers as “anomalies”, or temporary cultural holdouts in the inevitable sweep of history and progress. Whereas Powers lamented the fate of California natives, Kroeber criticized Powers for his “quick and vivid sympathy” towards California indigenous communities. For Kroeber, cultural succession was a natural spatio-temporal process that was best studied objectively and scientifically<sup>725</sup>. In contrast to the “flimsy texture and slovenly edges” of Powers’ ethnographies, Kroeber stressed the importance of rigorous statistical analysis of objective data on languages, material culture, myths, and ritual practices

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<sup>723</sup> Kroeber, Alfred Louis. *Handbook of the Indians of California*. Vol. 78. Courier Corporation. 1925, p. 33.

<sup>724</sup> Buckley, Thomas. “Kroeber's Theory of Culture Areas and the Ethnology of Northwestern California”. *Anthropological Quarterly*, Vol. 61, No. 4, Culture Theory and Cultural Criticism in Boasian Anthropology (Oct., 1988), pp. 15-26.

<sup>725</sup> see e.g. Kroeber 1925.

in space and time<sup>726</sup>. He regarded his brief visit to the Klamath and Salmon Rivers as an opportunity to take an impartial snapshot of primitive culture before it was obliterated. He measured only those indicators of Karuk “pure culture” such as dances, rituals, artifacts, myths and ceremonies that would help him prove his new theory. Fire was written-off as a ritualistic performance and afforded only a side-note in his notes on the formulist preparing medicine for the Deerskin Dance at *Katimiin*.

To the early Forest rangers, indigenous peoples’ use of fire was also an indicator of cultural degeneracy and superstition. The Forest ran into difficulty with fires immediately after Klamath National Forest was set aside in 1905. The first rangers had little direction regarding their everyday activity beyond keeping track of their hours in their 874 notebooks and ranger diaries. In their first few years, the rangers in the Salmon River District split their time between issuing permits for grazing, checking on mining claims activity and shutting down local saloons. Aside from battling saloons and struggling to convince miners to fill out paperwork for sheep and cattle grazing, the first rangers in the Salmon spent most of their time putting out fires. For the first six years, the District had no direct orders or plan with regards to fire suppression. They simply put them out whenever they encountered them: “Fires were suppressed when they were found. No systematic procedure for fire control had been established”<sup>727</sup>. The local miners, ranchers and Indians stubbornly continued to set fires to the dismay of the Salmon rangers, who labeled them “incendiaries”. In 1909, 19,000 acres burned on the Salmon River district from fires set by “incendiaries”<sup>728</sup>. The Forest Service stepped up its suppression efforts. In response, some locals, both white and Indian, wrote letters to Pinchot and Roosevelt advocating the strategic use of fire and the shortsightedness of the new Forest Service suppression policy. After attempting to “reason” with the Indians of the Forks of Salmon area about their use of fire, Ranger Robinson remarked that:

“methods of appeal such as respect of law, good of Country, etc fall flat when applied to these people. It is my sincere belief that as in the case with the Oriental, few whites understand their methods of reasoning or the result which they arrive at. Constant preaching of the ‘Indian Custom’, ‘no such brush on hills when I was a boy’, etc. serves to counteract any educational work.”<sup>729</sup>

Many appeals were made by local indigenous folks to the Forest Service district and regional offices. A Karuk and Yurok man named “Klamath Jack” wrote a letter to the USFS, stating:

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<sup>726</sup> Buckley 1988. See e.g. Powers, Stephen (1876). *Tribes of California*. Berkeley & Los Angeles: University of California Press. Retrieved August 22, 2012 (1878).

<sup>727</sup> Davies, Gilbert W. and Frank, Florice. *Stories of the Klamath National Forest: 1905-1955*. History Inc: 1992.

<sup>728</sup> Davies 1992, p. 33.

<sup>729</sup> Davies 1992, p. 91.

“White man, he take care of what he plant and use...every year he cut out old wood and make lots of big berry and fruit grow...but he forget to fix mountain land for elk, bear and deer to eat.”<sup>730</sup>.

In response to Klamath Jack’s letter, US Forest Ranger Jim Casey replied:

“Jack, your fire is bad medicine. If that place had been left alone there would be big timber all over it and you could ride anywhere and there would be lots of grass on the ground for deer and cattle. And Jack, if your acorns are wormy, don’t blame it on the white man keeping fire out of the country...Anyways, there are other things that make better flour than acorns.”

The District 5 rangers refused to see Indian fire as anything but superstition and “pure and unadulterated cussedness”<sup>731</sup>. They intensified their suppression efforts in 1911 and hired Yale forestry expert Corbet DuBois in District 5 to develop a “vigorous program of fire problem analysis followed by a program of systematic fire control and a standardized reporting system”<sup>732</sup>. DuBois even established competitive prizes for best fire records in the District to help them transition from the 875 reports. Still, the Salmon River rangers couldn’t stop the local “incendiaries”. An exasperated Ranger Morgan of District Five proposed hiring Secret Service agents and gumshoe detectives to investigate fires in the lower Salmon: “get a Sherlock Holmes or Burns for each forest. The only way to reduce manmade fires is to make examples of the builders”<sup>733</sup>. Still, the locals stubbornly continued to set fires and the Forest escalated its suppression efforts in response, back and forth for decades. Finally, in 1939, the Forest Service got the decisive upper hand when they received support from the US military. Designated war-time military units were deployed around the Klamath National Forest. Military aircraft were used to carry rangers around to find fire and suppress it and a parachute battalion was stationed at Cave Junction. The strategy was so successful, it became the model for suppressing fires in National Forests across the country.

It wouldn’t be until the 1973 publication of Henry Lewis’ “Patterns of Indian burning in California: Ecology and Ethnohistory” that the ecological dimensions of Indian prescribed fire were recognized in academic communities<sup>734</sup>. It would take over two decades of intense political conflict, armed occupations of sacred sites, community activism, civil and conventional science for the Forest Service to formally acknowledge the importance of Karuk prescribed burning. Despite the body of literature that formed around the importance of indigenous prescribed fire for maintaining the ecological function and resilience of the Klamath, the Forest

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<sup>730</sup> Klamath Jack letter to USFS, May 27, 1916. Thanks to Will Harling for bringing this correspondence to the attention of the attendees Klamath Fire Ecology Symposium 5/14.

<sup>731</sup> Davies 1992, p. 45.

<sup>732</sup> *Ibid.*

<sup>733</sup> Davies 1992, p. 92.

<sup>734</sup> Lewis, Henry T. *Patterns of Indian burning in California: ecology and ethnohistory*. No. 1. Ballena Press, 1973.



continued to suppress intentional and wildfire through the 1990s. It wasn't until 1997 that the Klamath National Forest and the Salmon River Ranger District finally acknowledged the connections between fire recurrence intervals and watershed health in their Salmon River Watershed Assessment. As we will see in the next chapter, by 2013, directors of the local watershed councils in the western Klamath were calling fire the "best watershed management tool we have".

By the time Kroeber sent his friend and protégé, Edward Winslow Gifford back to the Salmon River to gather more data in the early 1940s, Indian fire was being successfully suppressed to the detriment of the local inhabitants. According to one of Gifford's Karuk informants, Mary Ike in 1942, "Now that the Indians no longer burn fires on Mt. Offield and no longer perform the Deerskin Dance, food is scarce and they are dying off"<sup>735</sup>. However Gifford was, like Kroeber, much more interested in taking measurements of "pure culture" such as the seasonal timing of ceremonies, language diffusion, formulas recited by priests and rituals performed by medicine people than he was in the contemporary livelihood struggles of Karuk. Though he presents more a bit more ethnographic information than Kroeber on the ceremonial use of fire, he still regards Karuk cultural fire as a performative or symbolic affect of ceremonial practice rather than an important landscape management tool being systematically eradicated by the Forest Service.

When Kroeber returned to Berkeley after his brief 1902 visit, he immediately began working out his new theory, using his field data from the Klamath as his primary raw material. In his brief visits, he assumed he had collected all of the "Karok" data he needed, asserting in his first publication on the Karuk that they "are indistinguishable in appearance and customs, except for certain minutia" from their Yurok neighbors<sup>736</sup>. Despite declaring that "data are scarcely available for a full sketch of Karok culture", he specifies that, in "95 out of every hundred institutions, all that has been said of the Yurok or is on record concerning the Hupa applies identically to the Karok"<sup>737</sup>. Thomas Buckley (1982) demonstrates how Kroeber's self-justified ignorance of Karuk and Hoopa cultures and his exclusive focus on the Yurok allowed him to expound a theory of the distribution of culture in space that clustered around "centers".

By 1907 Kroeber had introduced the idea that a single tribe might be regarded as the principal center of influence in an area. Rather than points of origination, such cultural centers were seen as "hearths", foci of cultural accumulation where traditions, technologies, myths and stories were gathered, mixed and re-deployed out into the peripheries of the culture area. By 1917, Kroeber had developed his own technique of "humanistic statistics" and was

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<sup>735</sup> Gifford, EW, "Karok, Katimiin". *University of California Publications in Anthropological Records*. 1952, ol XIII 1949-1952.

<sup>736</sup> Kroeber 1925, "Karok", p. 5.

<sup>737</sup> *Ibid.* See also: Bright, Jane O., and William Bright. "Semantic Structures in Northwestern California and the Sapir-Whorf Hypothesis." *American Anthropologist* 67.5 (1965): 249-258.

comparing “ethnic traits” as diverse as seasonal calendars, human skull sizes, fishing implements, property forms, and religious beliefs in quantitative and tabular forms for tribes across the entire Pacific North West. These data were then processed into objective measures of “cultural intensity”. “Centers” could be identified according to their high levels of “cultural intensity”, an objective measure of the “quantity of cultural content amassed together with the integrated systemic complexity achieved”<sup>738</sup>. Intensity was an indicator of “the degree of progress toward higher civilization, defined by things such as accurate time reckoning, religious hierarchy, set of social classes, detailed property law. etc”<sup>739</sup>. The center was defined as the “cultural climax”, the culmination in time and highest degree of development or growth reached within an area. Unsurprisingly, Kroeber’s data pointed to the Yurok lands as the center of the North West Pacific civilization.

According to the Tribe’s former Karuk Tribal Heritage Protection Officer, Kroeber was never taken very seriously in the Karuk community. Many regarded him with suspicion and told him stories, often erroneous ones, just to make him go away<sup>740</sup>. However, through his very brief visits to the region at the turn of the century, he felt he had collected enough Karuk data to launch his theory and his career. Like Kroeber, Gifford was interested in bagging as much “pure culture” as he could in the form of ethnographic data on ceremonies, rituals, myths, genealogies, primitive technology and material artifacts. Gifford felt that the Karuk culture was a better ethnographic specimen, because “by the time he got the Klamath River he found the Karok in their relatively more protected upstream position, less dispersed and less disrupted culturally and economically than the Yuork”<sup>741</sup>. In addition to his field notes and interviews, he brought many “material indicators of culture” such as artifacts, regalia, and human remains, back to the Hearst museum where they remain today. Once safely secured in texts, archives, and museums displays, the material artifacts and field data could be used to ground Kroeber’s theories on the distribution of culture in space and time. Gifford’s excursion to the Salmon in 1942 gathered the last ethnographic data on the Karuk before the Indian Claims Commission Act of 1946 put both the land claims of Californian indigenous groups and Kroeber’s science of “culture areas” on trial.

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<sup>738</sup> Kroeber, Alfred. 1939. Cultural and natural areas of native North America. UCPAAE 38:i-xii, 1-242, p. 5. See also Kroeber, Alfred. 1943. Structure, function, and pattern in biology and anthropology. *Scientific Monthly* 56: 105-13; Kroeber, Alfred. 1952. *The Nature of Culture*. Chicago: University of Chicago Press.

<sup>739</sup> *Ibid.*

<sup>740</sup> See Rouvier, Hélène. 2010. *Integrating Culturally Sensitive and Best Museum Practices at Two Northern California Museums: The Phoebe Hearst Museum of Anthropology and the Karuk People’s Center*. A Thesis Presented to the Faculty of California State University, Chico. Fall 2010.

<sup>741</sup> T. Kroeber, Introduction to Kroeber, Alfred Louis, and Edward Winslow Gifford. *Karok myths*. Univ of California Press, 1980, p. xviii.

## 5. Indian Claims Commission: Culture Areas on Trial

Due largely to the efforts of lobbyist Frederick D. Collet, the US Congress passed the Indian Claims Commission Act to settle unresolved claims of Indian tribes against the Federal government. The Act appointed a California commission to hear the grievances of the eighteen tribes, the Karuk included, whose treaties with the Federal government had never been ratified. The California legislature hung on dearly to the lands promised to the Indians, which were estimated at over a hundred million dollars<sup>742</sup>. The Indian Claims Commission (ICC) came to California in the early 1950s with the intention of achieving closure on these unratified treaties through reparation payments to the descendants of the treaty signatories. Congress intended the ICC to provide a “nonadversarial setting for airing and settling grievances in the US government”<sup>743</sup>. They hired Kroeber, Gifford, and a number of Kroeber’s graduate students such as Robert Heizer, Julian Steward and Ralph Beals to provide impartial scientific evidence regarding the extent of Indian land use and occupancy.

The trials ended up lasting nearly a decade and opening a rift among different schools of thought in the Berkeley anthropological community. By the time they were concluded in 1955, they had cleared the way for Tribal Termination in the 1950s and had spawned a new discipline of “cultural ecology” in the social sciences<sup>744</sup>. Kroeber ended up arguing his “culture areas” theory for the plaintiffs against the emerging theories of “cultural ecology” being propounded by his students Steward and Beals for the defense<sup>745</sup>.

Kroeber initially was invited in 1949 to attend a “round table” discussion about the possibility of the US government reaching agreements with the Tribes without resorting to litigation. By 1952, Kroeber was hired as an expert witness for the plaintiff attorneys for the California tribes and by 1955, Kroeber’s students Beals and Steward had been hired by the US Department of Justice for the defense. As the hearings wore on, Kroeber found his “historical particularist” approach to ethnohistory vigorously challenged by his former students who applied a new, self-styled “ecological approach”<sup>746</sup>. Steward, Beals and Driver advocated a theory of culture change based on cross-cultural comparisons. They took data on land-use among five hundred different Indian groups and generalized them in to 6

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<sup>742</sup> Heizer 1972.

<sup>743</sup> Ray Arthur J. *History of Anthropology, Volume 11 : Central Sites, Peripheral Visions : Cultural and Institutional Crossings in the History of Anthropology* ed. Handler, Richard; Publisher: University of Wisconsin Press : 2006.

<sup>744</sup> Ray 2006

<sup>745</sup> Ronaasen, Sheree, Richard O. Clemmer, and Mary Elizabeth Rudden. "Rethinking Cultural Ecology, Multilinear Evolution, and Expert Witnesses: Julian Steward and the Indian Claims Commission Proceedings." *Julian Steward and the Great Basin: The Making of an Anthropologist*. Richard O. Clemmer, L. Daniel Myers, and Mary Elizabeth Rudden, eds (1999): 170-202; Beals, Ralph Leon, and Harold Edson Driver. *Indian land use and occupancy in California*. Vol. 1. Garland Pub. Incorporated, 1974.

<sup>746</sup> See e.g. Beals 1972.

“ecotypes” based on the intensity of subsistence land use. Steward based the ecotypes on a classificatory scheme developed by Ralph Linton in 1936 which weighted the intensity of resource use in hunter-gatherer territories on a gradient from intensively exploited “home range” to a less-frequented “extended range”<sup>747</sup>. According to Linton’s measures, the Indians of California gained most of their subsistence from a relatively small proportion of the territory they were claiming.

The attorneys for the Justice Department used this theory to shave millions of acres off the territory claimed against California in order to protect the American taxpayer<sup>748</sup>. The defense proposed that the Indians of California were “so devoted to salmon, deer and acorn as food that a good approximation of total land use could be reached by measuring the length of the salmon streams and converting linear miles to square miles and adding that to the area of oak forests”<sup>749</sup>. For example, it was calculated by such means “that the Hupa gained 80 to 90 per cent of their subsistence from 20 per cent of the Hupa area”<sup>750</sup>. Kroeber took up the defense’s challenge and held that the Beals approach substituted theory for essential cultural and environmental detail and that their “land-use intensity calculations imparted a false sense of scientific precision”<sup>751</sup>. In addition, he held that the “ecological” approach undervalued non-subsistence use of land and occasional use of remote lands. The dispute ended when the Department of Justice attorneys produced a letter written previously, in confidence, to their team regarding the difficulties of calculating land-use intensity among California Indians:

“Land actually used and occupied by native groups is going to be hard to define because it slides off in a gradient. A settled site with houses is certainly both occupied and used. But the watershed ridge that bounds the valley of this group might never even be visited except in pursuit of a wounded deer.”<sup>752</sup>

This letter was taken as an admission by the attorneys that the Beals approach could reliably be used to calculate the actual area relied upon by Tribes for subsistence. According to Arthur Ray (2006), Kroeber felt humiliated by the Defense’s cross-examinations, which had exposed a serious rift in the “Berkeley school” of anthropology. Though the Commission ended up favoring his “culture areas” approach, the field had begun moving towards the methods forged by his younger students during the trial. Though he emerged victorious, the trial marked an end-point for the 75-year old Kroeber’s career and a transition point for post-war American anthropology away from historical particularism and towards structuralism and systems theory. The trial inspired turning points in Steward’s thinking and influenced some of his most significant theoretical publications. The

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<sup>747</sup> See e.g. Linton, Ralph. *The study of man*. New York: Appleton Century, 1936.

<sup>748</sup> Ray 2006.

<sup>749</sup> Stewart, Omer Call. *Kroeber and the Indian Claims Commission Cases*. 1961.

<sup>750</sup> Stewart 1961.

<sup>751</sup> Ray 2006.

<sup>752</sup> Ray 2006 p 254; Stewart 1961, p 187.

commissioners concluded that California Indian claimants had been illegally dispossessed of 64,435 acres of land in total. In 1963, lawyers representing the Indians obtained a settlement of \$29.1 million, which amounted to about 45 cents per acre before lawyer's fees<sup>753</sup>. Once the reparation payments reached tribal members who could trace their genealogy to original tribal rolls, the claims against the United States were quieted and tribal governments were terminated. The Oregon band of the "Karok" Tribe was terminated via Public Law 588 in 1954<sup>754</sup>. The Klamath Tribes were terminated in 1954 via Public Law 587<sup>755</sup>.

Immediately after World War II, the idea of "termination" began gaining momentum and systematically over-turning the political and legal gains made by Tribes in the Collier "re-organization" era<sup>756</sup>. In-line with post-war ideologies that demanded assimilation, Tribes' rights associated with land, water hunting, fishing and gathering were systematically dismantled in the termination era. Beginning with the Indian Civil rights and American Indian movements in the 1960s, the occupations of Alcatraz (1968) and Wounded Knee (1973) and continuing through the 1970s self-determination and natural resource rights struggles, American Indian Tribes began regaining sovereign status and reasserting their land, water, fishing, hunting and gathering rights. In the Klamath, Tribes kept pressing for recognition of their distinct political and legal status and their resource rights in aboriginal territories. Beginning in the late 1970s with the with the "fish-wars" mentioned last chapter, Klamath tribes began asserting their sovereign rights to manage natural and cultural resources in their aboriginal territories. The California Department of Fish and Game, at the request of the BIA, began allocating a tribal harvest at Ishi Pishi in 1979, and by 1985, the California courts had recognized the Karuk's right to fish at Ishi Pishi falls for ceremonial and subsistence purposes<sup>757</sup>.

By the late 1980s, the Karuk were beginning to actualize their rights as a sovereign government to direct resource management policy in their ancestral territory. After resuming government-to government-relations with the United States in 1978, the Tribe elected a tribal council, organized a tribal government and drew up a tribal constitution. The Karuk Aboriginal Territory was charted the next year on the basis of a mix of government documents, interviews with tribal elders, and ethnographic reports. According to one Karuk Tribal member I spoke with,

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<sup>753</sup> Ray 2006.

<sup>754</sup> Public Law 588 | Chapter 733 August 13, 1954 | [S. 2746] 68 Stat. 724 Termination of the Karok Tribe.

<sup>755</sup> 68 Stat, 718; 25 U.S.C. 564.

<sup>756</sup> Deloria, Vine, and Clifford M. Lytle. *The nations within: The past and future of American Indian sovereignty*. University of Texas Press, 1984.

<sup>757</sup> However, the Federal government to this day does not recognize the tribal fishery, putting it in the precarious position of being the only tribal fishery that is recognized by the State and not the Federal government.

“In early versions of arc GIS, I built a shape file following the description of our ancestral territory in the constitution, based on ethnographic information, maps of our territory, place names etc. and I followed the contours. In 1979, the aboriginal territory was developed in a subcommittee. The line you see on paper is a proxy of course, but we need to assert it, we need that line. We need to be able to say: we are a sovereign nation, we have a sovereign jurisdictional claim here.”

By the late 1980s, the Tribe’s 1.38 million acre ancestral territory would finally be recognized, at least on paper, by Federal and State agencies. Kroeber’s claim that the “watershed ridge that bounds the valley of this group might never even be visited except in pursuit of a wounded deer” turns out to be false. Portrayed more accurately, the Karuk Tribe actively managed ridge systems through seasonal applications of prescribed fire for the purposes of supporting bunch grass-forbe communities and deer and elk habitat. As next chapter demonstrates, over the last decade, and especially in the last 5 years, the Tribe’s expertise around the use of fire has been sought after by agencies, NGOs and academics like myself for its ecological as well as its cultural significance. However, the recognition both of Karuk expertise regarding the strategic use of fire and the complexity and extent of their ecosystem management activities were not recognized by academic researchers until recently. After the Land Commission Claims in the 50s, it took decades for scientists and resource managers to catch onto the importance of Karuk indigenous knowledge. Until the 1990s, the US Forest Service continued to suppress fires, build roads and extract timber while the courts continued to ignore Karuk claims to land, resource access, free exercise of religion and political self-determination.

## **6. Board-feet and in-stream flows**

The time period between the end of World War II and the mid-1980s, when Tribes and environmentalists began contesting the US Forest Service’s timber management operations in National Forests, was a major boom-period for timber production on the Klamath and Six-Rivers National Forests. Between 1945 and 1991, when the spotted owl (*Strix occidentalis caurina*) was listed as endangered, the Klamath and Six River forests pumped out timber to feed the post-war housing boom around the world. Due to the explosion in demand for housing after World War II, timber demand skyrocketed, and the plantations on the Klamath and Six Rivers pumped out trees to feed the growing demand for wood. The Forest produced an average of roughly 200 million board feet of timber annually between 1979 and 1989<sup>758</sup>. Timber production rose steadily during the 1980s, peaking at around 300 million board feet just prior to the spotted owl listing<sup>759</sup>. In the period between 1945 and 1985, it is hardly an exaggeration to say that the management of

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<sup>758</sup> Gallo, Kirsten, et al. *Northwest Forest Plan- the first 10 years (1994–2003): preliminary assessment of the condition of watersheds*. USDA Forest Service: 2005.

<sup>759</sup> US Forest Service. *Pacific Northwest Forest Plan Update*, 2003.

the Mid-Klamath and Salmon sub-basins was organized under the sign of a single metric: *board-feet*.

The management of Klamath watersheds for timber began in earnest in 1909, four years after the establishment of Klamath National Forest, when the first timber inventory was conducted. This “inventory” consisted of the first Forest Supervisor, Richard Bigelow, walking the bounds of the Salmon watershed and identifying all of the large trees and potential “experimental planting areas” where reforestation strategies were to be tested<sup>760</sup>. By 1947, the year-end report was oriented primarily around timber inventories, locating on the Klamath National Forest “ten and one billion feet board measure of Government and private timber in the Klamath, Salmon and Scott River drainages”. It also reports the sale of 7,859,000 board feet of timber and receipts to the Government of \$27,000, of which \$8,800 was returned to Siskiyou County, almost twice as much as the previous year<sup>761</sup>. By 1990, the timber cut was up to 300 million board feet on the Klamath National Forest and the Klamath was one of the highest timber-producing forests in California<sup>762</sup>. In the early 1970s, the wood products industry accounted for 31 % of total employment in northern California counties<sup>763</sup>. After the spotted owl crisis, the industry accounted for 15 percent of total employment in the region, less than half of what it had been a decade earlier<sup>764</sup>.

While timber revenues supported rural economies, local schools, services and infrastructure, the watershed and ecosystem effects of timber management were devastating. Clear cuts and logging roads created a patchwork landscape, destroying and fragmenting wildlife habitat, destabilizing soils and filling in streams with sediment. The effects, however, went undocumented and ignored by the USFS until they were confronted by tribes, environmental activists and local residents. This section explores the ways numerous local, tribal and government agencies have attempted to produce knowledge about the cumulative watershed effects of logging in the Salmon and mid-Klamath Basins.

## **7. Favorable Flows (of timber and hydropower)**

Despite the charge in its Organic act to “secure favorable flows of water “, the early Klamath National Forest was not interested in the watershed-ecosystem effects of its operations, taking water measurements in streams under its jurisdiction only briefly between 1909 and 1923<sup>765</sup>. Securing favorable flows, in this instance, meant ensuring flows favorable to the production of electricity.

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<sup>760</sup> Davies 1992.

<sup>761</sup> Davies 1992, p. 341.

<sup>762</sup> USDA FS 1994a: 3-114.

<sup>763</sup> FEMAT 1993:VII-53.

<sup>764</sup> Charnley, Susan, Candace Dillingham, Claudia Stuart, Cassandra Moseley, and Ellen Donoghue. *Northwest Forest Plan- The First 10 Years (1994–2003): Socioeconomic Monitoring of the Klamath National Forest and Three Local Communities*. USDA Forest Service.

<sup>765</sup> Davies 1992.

Stream measurements were not taken to examine the effects of its timber operations on in-stream flows, water quality or fish habitat, but rather to determine the power potential of various possible dam sites. When the USGS, the California Division of Water Resources and the Forest Service conducted dam-citing surveys of the lower Klamath and Salmon watersheds, they calculated the drainage area of the watersheds and evaluated the geomorphological features of the stream channels for the sole purpose of determining where the most power could be generated. For example, a team of Stanford engineers and businessmen, under the leadership of Iowan mining engineer Frank Langford, located the spot with the best power potential at Ishi Pishi Falls, on the site of a Karuk dance grounds, cemetery and traditional fishing spot directly above the confluence of the Klamath and Salmon Rivers<sup>766</sup>. Langford filed land, water, and rights-of-way claims on the Klamath and Salmon and initiated application no. 74 before the Federal Power Commission.

He even solved the problem of a lack of a market for the 200,000 KW to be generated once the waters of the Klamath and Salmon had been tapped. Because there was close to zero demand for energy in the area where it was to be generated, Langford proposed sending the electricity all the way to Trinidad on the coast, where it would be used for the production of aluminum, copper and other metals<sup>767</sup>. Though the Division of Water Resources and the Forest Service had issued permits and construction had begun, the California Fish and Game Commission halted the operation at the behest of the sport fishermen's lobby. I suspect with some help from then-Secretary of Commerce Herbert Hoover, who owned a fishing cabin on Wooley Creek, the coalition put an end to the Ishi Pishi dam when it passed Proposition 11 in 1924<sup>768</sup>. Proposition 11 prohibited the construction of any dams on the Klamath in the newly created "Klamath River Fish and Game District" between the Pacific Highway at the mouth of the Shasta and the Pacific Ocean. The Act put an end to Frank Langford's dam and the Forest Service's stream gauging efforts in the mid-Klamath and Salmon. Only due to the foresight of powerful fishing advocates who fell in love with Wooley Creek, the Salmon River and the mid and lower Klamath sub-basins were spared the dam building activity that spread from the upper Klamath lake down to Iron Gate Dam.

For most of its history, the Forest was self-policing and the only metrics that guided its management were board-feet targets. Many of the complex habitat mosaics and diverse forest stands of the mid-Klamath and Salmon watershed ecosystems were converted into plantations of Douglass Fir. Before environmental legislation in the late 1960s, USFS only evaluated the watershed and ecosystem effects of their logging impacts only cursorily. Even for the first decade after environmental statutes, the USFS didn't have to account for watershed-ecosystem effects of operations. Under "sustained yield" management. philosophy and

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<sup>766</sup> Boyle, J.C., 1976, *50 years on the Klamath*. Medford, Oregon, Klocker.

<sup>767</sup> "F. Langford". *Trinidad Museum Society Newsletter*. 2003.

<sup>768</sup> Davies 1992, p. 132.



practice, the USFS continued to manage watershed-ecosystems for board-feet, building roads to plantations as long as they promised timber, jobs and revenue. Despite providing jobs for local indigenous and settler communities and wood for houses around the world, the cumulative effects of logging began to take their toll on local watershed-ecosystems. As a result of decades of logging, by the early 1980s, a checkerboard of plantations, clear-cuts and road networks dotted the landscape. The effects on the local tribal community were devastating and still have lasting effects. According to Karuk cultural biologist Ron Reed:

“There was a transfer of wealth when our land became US Forest Service land. There was a major transfer of local wealth out of our watersheds. Outside folks came here and took all of the wealth and benefits out of our watersheds. This is an environmental justice issue. Inequality is still built into the fabric of our landscape with mining, logging and fire suppression- this is institutionalized racism. The modern management process eliminated cultural and biological diversity and created a monoculture in its wake.”

Among the documented impacts of timber production include land conversion, habitat loss and fragmentation, spread of invasive species, herbicide spraying, fire suppression, reduced terrestrial and aquatic habitat complexity, loss of plant and animal diversity and increased rates of erosion and sediment transport<sup>769</sup>. The cumulative watershed effects of the timber operations, fire-suppression and road-building activities in the Salmon and Mid-Klamath, however, did not come into focus until members of the Karuk Tribe, local land-owners, watershed councils and schools began collecting their own stream-flow, temperature, water quality and fisheries data in the mid-1980s. Once the Tribe and the local environmental community formally organized and became major players in the resource politics of the Salmon and mid-Klamath, the center of power began to shift away from Forest Service district offices and timber plantations and towards a collaborative and integrative approach to management that centered around the watershed.

## **8. Cumulative watershed effects of logging**

The science behind the cumulative watershed-level effects of logging and associated road building came from numerous epistemic communities up and down the Klamath and in nearby watersheds in Northern California and Southern Oregon. This section looks briefly at how data on watershed hydrology, geomorphology and fisheries biology emerged from three distinct epistemic communities in the 1970s and 1980s and laid the groundwork for a watershed-approach to understanding the impacts of land use and forest management

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<sup>769</sup> See e.g. Coats, Robert N., and Taylor O. Miller. "Cumulative silvicultural impacts on watersheds: a hydrologic and regulatory dilemma." *Environmental Management* 5.2 (1981): 147-160; Ziemer, R. R., et al. "Modeling the cumulative watershed effects of forest management strategies." *Journal of Environmental Quality* 20.1 (1991): 36-42.

operations on in-stream hydrologic and aquatic ecological processes. I first look at USGS studies on private timber management above nearby Redwood National Park, then at the formation of the Karuk Department of Natural Resources Department, and lastly at water quality monitoring in a watershed education program at a local school. Through gathering data on the cumulative watershed effects of USFS herbicide spraying, clear-cutting and fire suppression, a coalition of local agencies formed and created a formidable power bloc to shift the Forest Service's management of watersheds exclusively for timber in the mid-Klamath and Salmon basins.

The local players responsible for documenting cumulative watershed impacts of logging in the Salmon and Mid-Klamath basins during this period were the newly formed Karuk Tribe Department of natural resources, the newly reorganized Salmon River watershed council, and the Forks of Salmon "watershed education program" in the local school. This section explores how their combined efforts of these different epistemic communities resulted in new understandings of watershed processes and in particular the role of human land use on the quantity and quality of water flowing through watersheds. The political alliances these communities formed through sharing data and joint monitoring led to new ways of managing watershed ecosystems for wildlife, biodiversity and social-ecological resilience. The ability to produce credible knowledge about the cumulative impacts of USFS logging and road-building practices on watershed processes allowed local coalitions to influence Federal and State resource management law and policy. These collaborative efforts to manage resources for local communities, wildlife habitat, biodiversity and ecosystem function coalesced around a watershed-scale approach, first through the Fisheries Task Force, then the formation of watershed councils, and finally through the Pacific Northwest Forest Plan Watershed Analysis process, which will be explored in detail in the next section.

#### **a. Redwood creek debates:**

Chapter 2 explored in detail the long history behind debates about the role of forests in influencing stream flow discharge and sediment transport patterns. In watersheds near the Klamath, experimental catchment studies at field stations such as Caspar in Mendocino county (est. 1962), Alsea River Basin Study in Southern Oregon (est. 1957) and the Redwood Experimental forest at Yurok, CA (est. 1940) were set up specifically to examine certain dimensions of hydrologic and geomorphologic impacts of different logging practices<sup>770</sup>. According to many

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<sup>770</sup> Lisle, Thomas. *The Caspar Creek Watershed: 40 Years of Research*. June 2003. "When formal cooperation began in 1962, the objective was to document hydrologic changes, erosion impacts, and sediment production resulting from road construction and logging second-growth forests."; J. D. Stednick (ed.), *Hydrological and Biological Responses to Forest Practices*. 2008: "The overall goal of the Alsea Basin Study of Integrated Land-Water Management was to learn how to obtain maximum productivity of a river basin for the greatest public good"; Redwood Experimental Forest at Yurok, California was established 1940 to study the silviculture of coast redwood and to develop techniques for regeneration and management.

people I spoke with, debates in the late in 1960s and early 1970s about logging on private lands above the newly created Redwood National Park, which is the drainage system directly to the South of the Klamath, charged the political and scientific climate around understandings of the impact of logging practices on watershed processes in the Pacific Northwest. These debates foreshadowed debates to follow a decade later nearby in the Salmon and Mid-Klamath Basins.

Redwood National Park was created in 1968 as the result of a heated political debate about preserving the last remaining stands of old-growth coastal redwood and their associated ecosystems and streams<sup>771</sup>. The creation of the Park was immediately followed by a spurt of intensified old-growth logging from 1969-1974 in private lands directly upstream from the Park. During the 1960s, the timber harvesting techniques changed to much more ecologically devastating “tractor-yarded clearcuts” and became concentrated in the redwood-dominated lower basin of Redwood Creek<sup>772</sup>. Debates around the effects of logging on sediment transport and downstream park resources, streams and fisheries habitat brought about an intense boundary dispute between environmentalists, Federal agencies and timber companies that lasted a decade, from 1968-1978.

Between 1969-74, a cooperative agreement maintained a narrow, one-half mile buffer zone along streamside areas where logging was prohibited. Environmentalists sought to expand the park boundaries and buffer zones around old growth stands and streams. To resolve the dispute, beginning in the early 1970s, the US Geological Survey and Humboldt State University researchers initiated studies to more precisely understand the impacts of upstream logging practices on geomorphological and erosional mechanisms operating at local, hillslope and cumulative watershed scales in the Redwood Creek basin<sup>773</sup>. Between October 1973 and September 1977, the U.S. Geological Survey took periodic measurements of water flows and suspended-sediment discharge at eight sites and on seven different streams<sup>774</sup>. They also “synoptically sampled” six of these streams

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<sup>771</sup> United States Congress 1968 (Public Law 90-545)

<sup>772</sup> Best, David. 1991 “History of timber harvest in the Redwood Creek Basin, Northwestern, California”. In Nolan, Kenneth Michael, H. M. Kelsey, and D. C. Marron. *Geomorphic processes and aquatic habitat in the Redwood Creek Basin, Northwestern California*. US Government Printing Office, 1991.

<sup>773</sup> See e.g. Janda, Richard J. K, Michael Nolan, Deborah R. Harden and Steven M. Coleman. “Watershed Conditions in the Drainage Basin of Redwood Creek; Humboldt County, CA as of 1973”; also see Nolan, K. M., and R. J. Janda. “Impacts of logging on stream-sediment discharge in the Redwood Creek basin, northwestern California.” *US Geological Survey Professional Paper 1454* (1995): L1-L8.

<sup>774</sup> See also: Iwatsubo, R.T., Nolan, KM., Harden, D.R., Glysson, G.D., and Janda, R.J. Redwood National Park studies, data release number 1. Redwood Creek, Humboldt County, California, September 1, 1973-April 10, 1974: U.S. Geological Survey open-file report, 175, 1975; Iwatsubo, R.T., Nolan, KM., Harden, D.R., and Glysson, G.D. Redwood National Park studies, data release number 2, Redwood Creek, Humboldt County, and Mill Creek, Del Norte County, California, April 11, 1974-September 30, 1975: U.S. Geological Survey Open-File Report 76-678, 245. 1976; Janda, R.J. Summary of watershed conditions in the vicinity of Redwood National Park, California: U.S. Geological Survey Open- File Report 78-25, 82 p; Janda, R.J., Nolan, KM., Harden, D.R., and Colman, S.M. Watershed conditions in

during nine storm events to measure water and suspended-sediment discharge fluctuations throughout the course of the storm event. They chose sample sites that were “as similar as possible in geology, physiography, and natural vegetation but were in various stages of the cutover-regeneration cycle”<sup>775</sup>. The results of their studies laid the groundwork for scientifically demonstrating the impact of forest management on water and sediment discharge.

Their synoptic sampling showed that recently harvested catchments in Redwood Creek Basin “produced several times more runoff and had higher runoff to precipitation ratios than unlogged catchments”<sup>776</sup>. Harvested catchments in Redwood Creek Basin showed increased large stormflow peaks as well as increased suspended sediment discharge<sup>777</sup>. According to Coats and Miller (1981), the influence of logging activities “on erosion and sedimentation far outweigh the effects on streamflow”<sup>778</sup>. However, the USGS research showed a complicated relationship between sediment and stream discharge, which is why it had previously been so hard to document the direct impact of forest management practices on erosional mechanisms. Janda (1977) suggested that during years of moderate or weak storm events, sediment from deforested terrain accumulates and is stored in tributary channels, while the main channel degrades. However, during large storm and flood events, the tributaries are “sluiced out” and the main channel aggrades<sup>779</sup>. These studies essentially proved that, due to logging, harvested tributary basins have become major sources of sediment during periods of high water discharge<sup>780</sup>. Nolan and Janda (1995) argued that streams draining recently harvested catchments demonstrated levels of suspended-sediment discharge that were at least 10 times as great as those of streams draining “physically comparable, but nearly uncut basins”<sup>781</sup>. According to Nolan and Janda (1995), these effects of logging events on water and sediment discharge persist for at least a decade to some degree.

This research published by the USGS was taken up by environmental advocates and used to exert pressure on Congress to expand the boundaries of the park. In 1975, sessions were heard and a bill was introduced that eventually was signed into law by Carter in 1978 (Public law 95-250). This 1978 law expanded the

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the drainage basin of Redwood Creek, Humboldt County, California, as of 1973: U.S. Geological Survey Open-File Report 75-568, 1975. 266 p.

<sup>775</sup> Nolan and Janda 1995.

<sup>776</sup> Janda 1977.

<sup>777</sup> Janda 1977; Bradford and Iwatsubo 1978.

<sup>778</sup> Coats, Robert N., and Taylor O. Miller. "Cumulative silvicultural impacts on watersheds: a hydrologic and regulatory dilemma." *Environmental Management* 5.2 (1981): 147-160, p 149.

<sup>779</sup> Janda 1977.

<sup>780</sup> Nolan and Janda 1995: “Logging resulted in increased runoff and had made more sediment available to naturally existing delivery systems...recent timber harvesting probably accounts for a substantial part of the observed differences between logged and unlogged terrane.”

<sup>781</sup> *Ibid.*

southern portion of Redwood National Park by 48,000 acres<sup>782</sup>, moving the buffer strip from a narrow one-half mile riparian corridor all the way up to the ridgeline to protect the entire watershed. According to Best (1991), “logging activity in the lower watershed ended abruptly with the expansion of Redwood National Park in 1978”. This expansion was considered a major victory by the environmental community. It encouraged resistance against the management of watersheds and ecosystems in the Pacific Northwest exclusively for timber, and was followed first by protests over road building in indigenous sacred sites and then to the Spotted Owl crisis that eventually brought a halt to the post-war timber boom.

In the late 1970s, as geomorphologists were publishing research on the effects of logging on erosion and sediment transport, a number of fisheries biology studies demonstrated the detrimental effect of sediment entering the streams from logged areas on fish spawning and rearing habitat. According to Coats and Miller’s 1981 review, “suspended sediment cements spawning gravels, thus impeding the construction of redds by spawning adults and reducing the flow of oxygen-rich water to eggs and alevins”<sup>783</sup>. Aggradation of streams with sediment was shown to fill-in pools and thereby reduce available habitat and cold-water refugia for fish<sup>784</sup>. Reduced riparian vegetation near streams also results in higher water temperatures, which in turn reduces dissolved oxygen concentrations and increases metabolic demands for fish. Increased amounts of organic debris entering streams was shown in some cases to deplete dissolved oxygen and block fish migration, while the lack of large woody debris was shown in other studies to impede the formation of deep pools and complex habitat needed by resident and anadromous fish<sup>785</sup>.

This research on geomorphological impacts, watershed hydrology and fish biology made its way into Klamath debates and translated into different studies on the impacts of timber management practices on the watershed ecosystems of the mid-Klamath and Salmon. At first, such studies were attempted piece-meal by the Karuk Tribe’s burgeoning Natural Resource Department, hippie communes and the local schools. By the late 1980s, these studies had resulted in new understandings of the effects of logging on local watersheds and their resident communities and new coalitions between tribes, hippies, environmentalists and fisherfolk resulted as well. These coalitions significantly reshuffled the flows of epistemic and political

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<sup>782</sup>Agee, James. Issues and Impacts of Redwood National Park Expansion. 1980. *Environmental Management*, Vol.4,No.5,pp.407-423.

<sup>783</sup> Coats and Miller 1981; See also Cordone, Almo J., and Don W. Kelley. *The influences of inorganic sediment on the aquatic life of streams*. California Department of Fish and Game, 1961; Moring, John R., and Richard L. Lantz. *The Alsea watershed study: effects of logging on the aquatic resources of three headwater streams of the Alsea River, Oregon*. Corvallis, Oregon: Oregon Department of Fish and Wildlife, 1975.

<sup>784</sup> Denton, Douglas. 1974. *Water management for fishery enhancement on North Coastal streams*. Calif. Dept. of Water Resources, N. Dist. 68 pp.

<sup>785</sup> See e.g. Fetherston, Kevin L., Robert J. Naiman, and Robert E. Bilby. "Large woody debris, physical process, and riparian forest development in montane river networks of the Pacific Northwest." *Geomorphology* 13.1 (1995): 133-144.

authority in the two Basins and reoriented management of watersheds as timber plantations to managing watersheds as ecosystems, homes for humans and habitat for non-human others.

## **b. Karuk Tribe Department of Natural Resources**

The Karuk Tribe's Fisheries and Natural Resources Departments were started by Karuk ceremonial leader Leaf Hillman in 1988. Hillman first received a small amount of Training and Technical Assistance funding from the Bureau of Indian Affairs to conduct some of the first detailed fish population and harvest studies in the mid-Klamath. Hillman was then able to grow the program through lobbying efforts in Washington DC. With the small grants he received, Hillman was able to birth the Karuk Tribe Department of Natural Resources behind a partition he erected temporarily in his living room. Leaf hired his friend, a Karuk fisherman, as his first employee and they began conducting fish counts and collecting data on Tribal harvests around Karuk ancestral territory. According to Hillman: "That's where it all began. That's where we got a voice". The Karuk Department of Natural Resources soon became a major player in Klamath environmental policy.

The new Karuk Department of Natural Resources conducted some of the first detailed Coho and Chinook population studies in the mid-Klamath and Salmon watersheds in the late 1980s and early 1990s<sup>786</sup>. They teamed up with USFS fisheries biologists, the new local watershed councils and the CA Dept of Fish and Game to conduct monitoring and share data. These surveys filled a crucial data gap and were perceived as legitimate and necessary by State and Federal agencies. The KDNR fish surveys produced some of the first solid data on local fish populations, habitat conditions and harvest levels among the local and tribal communities. The Karuk Department of Natural Resources program now employs many local community members in ecosystem restoration and resource management positions. What began as a Fisheries program in Hillman's living room has expanded into Water Quality, Fire and Fuels, Cultural Resources, Air Quality, Watershed Restoration, Environmental Education, and Food Security programs.

Nearly every working day of every season, the fisheries crew journeys to the most remote reaches of every creek in Karuk ancestral territory. They plunge into the many waterbodies of mid-Klamath and Salmon, even in freezing temperatures (wearing wetsuits of course) to monitor the aquatic ecosystems of their ancestral territory. The tables and graphs that display information they gather on phenomena such as fish population and demographics, number of redds and

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<sup>786</sup> See e.g. Karuk Tribe of California, Dept. of Natural Resources. *Final report: Karuk tribal harvest monitoring project*. Orleans, CA: 1991; Rhode, Robert, Leaf Hillman, Susan Smith and Bill Tripp. *Water Temperature Monitoring of the Klamath River Mainstem*. Karuk Department of Natural Resources: 1994; Karuk Tribe Department of Natural Resources. *Water Temperature Monitoring of the Klamath River Mainstem*, 1997; Karuk Tribe Department of Natural Resources. *Water Quality Monitoring Report 2001, 2002*; *Karuk Tribe Water Quality Assessment Report 305(b)*, April 2001.

escapement rates that end up going to agencies are grounded in the very material experiences of this team that scours into every nook and cranny of the watershed throughout the year. Supplying local, State and Federal agencies with such solid data is an excellent bargaining tool and way to gain political leverage with local, State and Federal agencies with jurisdiction concurrent to Karuk aboriginal territory.

### **c. Forks of Salmon Watershed ed.**

Another source of new understandings of the cumulative watershed impacts of logging practices came from the back-to-lander community living around Black Bear commune in the Salmon. As mentioned last chapter, the US Forest Service's aerial herbicide spraying campaigns in the 1970s mobilized the environmental community around protecting their drinking water and the prime Salmonid habitat supported by their watershed. Though activism was initially targeted at the effect of herbicide spraying on local drinking water supplies, the community also began to document the effects of timber plantations and fire suppression on the increasing frequency and intensity of wildfires and the subsequent influence on erosion in unstable slopes and sedimentation in streams.

One Salmon River resident I spoke with, Sue Terence, came to Black Bear in 1979, when the USFS was spraying 2/4-D dioxin up and down the canyon, directly upslope from their drinking water. She immediately became involved in the "herbicide wars" mentioned last chapter (Ch 3) and went to hearings, gave depositions and wrote letters in attempts to stop USFS aerial spraying activities. When I spoke with Sue in February, 2013, she remarked that, though their victory in halting aerial spraying marked a major turning point in resource management on the river, around 1986, directly on the heels of the herbicide victory, USFS service issued an EA to harvest timber on the steep, unstable granitic slopes of Somes, Butler, Duncan and Monte Creeks. Logging and building roads on steep, unstable slopes causes severe erosion, temperature increases and heavy siltation in prime fisheries spawning habitat. As Sue put it:

"all the 'ologists' said it was not appropriate ground for logging, but the EA was issued anyway. Community pressure eventually buried the plan."

Around that time, Sue also ended up teaching at the one-room Forks of Salmon schoolhouse. Due to the precipitous decline in salmon runs and the Forest Service citing lack of baseline temperature data as the reason why it couldn't determine the watershed effects of its timber operations, Sue decided to have her students fill in the local "data gap". In addition to having them journal every day about their favorite topics and places, she teamed up with Humboldt State University researchers and helped the students install a *hobotemp* gauge in the Salmon River near the Forks schoolhouse. Over the course of the school year, they collected the first stream of continuous temperature data for the Salmon River watershed.

The project was so successful, they installed another *hobotemp* in Nordheimer Creek on the South Fork of the Salmon. The Salmon River Concerned Citizens, who transformed into the Salmon River Restoration Council in 1992, became interested in the project and began helping students set up *hobotemps* around the Salmon watershed. They began to feed their data to the Forest Service, who eventually became interested in the project and asked the students to set up gauges in a few more creeks. As Sue said, “At the time, only some were interested in looking at things outside of the prism of timber. Over time we learned who was who and found individuals willing to partner with the school”. The relationship between the SRRC and the Forks School solidified into the first “*watershed ed*” curriculum that trained students in all dimensions of watershed monitoring, from hydrology and fisheries biology to forestry and water quality.

The “*watershed ed*” curriculum had a significant impact in terms of the technical training and career paths of local students. In my interview with Sue, she named five or six of her students who had since gone on to work for local NGOs or Federal and Tribal environmental agencies on watershed-related issues. The local schools still hold a “watershed day” for the local community and watershed education is built permanently into the K-12 curriculum. The local watershed councils hold after-school programs, internships and summer school programs for local youth. Today, the watershed councils and Tribal natural resources departments place a significant amount of importance in training the next generation of watershed managers.

To summarize this section, through the data collection efforts of local watershed councils, Tribes and local schools, the community began linking forest management practices with instream flow patterns. A new picture of the connections between land management and watershed processes began to emerge and inflect bioregional resource management practices. According to a Salmon River Restoration Council founder, the temperature data that the schools and the Klamath Forest Alliance collected after the ‘87 fires was crucial in supplying the first picture of the watershed effects of USFS logging and fire suppression. In his words, “Fire was not part of the watershed management conversation until data from the *watershed ed* program on temperature was put in front of them”.

## **9. Political coalitions in and through watershed science**

The herbicide wars in the Salmon and lower Klamath mentioned last chapter brought the Tribes and hippies together politically for the first time. According to film maker and author Stephen Most, “Karuks visited Black Bear and offered help, bringing salmon and teaching the communards how to smoke it. Emulating Indians had considerable appeal as a way to live in accordance with the



ecology of the bioregion”<sup>787</sup>. The coalition formed over the years between the Salmon River Restoration Council, the Mid-Klamath Watershed Council and the Karuk Department of Natural Resources has created a formidable power-block in Klamath environmental politics. Of course different communities, institutions and even people within those communities and institutions haven’t always seen eye-to-eye on resource management issues over the years. However their provisional alliance around restoring watersheds and ecosystems of the Klamath has proved a significant balance to the stronghold of USFS and other State, Federal and “out-of-basin” interests in resource management in the Salmon and Mid-Klamath.

One long-time local resident who has worked for both the Tribe’s Department of Natural Resources and the watershed councils offered the following description of the relationship between the settler and indigenous communities:

“The aerial herbicide spraying in the late 1970s brought the native and hippie communities together. There was a shift from the 1970s to the 1980s when a coalition formed between these distinct communities. The politics of poison got people to organize and empower themselves. These issues over time polarize communities in different ways and seed different alliances. Coalitions form around certain issues and linkages between communities emerge... An alliance formed around a collective belief system for land management and allowed us to come together and roll those f---ers. “

The next section explores the politics and environmental impacts of building and decommissioning roads as one particular area of watershed restoration that has been a source of collaboration between Tribes, the environmental community, and even State and Federal resource management agencies. Collaboration around taking out, reshaping and restoring road networks in the Salmon and mid-Klamath Basin has been a way for the Karuk tribe to build alliances with Federal, State and local agencies and gain legitimacy for their watershed restoration program. It has also been a way in which the Tribe has been able to materially recuperate local watershed ecosystems and revitalize the cultural resources and practices they support<sup>788</sup>.

## **10. Roads: the path to watershed colonialism and decolonization**

Some of the biggest ecological impacts of logging result from the roads that are built to take trees out of timber plantations<sup>789</sup>. Road failures can contribute

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<sup>787</sup> Most, Stephen. *River of renewal: Myth and history in the Klamath basin*. Oregon Historical Society Press, 2006, p 188.

<sup>788</sup> “Recuperate” was a term used by Donna Haraway as a less nostalgic alternative to “restoration” at the “Funny Kinds of Love” conference, UC Berkeley, 5/2013.

<sup>789</sup> In Redwood Creek, for example, the major source of sediment was found to be roads, particularly stream capture at road crossings. In flood events, the road can itself become a kind of stream and lead to road failure and mass wasting. See e.g. Hagans, D.K., W.E. Weaver and M.A. Madej. 1986. “Long term on-site and off-site effects of logging and erosion in the Redwood Creek basin, Northern

both fine and coarse sediment to streams, with some studies showing that roads can contribute from 50 to as much as 80% of the sediment that enters streams<sup>790</sup>. In large storm events the accumulated sediment from multiple road failures can have catastrophic watershed effects such as filling in pools, covering spawning grounds and reducing habitat complexity<sup>791</sup>. Numerous studies by fisheries biologists in the late 1970s and early 1980s began to show how surface erosion from roads acts as a chronic source of sediment that can diminish salmon and steelhead spawning success<sup>792</sup>.

Roads have played and continue to play a central role in the impact of colonialism on the watershed ecosystems and communities of the Klamath. Roads first allowed access to Klamath watersheds and allowed their resources to be extracted and taken out of local watersheds. According to ecologist, Karuk descendant and USFS employee Frank Lake, Indian trails became the medium for colonization in the Klamath as fur trappers, gold miners, loggers and recreationalists used trails to traverse, “explore, exploit, and settle tribal territories”<sup>793</sup>. First, repurposed Indian trails served as roads that led to gold mines and mineral resources, then to the water needed to extract the precious minerals, then to timber plantations and fire lookouts and finally to recreational sites. One can follow the history of colonialism, resource extraction and local eco-cultural genocide in the Salmon and mid-Klamath watersheds through a history of trail and road-building. However, recently, the Karuk Tribe has begun reframing local trails and roads as vehicles for decolonization, on one hand through road-decommissioning and watershed restoration, but also for cultural food revitalization projects along and adjacent to trails and roads, as we will see next chapter.

For example, processes and practices of both colonialism and decolonization have played out around the politics of building and decommissioning roads in a small, remote watershed in the lower mid-Klamath named Bluff Creek. According to a Six-Rivers USFS fisheries biologist, roads and bridges were first built around

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California”. In: *Papers presented at the American Geophysical Union meeting on cumulative effects* (1985 December); National Council on Air and Streams, Tech.Bull.No. 490, pp.38-66.

<sup>790</sup> Hagans et al. 1986.

<sup>791</sup> National Marine Fisheries Service (1996) guidelines for salmon habitat characterize watersheds with road densities greater than 3 miles of road per square mile of watershed area (mi/sq mi) as “not properly functioning”. A recent restoration planning document for the Salmon River by the Klamath National Forest (Elder et al., 2000) suggests that the maximum road densities in that basin should not exceed 2.5 miles/square mile. See Burns, J.W. 1972. Some effects of logging and associated road construction on northern California streams. *Transactions of the American Fisheries Society*. Vol. 101: 1-17.

<sup>792</sup> See e.g. Cedarholm, C.J., L.M. Reid and E.O. Salo. 1981. “Cumulative effects of logging road sediment on Salmonid Populations of the Clearwater River, Jefferson County, Washington”. Pages 38-74 in *Proceedings of Conference on Salmon Spawning Gravel: A Renewable Resource in the Pacific Northwest?* Report 19. Wash. State University, Water Research Center, Pullman, WA.

<sup>793</sup>Lake, Frank K. "Trails, fires, and tribulations: Tribal resource management and research issues in northern California." *Occasion* 5 (2013): 1-22.

the watershed for gold prospecting, initially to placer sites where the “easy gold” was located and then to filling and blasting sites for hydraulic-mining. These roads were quickly abandoned as soon as the gold ran out. For example, a bustling squatter town, California City, sprouted up in 1851 near the mouth of Aikens Creek<sup>794</sup>. As soon as the gold ran out in the Aikens and Bluff Drainages in 1853, California City was abandoned as the miners moved to the new gold strikes on the Scott and Salmon Rivers. The roads built to gold mines were abandoned as well and left to wash away into local streams during large flood events. New roads were built to timber plantations, platinum mines, homesteads and finally to recreational sites at fishing spots, lodges, lakes and camp grounds beginning in the 1930s with help from the California Conservation Corp. Major road networks were expanded in Bluff Creek during World War II to access the 6-8 mines scattered around the watershed for minerals valuable to the war effort such as platinum and chromium. Many roads to the mines followed Indian trails to the high country when they could, adding switchbacks up steep terrain when necessary.

In winter floods, roads on steep and easily erodible granite or serpentine soils were washed into streams, with the resulting siltation choking up Salmon habitat. In the devastating floods of 1964, the Bluff Creek channel actually blasted through the thin serpentinite wall separating it from the Klamath’s mainstem, creating an entirely new creek mouth<sup>795</sup>. Bluff creek and Aikens creek, which used to drain into the Klamath through the same outlet are now completely separate watershed systems, with separate river mouths. These days, roads bring in cars that carry Port-Orford cedar rot on their tires. The cedar rot is a deadly pathogen that is rapidly killing one of the few remaining stands of this rare tree in the Western Klamath around Fish Lake in the Bluff drainage.

In the 1980s, when the Tribe and USFS and CA DFG fish biologists began surveying the watersheds of the mid-Klamath and Salmon, they found that chronic surface erosion from roads and acute road failures were contributing significant amounts of sediment to salmon streams in Bluff Creek<sup>796</sup>. Roads caused mass wasting in large storm events and resulted in plugged culverts and the overall loss of critical spawning and rearing habitat. Beginning in the mid-1990s, roads became a focal point of both local ecological activism as well as movements for Tribal sovereignty over natural resource management in ancestral territories.

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<sup>794</sup> Rowley, Max and Wooden, Margaret. “California City: Bluff Creek and Vicinity”. *The Humboldt Historian*. Vol. 49, No. 2. Summer 2001. “Over the years, artifacts recovered from California City indicate it was a settlement of noteworthy habitation” (p 18). However, no population estimate is available, “as California City’s existence was so short in duration that map-makers in the following years never recorded the place. California City cannot be found on any maps, old or new” (p. 18).

<sup>795</sup> See e.g. Robertson, Taylor Donald. *A Watershed Analysis of the Bluff and Aikens Creek Watersheds: Six Rivers National Forest*. [Arcata, Calif.]: 1967.

<sup>796</sup> Crosby, Earl. “Road Related Watershed Impacts”, PPT for Karuk Watershed Restoration Program, Karuk Department of Natural Resources.

Some of the specific road-related impacts to watersheds in the Salmon and Mid-Klamath basins documented by the Karuk Tribe include increased sediment transport and deposition, impacts to domestic water supply and irrigation systems, interrupted hydrologic patterns and flow regimes, impacts on critical cold-water refugia, migration barriers, overall degradation of spawning and rearing habitat and spread of plant pathogens and noxious weeds<sup>797</sup>. Therefore, roads, if built in the wrong way or in the wrong area, are seen as a threat both to watershed health, fisheries, and local indigenous culture. The Karuk Tribe's watershed restoration program has therefore targeted roads as a primary source of watershed degradation that severely threatens habitat for Salmon and in turn severely impacts the Karuk Tribe's ability to subsist and to practice their ceremonies and culture.

In the late 1990s, road decommissioning also began to be seen by USFS, Cal DFW and local watershed councils as a crucial component of watershed and Salmon habitat restoration. According to a USFS biologist, collaborative efforts between the Six Rivers National Forest and the Karuk tribe began with road decommissioning in Bluff Creek. According to one respondent, the USFS was "trying to march at the same beat as the tribe and forge an example of co-management around a common goal- we all want fish, we want to be a player, we live here too". The road assessment for Bluff Creek was completed in 2004, with a complete ecological and geomorphological analysis of each road and a priority schedule for decommissioning the roads. Road decommissioning resulted in data-sharing between the USFS, Tribes and the local watershed councils.

From the late 1970s until the turn of the 21<sup>st</sup> century, watershed controversies in the mid-Klamath and Salmon basins centered around the politics of road building and decommissioning. The next three sections explore the politics of building and decommissioning roads as an important site to analyze the politics of knowledge in watershed governance. I begin by describing two stand-offs over road-building between the USFS and Karuk tribe and follow with an account of the first successful road-decommissioning project in the Salmon watershed. I explore roads as sites for conflict as well as cooperation and alliance-formation in integrated resource management in the Klamath.

#### **a. G-O Road controversy**

In the late 1970s, in the middle of the logging boom, the US Forest Service planned to run a highway between the towns of Gasquett and Orleans. The so-called "G-O Road" was to be a 75-mile paved road on Federal land connecting the interior timber plantations with the mills and ports on the Coast. In order to complete the project, the road included a 6-mile paved segment traversing the

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<sup>797</sup> Karuk Tribe Department of Natural Resources. *Karuk Ecosystem Restoration Program*. Final Report FY 2001, 2002, 2003.

sacred “Chimney Rock” and “Dr Rock” sections of Six Rivers National Forest, in portions of the Blue Creek and Bluff Creek drainages of the Klamath as well as the Smith River, which empties into the Pacific just north of the Klamath. This area is considered sacred by all three Tribes in the region, who believe it is a place where “the sprits moved when humans came to the earth”<sup>798</sup>.

In 1977, the Forest Service issued a draft EIS that examined the impacts of the road on American Indian cultural and religious sites<sup>799</sup>. The commissioned study, completed in 1979, found that the entire area “is significant as an integral and indispensable (sic) part of Indian religious conceptualization and practice”<sup>800</sup>. It verified that specific sites were used for ceremonial rituals and that “successful use of area is dependent upon and facilitated by certain qualities of physical environment, most important of which are privacy silence and an undisturbed natural setting”<sup>801</sup>. The study concluded that constructing the road “would cause serious and irreparable damage to the sacred areas which are an integral and necessary part of the belief systems and lifeway of Northwest California Indian peoples”. The report therefore recommended that the G-O road *not* be completed. Nevertheless, the 1982 Forest Service plan ignored the recommendation and instead allowed timber harvesting in the area and only required narrow, one-half mile protective strips around all religious sites identified in the archaeological report. For the Tribes, for whom management of the entire watershed-ecosystem is an integral part of their ceremonial practice, these narrow protective strips were not adequate<sup>802</sup>.

In the wake of this Plan, a coalition of tribal activists, political and religious leaders and environmentalists protested against the Forest Service’s proposed road. Community members made t-shirts, engaged local media and protested at local meetings and regulatory hearings. According to Bower (2011), the tribal community “used the movement to reclaim their turf, to tell their story, and to emerge as a political, social, and religious entity”<sup>803</sup>. This coalition of Indian governments, individual tribal members, conservation NGOs, activists and the State of California challenged both road building and timber harvesting in US district court for the Northern District of California<sup>804</sup>. They claimed that the USFS violated the free exercise clause of the US constitution, the Clean Water Act, NEPA, CEQUA,

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<sup>798</sup> Joseph William Singer, *Property and Coercion in Federal Indian Law: The Conflict Between Critical and Complacent Pragmatism*, 63 S. Cal. L. Rev. 1821, 1832 (1990). Footnote 24, p 7. Brennan, J. dissenting at 461.

<sup>799</sup> Singer, Joseph William. "Sovereignty and Property." *Nw. UL Rev.* 86 (1991): 1.

<sup>800</sup> See O’Connor, opinion in Richard E. Lyng, Secretary of Agriculture v. Northwest Indian Cemetery Protective Association, USSC, 485 U.S. 439.

<sup>801</sup> *Ibid*

<sup>802</sup> Tsosie, Rebecca. "Challenges to Sacred Site Protection." *Denv. UL Rev.* 83 (2005): 963.

<sup>803</sup> Bowers, Amy, and Kristen Carpenter. "Lyng v. Northwest Indian Cemetery Protective Association: Challenging the Narrative of Conquest." *Indian Law Stories* (2011).

<sup>804</sup> Northwest Indian Cemetery Protective Ass’n v. Peterson, 565 F.Supp. 586, 592 at n. 5 (1983) (citing Forest Service exhibit).

the American Indian Religious Freedom Act and other Federal statutes and trust responsibilities to Indians.

The District Court issued a permanent injunction forbidding the construction of the road and the case was appealed all the way up to the Supreme Court. The Supreme Court heard the case eventually in *Lyng v Northwest Indian Cemetery Protective Association*<sup>805</sup>. The legal issue the Court was considering was whether the first amendment's free exercise clause prevented the government from permitting timber harvesting in or constructing a road through a portion of a national forest that was considered sacred by members of Karuk, Yurok and Tolowa nations<sup>806</sup>. Justice O'Connor held that, even though construction of road would "virtually destroy the Indians' ability to practice their religion" the constitution simply did not protect those religious uses above the government using the property of the "public" to benefit the "public good". O'Connor, writing for the majority, remarked that:

"...whatever rights the Indians may have to the use of the area, however, those rights do not divest the Government of its right to use what is, after all, its land"<sup>807</sup>.

Property rights scholar Joseph Singer examines the *Lyng* case and argues that, in *Lyng*, the Court maintained that even if the construction of the road would virtually annihilate the Indians' ability to practice their religion, the Constitution simply did not protect those claims because "this was not the type of injury to religion that the Constitution guards against"<sup>808</sup>. O'Connor rejected their claims on strictly "pragmatic grounds", saying that the "government simply could not operate if it were required to satisfy every citizen's religious needs and desires"<sup>809</sup>. As Singer notes, the common law of property is not neutral with respect to religion<sup>810</sup>. Rather, it developed within a particular social and historical context of colonialism. The "common sense" underpinning O'Connor's opinion embodies the perspective of the dominant majority. In Singer's opinion, O'Connor's common sense was not neutral, but rather, it embodied a particular, culturally-situated and racially-charged vision of property and the "proper" form of social order and ecological relations.

In Justice Brennan's dissenting opinion, he argued that the Indians lost in *Lyng* because the majority believed that the Free Exercise Clause did not apply to their religion, at least when the government's property was at stake<sup>811</sup>. In Justice Brennan's words, through the *Lyng* decision, the court "stripped respondents and

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<sup>805</sup> *Lyng v Northwest Indian Cemetery Protective Association* 485 U.S. 439 (1988)

<sup>806</sup> Tsosie 2000, p. 1135.

<sup>807</sup> Cf *bowen v roy*, 476 us at 7240727

<sup>808</sup> Singer 1991

<sup>809</sup> Singer 1991, p 10, ft nt 36 *Lyng*, 485 US at 452.

<sup>810</sup> Singer 1991, ft nt 93.

<sup>811</sup> Bower 2011, p 524.

all other Native Americans of any constitutional protection against perhaps the most serious threat to their age-old religious practices, and indeed to their entire way of life”<sup>812</sup>.

Though the Klamath tribal community was devastated by the *Lyng* decision, they used it as a rallying point to educate other indigenous groups about the importance of American Indian religious beliefs and ecosystem management practices<sup>813</sup>. As a result of the controversy, “the protection of Indian sacred sites began to command political attention on the national stage”<sup>814</sup>. As a result of tribal and environmental activists pursuing other institutional mediums outside of courts, two years after the Supreme Court delivered the *Lyng* decision, Congress passed the Smith River National Recreation Area Act of 1990. This act protected the *entire* High Country of Blue Creek and the proposed site of the G-O road expansion from development by adding it to the Siskiyou Wilderness Area. Even though, *de jure Lyng* denied the Klamath Tribes the basic protections of the First Amendment, the case catalyzed a social and political movement that ended up reviving traditional religious practices on the ground. The Tribes of the Klamath emerged fortified as strong cultural and political entities, more prepared to contest road building and timber harvesting in sacred sites and important cultural resource management areas. As the G-O Road case was playing out in the courts, similar battles between the USFS, Tribes and environmentalists were playing out upstream in the Mid-Klamath and Salmon Basins.

#### **b. Offield Mountain standoff**

Though the Karuk Tribe was recognized by the BIA in 1978 and their ancestral territory mapped shortly after, the Forest Service at first refused to recognize the Tribe’s sovereign status and continued to operate as though they were the sole sovereign landowners. In the early 1980s, the USFS proposed a timber sale on Offield Mountain which involved harvesting and road construction on Karuk sacred sites without any consultation or tribal input into planning or zoning. This incident occurred in the middle of the “G-O Road” controversy, so the Karuk were particularly sensitive about Forest Service activity anywhere near important cultural sites. As the bulldozers were being brought in, a number of Tribal members occupied the Forest Service road leading up Offield Mountain “armed and ready to rock and roll”. According to one participant in the incident, “we had to figure out what tools were out there to use as leverage. People who

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<sup>812</sup> Brennan, J dissenting: “Today, the Court holds that a federal land-use decision that promises to destroy an entire religion does not burden the practice of that faith in a manner recognized by the Free Exercise Clause. [The Court has] thus stripped respondents and all other Native Americans of any constitutional protection against perhaps the most serious threat to their age-old religious practices, and indeed to their entire way of life.... The safeguarding of such a hollow freedom...makes a mockery of the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express and exercise their traditional religions.”

<sup>813</sup> Bower 1991, p 526.

<sup>814</sup> *Ibid.*

don't have a voice need to use all tools at their disposal". Despite the Forest Service's pressure to move forward with the sale, the contractor refused to continue and negotiations were set up at the Forest Service's Salmon River district headquarters at Somes Bar.

The gesture was seen as offensive as the conference room was built on top of a world-renewal ceremony grounds and an Indian cemetery. The discussions heated up and there was a physical confrontation between a Tribal elder and a District Ranger and a number of "arsonry" incidents. The contractor eventually backed out of the sale for good and the Tribe successfully stopped the timber sale and road construction on Offield Mountain. They also forced the Forest Service to relocate their headquarters to Oak Bottom. As one participant in the event remarked, "the incident brought the Tribe to the negotiating table with the Forest for the first time", adding "from that time forward, they couldn't just walk on us...Never again would they have a free hand within our sacred places".

Their success in the Offield standoff led eventually to the Tribe's being able to carve out "Cultural Management Areas" in ceremonial management districts through the USFS Land and Resource Management Planning process beginning in 1993. According to one respondent who was present at the standoff:

"After the Offield standoff, things were bad. We told the Forest Service: 'you will never do anything on this mountain again'. For the first USFS Land and Resource Management Planning process, as part of the relocation agreement, the firm line got the Tribe an appointment on the id (interdisciplinary) team for scoping projects which gave us an opportunity to create 'cultural management areas'. They heard us and understood they didn't have control over our lands... This is where cultural management areas came from."

After blocking the timber sale on Offield Mountain, the momentum shifted and the Tribe began leveraging its new bargaining position to expand Tribal sovereignty over natural resources in Karuk ancestral territory. In 1996, the Tribe and the two National Forests entered into a Memorandum of Understanding (MOU) that established a framework for the two partners to jointly identify, plan, and accomplish mutually beneficial projects within Karuk Ancestral Territory. Two Karuk ceremonial districts, or dance grounds, are now officially recognized in the State and Federal registers of historical places. Officially recognized carve-outs such as CMAs, tribal trust properties and water bodies, registered sites and sacred sites are incredibly important on paper, as they provide a legally binding reference point for the tribe to dictate particular regimes of management in those areas. However important those areas are, they represent only a sliver, around 827 acres of the Tribe's 1.38 million acre aboriginal territory<sup>815</sup>. As mentioned in the

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<sup>815</sup> Diver, Sibyl Wentz. *Negotiating knowledges, shifting access: Natural resource governance with Indigenous communities and state agencies in the Pacific Northwest*. PhD Dissertation. University of California, Berkeley: 2014, p 31.



testimony given by tribes in the G-O road case, for a tribe whose religious practices entail a duty to manage the entirety of the landscape for multiple species and cultural resource uses, this is a scalar mismatch (Ch 1).

According to Bill Tripp, the Eco-Cultural Resources Management Director for the Karuk Department of Natural Resources:

“CMAs have been good opportunities. They were supposed to support pilot projects in sanctioned areas, but were not enough of a foothold to build a program. We need a bigger planning scale. We need to re-delineate the boundaries for integrated wildland fire management and look at strategic treatments across the landscape. We need to treat places like riparian areas, ridges and meadows to meet multiple restoration goals across the landscape, not just in a little box.”

For example, I had a discussion with former THPO about registering entire watersheds as “traditional cultural properties”. Entire landscapes and watersheds of the mid-Klamath and Salmon basins are seen by the Karuk community as historically-produced Karuk artifacts, managed for particular subsistence, commercial and ceremonial purposes. According to the Tribe’s Former THPO, interpretations of sacred sites as bounded, discrete units become barriers for cultural heritage protection because focusing on borders as fortresses goes against the tribal perspective. Tripp has made a similar argument about the spatial misfit of the boundaries typically delineated around “cultural resources” and the landscape-scale focus of eco-cultural revitalization:

“For us, nature in a set of particular conditions, within a dynamic setting is a cultural resource; the watershed is a cultural artifact. The forest- its composition, diversity and dynamics- is a cultural artifact...Sacred sites connect and relate to one another. They form a bridge to areas important for resource utilization by people of place- you need the management unit to reflect this.”

This quote expresses eloquently how watersheds do not encompass the indigenous perspective on space and place or facilitate the Tribe’s approach to eco-cultural restoration. The Karuk Tribe continues to claim sovereignty over its members and its 1.38 million acre territory. The USFS on paper and in principle recognizes the Tribe’s ancestral territory. While claiming and maintaining inherent sovereignty in principle, the Tribe has also strategically pursued collaborations with the USFS at the watershed scale in order to reverse the history of eco-cultural genocide. Projects identified to benefit both partners have included watershed restoration, job training opportunities, and community economic development. The following section will explore road decommissioning one area of collaboration in watershed restoration between the Tribe’s Natural Resource Department and Federal, State and local environmental agencies.

### c. Decolonization and road decommissioning: Steinacher and beyond

As mentioned earlier, beginning in the mid-1990s, the local watershed councils, Tribes and the USFS all began to endorse road decommissioning as a key component of watershed restoration. The science emerging from numerous epistemic communities on the cumulative watershed impacts of logging combined with the environmental activism from communes, tribes, watershed councils and the local school led to a “watershed moment” around road decommissioning, inspiring collective action around taking roads *out* of local watersheds. There was a temporary convergence among the major players in Klamath environmental policy around taking roads out of local watersheds. Some of the first on-the-ground collaborations between the USFS, the Karuk Dept. of Natural Resources and the local watershed councils revolved around road decommissioning and the Karuk Tribe became a major player in the road-decommissioning movement.

The first major decommissioning project occurred on Steinacher road in the Salmon Basin in the late 1990s. The short 7.1 mile Steinacher road was built between 1969 and 1971 to access timber areas in Wooley creek in the Salmon watershed. Wooley Creek is considered one of most pristine anadromous fish habitats in California. It functions as key refugia for threatened Coho, spring Chinook, petitioned fall Chinook salmon and steelhead trout<sup>816</sup>. At the time, according to the Tribe and the USFS, Steinacher Road represented *the* primary threat to the future function as Salmonid refugia<sup>817</sup>. According to the Tribe’s estimate, approximately 10,650 cubic yards of sediment entered stream channels from cutbanks and road surfaces in the time since the road was constructed, amounting to more than three times the natural background levels<sup>818</sup>. While Phase I of the project was undertaken by the USFS, Phase II was implemented by a Karuk Tribal work force sponsored through the “Karuk Training Program” aimed at employing local tribal community members. This tribal hiring provision was seen by the Karuk Department of Natural Resources as a critical component of the success of the project in furthering the goals of eco-cultural revitalization.

The Steinacher project still stands as one of the largest road decommissioning projects in the Pacific Northwest to date<sup>819</sup>. The Tribe’s final estimate identified 196,056 cubic yards of fill material excavated and removed at a total cost of about \$3 million. After removing the fill, the Karuk crew re-sloped the road to reestablish the natural hillslope drainage pattern, thus effectively reducing the amount of sediment that would eventually enter the stream during storm and erosion events. On the heels of the successful decommissioning, the Tribe argued:

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<sup>816</sup> Karuk Tribe. *Steinacher Road Decommissioning Project and KRIS workstation*, Cooperative Agreement number 14-48-11333-9-J107, Proj number 99-319(h)-VI-07, Jan 2001.

<sup>817</sup> *Ibid.*

<sup>818</sup> *Ibid.*

<sup>819</sup> *Ibid.*

“Building the Tribe’s capacity to play an appropriate role in ecosystem management is the only means by which ecosystem restoration, cultural survival and community prosperity will be achieved.”<sup>820</sup>

Following the success of their initial decommissioning, the Tribe received funds for other road-removal projects from the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency Region 9, Bureau of Indian Affairs, U.S.F.S. Six Rivers National Forest, and the California Department of Fish and Game. In 2005, the Tribe embarked on a similarly ambitious decommissioning project along east Ishi Pishi road networks in Ti, Irving, Rogers and Ukonom Creeks, which were identified as containing high potential sources of sediment<sup>821</sup>. Through the decommissioning process, the Karuk Tribe attempted to work with the USFS to develop a programmatic approach to watershed restoration in the Karuk Ancestral Territory<sup>822</sup>.

Road decommissioning has been extremely important in building the legitimacy of the Tribe’s watershed restoration program and in supporting their ability to play a primary role in ecosystem management in the Mid-Klamath and Salmon River Sub-basins. Road decommissioning successes also led to a long-term successful partnership with Federal agencies and local environmental groups. Road decommissioning has also proved to result in real material watershed effects. Decommissioning roads significantly reduces the major source of non-point pollution in local watersheds and threats to anadromous fisheries- preventing over 10,000 cubic yards of fill material from entering the stream systems makes a real material difference for migrating and spawning Salmon<sup>823</sup>. This in turn works support cultural values, access to resources, livable-wage jobs for tribal members and indirect benefits to the local economy.

To summarize this section, roads initially paved the way for colonialism, giving settler communities access to Karuk watersheds and allowing mineral and timber resources to be taken out of local ecosystems. Roads continued to be a source of conflict between the USFS and timber contractors on one side and tribal and environmental groups on the other into the 1990s due to their adverse social and ecological impacts. The G-O road controversy and the Offield Mountain standoff both directly challenged the USFS construction of roads through Indian sacred sites. As a result of a confluence of factors such as political demonstrations, road blockades, law suits as well as the emergence of research on the cumulative watershed impacts of road building led to a paradigm shift. Beginning in the late 1990s, first with Steinacher, then Bluff and East Ishi Pishi decommissioning projects, roads became a vehicle for cooperation between the Tribes and Federal,

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<sup>820</sup> Karuk Tribe Press Release, November 1, 2002.

<sup>821</sup> Karuk Tribe Dept. of Natural Resources. *East Ishi Pishi Road Decommissioning Project*. 2006.

<sup>822</sup> Karuk Tribe Dept. of Natural Resources. Watershed Restoration Program 4 USFWS Year 2005: Final Report.

<sup>823</sup> Karuk DNR 2005.

State and local agencies. Roads have since become a vehicle for decolonization in reversing the watershed-ecological impacts of roads, restoring fisheries, protecting cultural resources and employing local tribal members.

Decommissioning roads and restoring watersheds is now seen by Karuk Tribal members and representatives as an extremely important aspect of decolonization. In restoring roads to stable hillslopes, the Tribe is attempting to support habitats and healthy watersheds in its ancestral territory. Through decommissioning, not only is the Tribe's Natural Resource Department working to restore the ecological basis of Karuk culture and religion, it is also working to actively empower and train local community members in restoration techniques. Road decommissioning is also a way for the Tribe to build strategic alliances with federal agencies and build legitimacy for its watershed program.

In this section, I have attempted to portray the strategic convergence of epistemologies, political institutions and mechanisms of collective action around road decommissioning in Klamath watershed governance. In road-decommissioning work beginning in the late 1990s, the watershed functioned as a kind of "boundary object" or a point of translation between social worlds<sup>824</sup>. According to Bowker and Starr, (1999 p 297-298) "boundary objects are those objects that both inhabit several communities of practice and satisfy the informational requirements of each of them"<sup>825</sup>. In the case of road-decommissioning, the genesis and maintenance of the watershed as a "boundary object" or common-ground for ecological restoration was a key process in developing and maintaining coherence across different epistemic communities.

In the case of road decommissioning projects, the watershed and the road-networks that traversed them did not necessarily have to mean the same thing for the Karuk Dept. of Natural Resources fisheries biologists, work crews, the USFS technicians or the local watershed council volunteers. The watershed in this case only had to be, like a boundary object, "plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites"<sup>826</sup>. However, the next section provides an example, in the Karuk Tribal Module for the Salmon Watershed Analysis, of an instance in which the epistemologies and ontologies of the watershed do not maintain common-grounds across social worlds. In this instance, ontologies and epistemologies of the watershed were both leveraged and challenged by Karuk representatives attempting to regain access to traditional cultural resources in their aboriginal homeland.

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<sup>824</sup> Starr and Greismer 1989.

<sup>825</sup> Starr, Susan Leigh, and Geoffrey Bowker. "Sorting Things Out: Classification and its Consequences." (1999).

<sup>826</sup> Star, Susan; Griesemer, James (1989). "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39". *Social Studies of Science* 19 (3): 387-420, p 393.

## 11. Northwest Forest Plan: challenging watershed epistemologies and ontologies

In 1991, logging on Federal lands halted abruptly across the entire range of the northern spotted owl (*Strix occidentalis caurina*) after the 9th Circuit Court of Appeals ruled that the USFS did not sufficiently support the owl's viability, as required by the Endangered Species Act, the National Forest Management Act (NFMA), and the National Environmental Policy Act<sup>827</sup>. The US House of Representative Scientific Panel on Late-Successional Forest Ecosystems was convened by the U.S. House of Representatives to develop management alternatives for the spotted owl<sup>828</sup>. In April, 1993, President Clinton and Vice-President Al Gore flew to Portland, Oregon to hammer out a solution to the crisis that was causing timber gridlock across the entire Pacific Northwest. Clinton directed the Federal agencies to devise an integrated approach to Federal land management in the Pacific Northwest that would provide for both ecosystem restoration and economic stability and put an end to the timber gridlock. Out of a series of options that resulted from the negotiations, Clinton chose "Option Nine", an ecosystem-based land management and restoration processes.

The Northwest Forest Plan was passed in 1994 and through it, the watershed became the central unit for baseline ecological research, project implementation and monitoring in the USFS's adaptive ecosystem restoration process. Interagency "Watershed Analysis" became a required step in land-management planning to describe patterns of process interactions and ecosystem function on Federal lands in the Pacific Northwest<sup>829</sup>. The watershed became a "cornerstone" of the new management approach, enshrined through the Record of Decision for FEMAT<sup>830</sup>. Watershed Analysis was intended on one hand to provide a "generalized understanding of the processes and interactions that shape the physical, biological, and social landscapes in an area" as well as an "overtly interdisciplinary view of the ecoscape"<sup>831</sup>. The US Forest Service's decision to approach ecosystem restoration and economic development through the watershed was multifaceted. Zeimer (1994) explains that:

"Watersheds were selected as the analysis unit because they come in convenient sizes, they are identifiable on maps and on the ground, they do not change much through time"<sup>832</sup>

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<sup>827</sup> Seattle Audubon Society v. US Forest Service 1991.

<sup>828</sup> Thomas, Jack Ward, et al. "The Northwest Forest Plan: origins, components, implementation experience, and suggestions for change." *Conservation Biology* 20.2 (2006): 277-287; Reid, Leslie M., Robert R. Ziemer, and Michael J. Furniss. "Watershed analysis on federal lands of the Pacific northwest." (1994).

<sup>829</sup> Zeimer and Reid 1994.

<sup>830</sup> See Zeimer and Reid 1994, p 96, ROD p. E-20, par. 4.

<sup>831</sup> Zeimer and Reid 1994.

<sup>832</sup>FEMAT Record of Decision, p. 10.

The USFS technical team assumed that the watershed provided the best unit for scientifically representing the complex dynamics of social and ecological processes in the Pacific Northwest. They also assumed that the watershed provided the optimal unit for coordinating agency science and policy and for approaching the restoration of spotted owl and Salmonid habitat and their associated ecosystems. Both of these assumptions proved incorrect in the case of the Salmon Watershed Analysis.

The first phase of implementation for interagency watershed analysis entailed the selection of fifteen watersheds for "pilot" analysis during 1994 to develop and test analysis techniques. The Forest Plan also divided Federal lands within the range of the northern spotted owl into "key watersheds" and "non-key watersheds" based on their relative strategic importance in the restoration of spotted owl populations. The Salmon watershed was identified as a "critical watershed" in the President's plan and the Karuk Tribe was invited to contribute a "Tribal Module" to the Salmon River Watershed Assessment. This Module provided the Tribe with their "first meaningful opportunity to date" to participate in USFS planning processes and influence management in the up-slope areas of local watersheds<sup>833</sup>.

The "Tribal Module" was officially endorsed by the Forest Service as an appendix to the Salmon Watershed Analysis and released in 1997. The module presents an explicit critique of the Forest Service's draft watershed analysis and a general critique of their use of the watershed to conceptualize biophysical and social processes. The Tribal Module attempts to counter the Forest Service's portrayal of the Salmon with an "indigenous watershed".

The module maintains that the Salmon watershed is itself a material product of a "historically-specific, culturally patterned relationship between land and people". The module shows how biophysical processes such as stand dynamics, plant composition and biodiversity distribution were affected by tribal management across the entire watershed. The Tribe provides detailed descriptions of intentional fire techniques and cultural resource management across a range of habitat types. The module expresses opposition to the Forest Service's use of Kroeber and Gifford's ethnographies, which portray the Karuk as "hunter-gatherers of the salmon-acorn type". Instead, the module positions the Karuk as active landscape managers of the watershed: "aboriginal Karuks were not mere 'users' of these resources, but meticulous managers who carefully manipulated the environment in which they lived in order to achieve a specific response or condition" (p 16). In contrast to Kroeber's "Karoks" from last chapter, "who might never visit the watershed ridge except in pursuit of a wounded deer", the module maintains that Karuk seasonally set fires along ridges to serve a variety

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<sup>833</sup> Karuk Tribal Module, Salmon River Watershed Analysis, Pacific Northwest Forest Plan, 1996, p. 2.

of ecological and social purposes, one of which is maintaining habitat for elk and deer herds.

In the “Tribal Module”, the entire watershed is itself a Karuk artifact, the “result of constant manipulation by the people who lived within it” (III-5). Over the last decade, biophysical scientists studying Klamath ecosystems have confirmed that the species abundance and diversity, stand compositions and fire histories cannot be represented without the Karuk knowledge and management activities that produced them<sup>834</sup>.

In addition to making the case for restoring culturally-prescribed fire regimes in order to restore the Salmon watershed, the module argues for restoring Karuk people as managers of their ancestral watersheds. Due to their intimate knowledge of their watersheds’ historic and contemporary conditions, “only the Karuk people provide a thread of stability and... pragmatic and spiritual connection with this landscape”<sup>835</sup>. The module also lays out the Karuk watershed ethic, which sees plants and animals as “co-creators with humans in both the maintenance of ecosystem function and through spiritual ceremonies of world renewal”<sup>836</sup>.

Finally, the module pivots on the difference between Karuk and Forest Service conceptualizations of the watershed to launch a broader criticism of the Forest Service science:

“The Karuk Tribe, speaking on behalf of a sovereign aboriginal people, recognizes that ‘rational’ or ‘technical’ answers are in themselves insufficient to comprehend the forest landscape as an inclusive system. The purely rational and technical approach un-augmented by a sense of the sacred or by the sensibilities specific to place, will necessarily become destructive and irrational over time as it seeks its own narrow purposes. Technical knowledge is in itself insufficient to interpret the multi-leveled complexity of natural systems”

In the quote above can be seen both an ontological critique of how the watershed is represented by to the USFS and an epistemological critique of how the watershed can be known through the dominant knowledge system. Implied is also a political maneuver that positions the Karuk tribal community as rightful managers of their ancestral watersheds. We see in this episode how the watershed does not function as a successful boundary object that translates between distinct social worlds. While the USFS assumed that the watershed could integrate multiple scientific ecological and hydrologic sciences as well as indigenous and local knowledges, the Karuk Dept. of Natural Resources did not agree with multiple

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<sup>834</sup> See e.g. Lake 2007; Norgaard 2014; Taylor, Alan H., and Carl N. Skinner. "Spatial patterns and controls on historical fire regimes and forest structure in the Klamath Mountains." *Ecological Applications* 13.3 (2003): 704-719.

<sup>835</sup> Karuk Tribe 1996, p. 37

<sup>836</sup> Ibid, p. 18.

aspects of the USFS approach to understanding and managing watersheds. How the watershed can or should be known was contested through the Tribal module. Also contested was how the benefits from restoration projects would be distributed. Most importantly, the scale of resource management was itself contested by the Tribe. The watershed, in these critiques, did not sufficiently capture important social and ecological dynamics important to the Tribe and its members.

Furthermore, members of the Tribe have critiqued whether the watershed-scale approach of the Northwest Forest Plan is even adequate to the task at hand, namely protecting spotted owl populations. According to one Tribal member I spoke with, the watershed-centric approach of the USFS to managing spotted owl populations misses important ecological dynamics taking place in the understory and across drainage divides:

“For Spotted owl, you can’t manage for it well at the watershed scale. You need to achieve a multilayer canopy with a large tree component, not large contiguous blocks. The NWFP took a watershed approach to protecting spotted owl, but you need to focus more on their dispersal corridors and ability to find prey. You have to worry about starvation, predation, habitat fragmentation, etc. and mid-slope, mid-range, mid-canopy is where that all happens for spotted owl- they either starve or get eaten. The timber plantations are so choked up now, owls are starving there because they can’t find woodrats. We’re finding that the dispersal range for males can be up to 15 miles and for females up to 10 miles. So watershed boundaries are also too small to capture their ranges in many cases.”

Bill Tripp has further remarked on the impact of spotted owl management zoning on Tribal sovereignty and cultural practices:

“The spotted owl critical habitat designations and management plans diminishes Tribal ability to perform cultural burns at certain times of year. It diminishes our ability to formulate effective management solutions that are place-based and consistent with our cultural responsibility.”<sup>837</sup>

As we will see next chapter, Tripp argues for an approach to integrated resource management through targeting culturally prescribed fire for multiple species at multiple scales across the Karuk aboriginal territory. I pick up this theme next chapter and argue along with Tripp and other community partners that a multi-scalar approach to ecosystem management is a more appropriate approach to managing ecosystems and watersheds according to scales that are appropriate to particular places and the communities that inhabit them.

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<sup>837</sup> Tripp 2014, p. 13.



While the Karuk tribal module was published as part of the final Salmon Watershed Analysis, only certain dimensions of the Karuk's claims made their way into on-the-ground initiatives. A number of Karuk-led restoration projects such as creek-mouth restorations and road-decommissionings were initiated. However, many of the "non-technical" assertions related to Tribal sovereignty, local work-force development, indigenous knowledge and youth empowerment were ignored. Religious and political aspects of watershed restoration were also ignored. According to many Tribal members I interviewed, the most frustrating outcome of projects initiated under the Northwest Forest Plan has been the lack of prescribed fire as a watershed management and restoration tool. As we will see next chapter, this frustration with the watershed-scale approach to resource management eventually resulted in the development of collaborative resource management institutions according to other scalar formations such as firesheds and foodsheds.

Through this episode of the Salmon WA, we see how epistemologies and ontologies of watershed go head to head in collaborative watershed governance forums. In the case of the Northwest Forest Plan, the watershed was not a boundary object. It did not successfully translate across social worlds while maintaining a core identity. It couldn't harmonize the diverse world-views and epistemologies of the different communities of the Klamath. While the Tribe leveraged the opportunity to articulate an indigenous perspective on ecosystem restoration at the watershed scale, they also took advantage of the opportunity to critique the ways in which the US Forest Service, and western science in general, conceptualized social and ecological systems through technical terms.

## **12. Karuk critiques of the watershed**

In this section, I continue to analyze Karuk critiques of the watershed as the appropriate scale of environmental governance. I begin with some general Karuk critiques of "dominant knowledge paradigm" (Ch1) approaches to understanding traditional ecological knowledge. I then provide other instances of Karuk epistemologies and ontologies of Klamath watershed-ecosystems bumping up against conceptions of the watershed held by State and Federal agency representatives and scientists. Despite remaining critical of the epistemologies, ontologies and political spaces embedded in and sustained through the watershed, the next section focuses on the ways in which members of the Karuk Tribe's Department of Natural Resources have nevertheless leveraged watershed governance forums to advocate for ecological restoration and cultural revitalization in their ancestral territory over the last decade.

For many Karuk people I spoke with, knowledge cannot easily be separated from everyday resource management practices or ceremonial practices of "world renewal" (Ch 1). Knowledge is created through ongoing relationships among people in relation to place and maintained through ongoing ceremonial duties to steward those places. Part of the reason why collaborative watershed management forums did not incorporate traditional knowledge well was that Karuk indigenous

knowledge cannot easily be separated from particular activities in particular locations and the particular groups of people associated with those places and activities. Putting knowledge on paper or on a map means taking knowledge out of context for many tribal members. Knowledge is seen as so intimately connected to place and to practice that it can't be abstracted and circulated like data points in dominant modes of knowledge production. According to Bill Tripp:

“When information is exchanged orally, it's through interpersonal communication and you know where it's going. When knowledge is on a map or a piece of paper, it's out there and can be taken in any direction. You need to consult with people, not with maps, plans or pieces of paper. TEK is dynamic and needs to remain this way. You can't confine it; it's cumulative and dynamic. It's constantly changing, being retold and reshaped.”

For many Karuk tribal members, knowledge must be told to particular people in particular places and under particular circumstances. An unwillingness to put knowledge on paper or share knowledge in public forums must not be seen as evidence that there is no knowledge to share, just that the document or forum is not the proper place to share it. According to some critiques, the process by which the USFS attempts to identify Karuk knowledge reinforces its political and epistemic dominance. Another quote, by Ron Reed, Karuk cultural biologist, also explains the ways in which the Tribe's knowledge can be extracted in improper ways, without benefit for the Tribe:

“We aren't allowed to detach our knowledge from place- we aren't allowed to put it on paper, in articles or in maps, with a guilt-free conscious. When we do share our knowledge, we need to know where it's going and what's coming back to us. Those who use our TEK need to recognize it, empower the tribe and stimulate our local economic development.”

Though Karuk scientists and USFS scientists both see the forest for its watersheds, the way they produce and communicate knowledge about watershed processes and relate to watershed ecosystems on a cultural or metaphysical level as well as through everyday knowledge-making and livelihood practices are incredibly different. In addition to the Salmon WA, the following example of collaboration on monitoring project serves as another example of unsuccessful translation between these two very different social worlds.

Around 1996, the Karuk Fisheries department and the USFS collaborated on a watershed and ecosystem joint monitoring program<sup>838</sup>. They decided to use the Pacific Giant Salamander (*Dicamptodon tenebrosus*) as an indicator of surface water quality. In the Karuk Tribe's stories and traditional resource management practices, the presence of the Giant Pacific Salamander, or “*pu'f-puuf*”, is an

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<sup>838</sup> See Hillman, Leaf & John F. Salter. Environmental Management: American Indian Knowledge & The Problem of Sustainability. *Forests, Trees and People Newsletter*, FAO: 1997.

indicator of good water quality. For aquatic ecologists, the use of amphibians such as salamanders as ecosystem indicators, or proxies of certain water quality conditions that need to be in place to support that organism and its food webs, is well-substantiated in the scientific literature<sup>839</sup>. The Salamander seemed like a perfect “boundary object” to translate between their two social worlds and coordinate ecosystem restoration and monitoring. However, the initiative broke down at a metaphysical impasse- the Tribe was insistent that the Salamander was itself an actor or an agent in creating or maintaining clean water, while for the USFS biologists, the Salamander could only serve as an indicator of the presence of particular habitat conditions. For Karuk scientists, for whom plants and animals are considered “relations”, knowledgeable agents and strategic partners in “world renewal” and eco-cultural revitalization, this denial of the Salamanders’ agency was considered offensive. It was seen as symptomatic of a “single-species” oriented view of management, rather than an approach to managing watershed-ecosystems as lively webs of interacting agents. The joint monitoring project broke down as a result of these divergences in ontologies of the watershed and its non-human inhabitants.

Karuk scientists I spoke with also pointed to instances in which Karuk knowledge had been shared with agencies and even used by those agencies, but in the wrong way, without proper credit given, or without attendant resources channeled back to those who shared their knowledge. For example, in the Orleans Community Fuels Reduction project, the USFS, the Tribe and the local watershed councils had planned strategic fuels treatments along a road near a Karuk sacred site and trail system. Though the tribe had consulted with the USFS in the planning phase, they were completely left out of the project implementation phase. The USFS project crew, while citing their collaborative efforts, yet not consulting with tribal representatives, ended up burning directly through a Karuk medicine trail and setting collaborative efforts back for years. According to a representative of the local watershed council: “The OCFR was an example of collaboration gone wrong. After that incident, collaboration became a four-letter word around here.” According to a Tribal member I spoke with:

“OCFR led to a serious lack of trust between the tribe and USFS around collaboration. People do want to enhance cultural resources and see restoration but there are major barriers. By sitting at the table with them we sanction them to say ‘we listened and now we’ll do what we want anyway’. To exclude us in good conscious- it leads to a breach of trust in the community.”

Such incidents made Tribal members wary of sharing their knowledge with natural resource management agencies. These incidents also soured the local community on collaborating with the USFS. According to Ron Reed, through

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<sup>839</sup> See Karuk Tribe Water Quality Assessment Report (305(b)) 2001; Mason, C.F. 1991. Biology of Freshwater Pollution. Second Edition. Longman Scientific & Technical. New York .

collaboration and sharing knowledge, “there was a transfer of knowledge and expertise to environmental groups and agencies, without a flow of benefits back to the tribe. We need to ask, who is benefiting from us sharing our knowledge?” Reed pointed to both the opportunities and dangers inherent in the recent wave of attention being paid to traditional knowledge:

“The only way to perpetuate our culture is getting TEK integrated into the local curriculum, but we don’t want TEK to become another tool of appropriation. How can we develop a process to prevent cultural appropriation of our knowledge? How do we protect our knowledge sovereignty while building our capacity for gathering cultural information and disseminating it? We need self-determination over the utilization of traditional knowledge; we need self-determination over knowledge. Knowledge of natural resources *must* be tied to capacity building and empowerment of our community...We don’t mind sharing our knowledge, we just need to make sure the benefits go back to us and establish us in this landscape.”

Adele Clarke’s concept of a “boundary world”, intended as a critique of the concept of a “boundary object,” is actually a better metaphor for the ways in which the watershed becomes the site of negotiation between different epistemic cultures in the Klamath. A *boundary world* is an arena of contestation in which a line of scientific work becomes contested terrain and “multiple actors seek to control, direct or even destroy it”<sup>840</sup>. These “boundary worlds” are the terrain over and through which multiple actors “pitch their battles and negotiate their treaties”<sup>841</sup>. In moments such as the Salmon Watershed Analysis, we see how the watershed is contested as a space of knowledge-making and governance. Through the watershed, there was achieved no consensus or closure- only more or less “successful or unsuccessful negotiations among those involved at any historical moment”<sup>842</sup>.

Karuk critiques of the watershed as a way of conceptualizing and managing Klamath eco-cultural landscapes, however, did not signal a death of the watershed as a unit of environmental governance in the Klamath. As next section shows, despite the widespread critiques of the appropriateness of the watershed as a unit of eco-cultural revitalization, the watershed has been leveraged by Tribal members to guide knowledge-making and resource governance in a number of regulatory policy arenas over the last decade. Next chapter (Ch 5) explores attempts of KDNR and local allies to expand the scales of ecological democracy beyond the fixed scale of the drainage basin over the last decade.

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<sup>840</sup> Clarke, Adele E. "Controversy and the development of reproductive sciences." *Social Problems* 37.1 (1990): 18-37. p 30; cf Star and Greisemer 1989.

<sup>841</sup> Clarke 1990, pg 30.

<sup>842</sup> *Ibid*, p 31.

### **13. Klamath watershed democracy over the last 10 years**

After the Klamath Fisheries Task Force expired in 2006 and was not renewed, it left a vacuum for collaborative resource governance and ecosystem restoration. While numerous State, Federal and local agencies continued the watershed-scale approach to collaborative resource management, there was no coordinating body to take over the Task Force's central role. This section surveys three areas in which the Karuk tribe has participated in what has become of collaborative watershed governance in the wake of the Task Force across three different domains of watershed governance: local watershed councils, the Clean Water Act TMDL listing and implementation process and the Federal Energy Regulatory Commission's dam relicensing process. In each forum, the watershed was both leveraged and contested as a scale of knowledge production and resource governance by Karuk scientists and representatives. Even while participating in the "boundary worlds" of collaborative watershed governance forums, Karuk scientists continued to both challenge and elaborate the watershed as a socio-spatial unit for managing and restoring ecosystems in their ancestral territory.

As a result of these critiques of the appropriateness of the watershed in representing people and place, Karuk scientists and representatives began seeking out other scales of knowledge generation and resource governance. Next chapter explores firesheds and foodsheds as emerging scales of democratic environmental governance in the Klamath that both challenge watershed-centrism and elaborate watershed science and governance according to the specificities of place. However, even while exploring other scales of eco-cultural revitalization, the Karuk Tribe has continued to engage in watershed-based management. My argument is not that the watershed has been abandoned as a site of democratic environmental governance, only that it is no longer relied upon as the *primary* site of collaborative knowledge production and integrated resource governance in the Klamath. As will be demonstrated next chapter, other emerging scales of governance such as the fireshed and foodshed are designed to provide more place-specific perspectives on the connections between social, ecological and hydrologic processes in the Klamath. However, they are not designed to replace watersheds as resource management units, but rather to work in connection with watersheds through a multi-scalar approach to democratic environmental governance in the Klamath.

#### **a. Watershed Councils**

The Salmon River Restoration Council was formed out of the Salmon River Concerned Citizens after receiving funding from a private family foundation and gaining State recognition as a watershed council in 1992<sup>843</sup>. Since their founding, the Council has been receiving grants, conducting watershed surveys, leading workshops, teaching at local schools and co-authoring restoration and management plans for the Salmon watershed alongside State, Federal and Tribal

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<sup>843</sup> The Council became a 501 (c)(3) non-profit corporation in 1995.

agencies<sup>844</sup>. The Mid-Klamath Watershed Council was formed in 2001, initially as an outgrowth of the Karuk Tribe's natural resource programs. The director of the Karuk Natural Resources Department tasked non-tribal affiliates with starting the mid-Klamath Watershed Council to be eligible for Task Force funds for Sub-basin planning. The vision behind MKWC was that it would be an independent community-based group working towards Tribal eco-cultural restoration goals. Tribal members became board members and were hired as MKWC staff. According to a MKWC representative I spoke with:

“There is a direct linkage between the Tribe and MKWC on the board and staff and a recognition that we can make a larger political block if we have a larger network aligned across our communities. Our Board contains hippies, loggers, tribal folks- a blend of local voices that defines how we grow, what our priorities are. It is a central pivot in our community relations.”

As will be seen the discussions in Chapter 6 about groundwater governance in the Scott Basin, the Karuk DNR has a more tenuous relationship with the Scott River Watershed Council, based in a drainage just upstream from Karuk aboriginal territory. During the explosion of support for watershed collaboratives in the 1990s (see Ch 2), all of the watershed councils in the Klamath received a substantial amount of support from the Klamath Fisheries Task Force, Federal Agencies such as the EPA and Fish and Wildlife Service, and the State Water Boards.

The Klamath Fisheries Task Force's Long Range Plan was eventually issued in 1991 and ended up authorizing and directing nearly all of the \$40 million promised to restoration projects in the Klamath over the course of 20 years. Both of the watershed councils and the Karuk Department of Natural Resources got funds to conduct monitoring, planning and restoration activities in the Salmon. With the funds, the Salmon River Restoration Council (SRRC) was able to pioneer community-based monitoring and restoration planning strategies. Beginning in 1994, the SRRC held a series of workshops through which they developed a “Long-Range Community Action Plan” which “prioritized and directed efforts to best accommodate watershed and fisheries recovery”<sup>845</sup>. The plan was updated in 1999 and became the Salmon River Community Restoration Program, which was coordinated with the US FWS and CA DFG to create the Salmon Sub-Basin Restoration Planning activities in 2002. This gave the community-generated

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<sup>844</sup> See e.g. Salmon River Restoration Council. *Report to the Salmon River Community Restoration Program*. 1997. Klamath River Fisheries Restoration Program, US Fish and Wildlife Service; Salmon River Restoration Council. *Community Restoration Plan*. August, 2000; Salmon River Restoration Council. *Salmon River Noxious Weed Control Program and Management Strategy for Restoring Native Plant Communities*. 2002; Salmon River Restoration Council. *Trends and Changes* Newsletter, Spring 2011; *Aquatic Communities* Spring/Summer 2010; *Salmon River Community Wildfire Protection Plan*. Oct. 30, 2007.

<sup>845</sup> Salmon River Restoration Council. Long-range Community Action Plan. 1994.

restoration plans “official, but non-binding” status in the eyes of State, and Federal agencies<sup>846</sup>.

Over the past 20 years the SRRC held workshops and educational events such as the Salmon River Learning and Understanding Group (SLUG), an informal gathering of landowners interested in local watershed issues<sup>847</sup>. They coordinated community-based surveys across the entire Salmon watershed, including Coho and Salmon habitat surveys, upslope vegetation mapping, wildfire and “fired” analysis, fish harvests and water quality, quantity and temperature measurements. Since the late 1970s, for every Spring and Fall Salmon run, SRRC has mobilized volunteers in Salmon population surveys and carcass counts. For the Salmon dives, the volunteers have to put on wetsuits and dive into the frigid water from early in the morning until late in the day<sup>848</sup>. I had the opportunity to participate in the 2013 spring Chinook dives. Each new participant was encouraged to take an instruction course, whereby we were trained to spot differences between Coho, Chinook and steelhead, learn about their behavior and how to identify certain habitat characteristics. Then we split up into teams and scoured every reach of the 500,000-acre watershed. It was not easy work, involving swimming upstream against strong currents and periodically getting tossed over sharp boulders. It is also difficult to spot and identify fish as they attempt to dart out of sight. However, with heads under water, eye-to-eye with the salmon and the stream, hundreds of people systematically surveyed every reach of the stream systems of the Salmon watershed.

The “spring dives” somehow motivate a crowd of volunteers every year and has actually escalated and become a local spectacle over the years. In addition to generating the most detailed data on Spring Coho populations available, this event convenes the local community and their allies from all over the State around generating knowledge about the Salmon watershed and its threatened Salmonid populations. The local watershed councils’ ability to enroll the local landowners, students and Americorp and CCC volunteers in restoration projects in incredible, totaling nearly 100,000 hours of volunteer watershed restoration activities<sup>849</sup>. That

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<sup>846</sup> See e.g. Salmon River Subbasin Restoration Strategy: Steps to Recovery and Conservation of Aquatic Resources. Watershed Restoration Strategy Co-Authored by USFS (Don Elder, Brenda Olson, Alan Olson) and SRRC (Jim Villeponteaux, Peter Brucker) for The Klamath River Basin Fisheries Restoration Task Force. September 25, 2002.

<sup>847</sup> See SRRC. *Salmon River Restoration Council 1992-2012 Accomplishments Report: 20 Years of Restoration Accomplishments*. April, 2013.

<sup>848</sup> See e.g. SRRC. *Klamath River Basin Spring Chinook Salmon Spawner Escapement, River Harvest and Run-size Estimates 1980-2014*; SRRC. *Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates: 1978-2013*.

<sup>849</sup> For example, in 1999, alone, there were over 188 volunteer days, with 791.75 person days, valued as an “community in-kind service contribution” at \$74,699.00. “To date, the SRRC has sponsored more than 1,200 restoration related workshops, workdays, and field trips. Community members, staff, technical specialists, and others have contributed over 9,962 volunteer days (79,700 hours) to watershed restoration activities”. See: <http://srrc.org/aboutus/index.php>. Last Visited 6/01/14.

watershed councils have become major players in Klamath watershed-ecosystem restoration and resource management policy should not be seen as an example of privatization or “neoliberal governance” guided by markets and furthering the accumulation of capital<sup>850</sup>. Both groups are registered as non-profits and are community and place-driven organizations. MKWC and SRRC have been major players in ecosystem restoration roles both as a result of strategic relationships with Federal, State and Tribal agencies and because of their ability to work with private landowners and their legitimacy in the eyes of the local community. According to a Federal agency fisheries biologist, “watershed councils are the bridge between communities and agencies. They really speak to what people care about and translate it to us”. However, MKWC and SRRC are also small, low-budget non-profits that rely heavily on volunteer labor are not resourced to be able to take over the job of managing millions of acres of watershed-ecosystems.

Though they don’t always see eye-to-eye with their tribal partners, MKWC and SRRC have maintained strong relationships with the Karuk Department of Natural Resources. They collaborate on the planning, implementation and monitoring of watershed restoration projects. Many Karuk tribal members work with or are on the boards of both watershed councils. Many Karuk youth attend workshops, events and summer camps through the watershed councils. The alliance formed between the watershed councils and the Karuk Department of Natural Resources has created a formidable alliance in Klamath watershed governance. Commenting on the relationship between MKWC and KDNR fisheries, a MKWC representative remarked:

“Our fisheries programs are intricately intertwined. We are constantly working towards sharing liability, sharing power, funding and data - our relationship is constantly evolving. Our goal is to see the Tribe establish co-management of National Forest lands... We want to show that the disempowerment of Karuk people is taking away from ecosystem resilience and that the only way forward is through collaboration.”

Tribes, environmental groups and the local community acting in concert in producing knowledge and implementing restoration plans has significantly shifted the balance of power in the mid-Klamath and Salmon Basins away from Federal and State agency expert-dominated processes towards a more community-oriented approach to knowing and governing watersheds.

The next two sections analyze two regulatory processes, the Clean Water Act’s TMDL process and the Federal Energy Regulatory Commission’s dam

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<sup>850</sup> See e.g. Heynen, Nik, et al., eds. *Neoliberal environments: false promises and unnatural consequences*. Routledge, 2007; Heynen, Nik, and Paul Robbins. "The neoliberalization of nature: Governance, privatization, enclosure and valuation." *Capitalism Nature Socialism* 16.1 (2005): 5-8; Castree, Noel. "Neoliberalising nature: the logics of deregulation and reregulation." *Environment and planning. A* 40.1 (2008): 131; Bakker, Karen. "The limits of 'neoliberal natures': Debating green neoliberalism." *Progress in Human Geography* 34.6 (2010): 715-735.



relicensing process, to demonstrate the ways in which State and Federal approaches to managing watersheds have been both leveraged and challenged by Karuk scientists and representatives. Though alliances between watershed councils, tribes and environmental groups have strengthened over the years, the watershed approach to collaboratively managing resources has been challenged on all sides. As will be explained next chapter, both watershed councils have expanded over the last decade into fire management and have since created “fire safe councils” and have focused on managing fire across the landscape through collaboratively defined “firesheds”.

**b. TMDL/ Cultural Beneficial use**

In June, 2003, the North Coast Regional Quality Control Board, the State organization responsible for carrying out the Clean Water Act, amended the “beneficial uses” section of their Water Quality Control Plan to include a “Native American Culture” (CUL) category of protected water use. This amendment came out of negotiations conducted between the US Environmental Protection Agency, the State Water Board and the Klamath River Inter-Tribal Fish and Water Council to identify cultural and traditional uses of water and implement the Clean Water Act in Tribal water bodies in a culturally appropriate way. For water bodies in Karuk ancestral territory, Native American Culture (CUL) was identified as a beneficial use for both the Salmon River and the Klamath Mainstem, and a number of cultural, ceremonial, and subsistence water use sites were identified in the Karuk Ancestral territory. This category was approved solely for the North Coast region to protect “uses of water that support the cultural and/or traditional rights of indigenous people such as subsistence fishing, basket weaving and jewelry material collection, navigation to traditional ceremonial locations, and ceremonial uses”<sup>851</sup>.

In their determination of the extent of “Native American Cultural water use” in Karuk water bodies, the Regional Water Board considered all “traditional” Karuk ceremonial and cultural practices that involved water use either directly or indirectly<sup>852</sup>. Indirect uses of water for cultural resources such as subsistence fishing, basketry, and traditional foods and medicines were considered and the amount of time Karuk spent in contact with the water while wading, boating, fishing, and preparing foods was calculated. In addition, the Board considered ceremonial practices such as bathing and ingestion that required Karuk to be in contact with the water. Ceremonial bathing in the Klamath or its tributaries is seen as an important component of most ceremonies. For example, bathing is associated with funerary rites in preparation for burial and after burial for purification<sup>853</sup>. Another example given was the ritual whereby the Medicine Man ingests water

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<sup>851</sup> California State Water Board Resolution 68-16, 2.2 “Beneficial Use Definitions”, 2007.

<sup>852</sup> State Water Resources Control Board Meeting Session. “Consideration of a resolution approving and remanding a portion of an amendment to the water quality control plan for the North Coast region to incorporate revised beneficial uses.” Division of Water Quality, June 17, 2004.

<sup>853</sup> NCRWQCB 2007, citing Curtis 1924; Sloan 2003, p.28.

from the river at the end of his fourteen-mile walk as part of the world-renewal ceremony<sup>854</sup>.

Based upon interviews with Tribal Representatives, the Water Board identified the seasonality and total amount of physical contact with the water that was entailed in each of these “cultural” activities. They then calculated the accompanying risk of exposure to toxic substances and determined that the Native American Cultural uses of the Klamath and Salmon Rivers were not being supported by related water quality conditions. The water board and the Tribe then determined temperature, nutrients, and dissolved oxygen as the main factors contributing to impaired use an action plan to remedy the conditions. Temperature, DO, pH, conductivity, phosphorous, and nitrogen were selected as parameters to be measured to determine the support of these Cultural Beneficial uses.

The inclusion of Cultural Beneficial Uses was considered a major victory by the Tribe and its allies at the time. However, though the Klamath and Salmon rivers are both listed as impaired, there is no clear enforcement mechanism attached to the TMDL implementation program. Though the Regional water board monitors progress towards achieving TMDL goals, they typically do not penalize water users for not meeting maximum load goals. Local organizations like River Keeper, the Karuk Department of Natural Resource and the watershed councils are left with the task of moving their watershed communities towards the Federally mandated targets.

### ***c. FERC dam-relicensing process***

After the water wars and fish kills of the early 2000s, Basin-wide political processes shifted their attention to the relicensing of the Klamath dams. In 2006, the same year the Task Force was disbanded, the licenses of 5 out of 7 of the Klamath’s dams went up for renewal. Frustrated with outcomes in formal channels such as courts and regulatory hearings, many tribal members took to grassroots measures to voice their grievances. For example, Karuk tribal members traveled to the shareholder meetings of companies that owned the Klamath Dams, Berkshire Hathaway in Nebraska and Scottish Power in Scotland<sup>855</sup>. They picketed outside meetings, disrupted sessions and famously cooked Salmon for any who wanted a taste of the species their “asset” was putting at risk of extinction. In addition to exploring informal channels of political demonstration, Karuk scientists and representatives continued to participate in the regulatory hearings associated with dam relicensing.

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<sup>854</sup> *Ibid.*

<sup>855</sup> See e.g. Karuk Tribe Press Release, May 5, 2008. “Klamath River Tribes and Fishermen Declare Mission Accomplished Groups succeed in disrupting Warren Buffett’s Woodstock of Capitalism”; BBC News, UK, Scotland. “Native Americans fight power firm”, 23 Jul 04; BBC News, UK, Scotland. “Tribe chiefs battle utility giant” 09 Jul 04; BBC News, UK, Scotland . “Tribes Continue Power firm fight”; Jul 22 04.

As part of the Environmental Impact Statement for dam relicensing, the Klamath River Intertribal Fish and Water Commission submitted a document titled “First Salmon: The Klamath Cultural Riverscape and the Klamath River Hydroelectric Project” on behalf of the Yurok, Karuk, Hoopa, Shasta tribes<sup>856</sup>. The document frames the river as a “cultural riverscape” and details the cultural practices through which the indigenous communities of the Klamath relate to the river. It lays out a wealth of ethnographic material and interviews with elders to show that the “Klamath river is a deeply significant cultural resource whose health is critical to the lives and cultures of the Klamath tribes”<sup>857</sup>.

Framing the Klamath as a “cultural riverscape” makes the claim that it “traditional cultural property” and thus eligible for nomination in the National register of historic places, meaning that FERC has to consider impacts of its dam operations on indigenous people’s relation to the river. The report details cumulative adverse damage caused by the hydroelectric project, such as alterations in water quality, flow regimes and temperature that effects fish, plant life, habitat and human use of the river. Citing a wealth of ethnographic, hydrologic and water quality data, the report claimed that “the effects of the dams damage tribal use of and relationships to the riverscape and diminish its cultural integrity”<sup>858</sup>.

According to cultural biologist, Ron Reed, a turning point in dam-removal negotiations was a publication of a study by sociologist Kari Norgaard (2005) on the cultural, socio-economic and public health impacts of denied access to salmon among Karuk tribal members<sup>859</sup>. Noorgard’s report demonstrated the links between dams, declining salmon runs, restricted access to Salmon in local diets and increased rates of hypertension, diabetes and other diet-related illnesses among Kruk Tribal members. According to Reed:

“During FERC relicensing when Kari’s denied access report was validated by FERC- this was a major turning point in relations. The parent company then had to address all of the accusations in that document. We got a lot of press for that article- it ended up in the (Washington) Post and everything. Before, when I would speak, everyone would drop their pens and look away. People weren’t trained to listen to me. They were trained to ignore me and only pay attention to what their western education told them was important. Then after the report came out, everyone started to listen, even the most skeptical folks. I got instant credibility after that. Then I’m hearing ‘So what’s upslope management you’ve been talking about?’ After that, the conversation changed.”

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<sup>856</sup> King, T. F. "First salmon: the Klamath cultural riverscape and the Klamath River hydroelectric project." *Klamath River Intertribal Fish and Water Commission, Hoopa, California* (2004).

<sup>857</sup> Ibid, p. 2.

<sup>858</sup> Ibid, p. 37.

<sup>859</sup> Norgaard, K. "The effects of altered diet on the health of the Karuk people: A preliminary report." *Unpublished report to the Karuk Tribe of California, Department of Natural Resources Water Quality Program, Siskiyou County, Calif: 2005.*

The “Cultural Riverscape report”, along with the “Altered Diet report”, endangered species suits and protests at the hydropower company’s shareholder meetings put significant public and legal pressure on Pacficorp to reconsider their operations. In response to the protests at shareholders’ meetings, the “Cultural Riverscape” document and the “Altered Diet” report, FERC and the dam owners began to change their tune on dam relicensing. FERC determined that it would actually be cheaper and in the rate-payers’ best interests to take down the Klamath dams rather than remodel them to comply with all of the required modifications to meet environmental standards<sup>860</sup>. In 2008, the Governors of California and Oregon, numerous line-officers of Federal and State agencies, all of the Klamath Tribes except the Hoopa and numerous environmental groups signed what was at the time (and still is) the largest dam removal agreement in history<sup>861</sup>. As he signed the agreement, then Governor Schwarzenegger remarked, in character: “Its time to say *hasta la vista* to the Klamath dams... I can see already the salmon are screaming, ‘I’ll be back’”<sup>862</sup>.

In 2014, after a long study on the socio-economic, ecological and legal dimensions of dam removal, then Secretary of the Interior Ken Salazar decided that dam removal was in the public’s best interest<sup>863</sup>. He therefore recommended dam removal to the people of the United States. Legislation was introduced in the US Senate in December 2014<sup>864</sup>. If it is carried to completion, it would be the largest dam removal to date in the United States<sup>865</sup>.

#### **14. Conclusion: Watersheds, Scale and Sovereignty**

The movement towards watershed-based governance was, like the county boundaries of early California, the outcome of political negotiations, knowledge conflicts and struggles over access to resources whose compromises provisionally stabilized along drainage boundaries. Following the history of watershed governance in the Salmon and mid-Klamath Basins, scientific understanding of

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<sup>860</sup> See e.g. Gosnell, Hannah, and Erin Clover Kelly. "Peace on the river? Social-ecological restoration and large dam removal in the Klamath basin, USA." *Water Alternatives* 3.2 (2010): 361-383; Oregon Public Utilities Commission Rate Case No. UE-219; Oregon Public Utilities Commission Order No. 10-364; Tucker, Craig et al Press Release. "It’s Official: Removing Klamath Dams Saves Money For Power Customers Oregon Public Utilities Commission Rules That Dam Removal Under Terms Of The Klamath Agreements Is In Ratepayers’ Best Interest", American Rivers, September 17th, 2010.

<sup>861</sup> For full text of the Klamath Settlement Agreements, <http://www.klamathrestoration.org>, last visited 6/20/15; See also Allen, David N. "Klamath Hydroelectric Settlement Agreement: Federal Law, Local Compromise, and the Largest Dam Removal Project in History, The." *Hastings W.-Nw. J. Env’t’l L. & Pol’y* 16 (2010): 427.

<sup>862</sup> See California State website for coverage: “Governor Schwarzenegger Signs Historic Klamath River Agreements”, <http://gov.ca.gov/news.php?id=14473>, last visited 6/20/14.

<sup>863</sup> US Department of the Interior and California Department of Fish and Game. *Klamath Facilities Removal Environmental Impact Statement/ Environmental Impact Report* (EIS/EIR), December 2012.

<sup>864</sup> Klamath Basin Klamath Basin Water Recovery and Economic Restoration Act of 2014 (S.R. 2379).

<sup>865</sup> Allen 2010.

watersheds and the uptake of watershed knowledge into policy did *not* follow a neat linear progression through successive phases, with more accurate scientific representations of Klamath biophysical processes gradually aligning resource management institutions with the watershed as a primary scale of resource governance. More inclusive science and more accurate understandings of watershed processes did not magically guide the evolution of institutions to more “resilient” states adaptive to the dynamics of local processes and aligned with their “natural” boundaries.

Each time the watershed was recruited to guide resource management, both watershed science and the watershed as a scale of governance were contested by numerous coalitions of actors attempting to access resources and influence the distribution of resource benefits and burdens. Each wave of conflict, from McKee’s treaty making journey to the drawing of county boundaries, the citing and removal of dams to the planning of ecosystem restoration animated the watershed as an arena of political deliberation as it sought closure to knowledge and resource conflict through collaboration in knowledge production and decision-making at the watershed scale. Each configuration of watershed-based governance structures a range of inclusions and exclusions that determine who is allowed to influence knowledge production, decision-making and policy-making. These exclusions/inclusions are both politically and ecologically constitutive- in determining whose knowledge and values matter in designing environmental policy, they embed particular sets of values and politics in the material conditions and dynamics of watershed ecosystems, which in turn shapes patterns of resource access and the distribution of resource benefits and burdens.

Beginning in the mid 1980s, the watershed became a primary arena through which issues of sovereignty, representation, property, justice and cultural difference were worked out in the Klamath. The fact that the Karuk Tribe, the Forest Service, the Regional and State Water Boards, FERC, NMFS and many community organizations converged on the watershed beginning in 1986 should not be seen as evidence that the watershed is, in the words of Donald Worster, the “natural home of democracy”<sup>866</sup>. Numerous factors forced Federal, Tribal and local priorities to converge on the watershed in the Klamath during the “third wave” of democracy. From this mangle of cultural politics, the watershed emerged as the primary unit of conflict resolution, ecosystem restoration, integrated water management and social learning from the mid 1980s through the first decade of the 21<sup>st</sup> century. Numerous resource management institutions, such as USFS, US FWS, BoR, FERC, NOAA fisheries, State Water Boards, Tribal Natural Resource Departments and environmental NGOs all deployed the watershed as they attempted to resolve issues such as depletion of fisheries, spotted owl habitat degradation, dam removal and water quality issues.

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<sup>866</sup> Worster, Donald. *Watershed Democracy: Recovering the Lost Vision of John Wesley Powell*. 23 *J. Land Resources & Envtl. L.* 57 (2003) See Ch 1 for extended discussion on Powell’s concept of “riverbasin commonwealths” and Worster’s concept of “watershed democracy”.

Overall, collaborative watershed-based governance represents a significant departure from the style of top-down, centralized resource management that characterized Klamath environmental governance until the mid-late 1980s. Collaborative watershed governance institutions provided Karuk representatives and Tribal members unprecedented opportunities for formal participation in Western knowledge production and resource management processes. However, collaborative watershed forums also provoked debates about what constitutes credible knowledge of watershed processes and who has the authority to represent the values and interests attached to watershed resources. Ontologies and epistemologies of the watershed were both leveraged and challenged by Karuk representatives. As we saw in the Karuk's critique of the USFS Salmon River Watershed Analysis, Karuk indigenous knowledge can't easily be separated from livelihood, ceremony or place. In some cases, such as with the giant Pacific salamander, even apparent overlaps in epistemology and ontology can cover-up deep metaphysical fissures between knowledge-making communities. In other instances where Karuk watershed knowledge is shared such as in the OCFR fuels treatment, benefits such as jobs or access to resources do not accrue to those who share their knowledge.

The quote below from Ron Reed expresses frustration with collaborative environmental governance on many levels:

"A 3 minute time card? This is collaborative management? I drove 5 hours for 3 minutes? I need more than a 3 minute time card. How do I tell the history of genocide, boarding school, denied access to cultural foods and intergenerational trauma in 3 minutes? To make things fair we need to address 150 years of colonialism and injustice, but people don't feel comfortable telling these personal stories in public settings. People don't want to revisit this trauma."

Reed conveys a similar frustration with regards to the watershed-scale approach to environmental management:

"You can't just drop management zones down on us. It has to be about what's important to us in each place, based on ancestral management areas. You need to understand the landscape and the history that ties it into where we're at now."

This quote from Bill Tripp sums nicely the many reasons why watersheds do not provide an appropriate scale for Karuk eco-cultural revitalization:

"Tribal issues are not well captured at the watershed scale. It misses ecological and social dynamics that are important to us. Integrated management should not be constrained by the watershed- it limits the management perspective. You have to look both smaller, within watersheds, as well as at connectivities across the landscape...You have to look at the

diversity dynamics and variety within a watershed and the key cultural values inside and across these drainages. You have to open up the BpS (biophysical setting) and look at understory dynamics, different elevation bands and variation within a band... Including other scales will allow you to look at multiple cultural and ecological processes and better address all our needs related to fire, food security, local economic capacity- it's all tied together. We need new scales of management that are symbiotic with the tribal perspective. We need to make practices applicable across our whole territory, not just confined to particular watersheds. The scale of management is also a political scale; it's all about sovereignty. "

In addition to an epistemological and ontological critique of the watershed's ability to capture both local biophysical dynamics and cultural resource values, Tripp expressly points to the political dimensions of scalar processes. Tripp and Reed's critiques of watershed-centric governance demonstrate the complex ways in which the watershed structures the scalar perspective of collaborative natural resource management in such a way as to exclude important tribal perspectives on place and thereby diminish Tribal sovereignty.

Through knowledge conflicts in collaborative watershed forums, the representativeness of the watershed was called into question. On one hand, the watershed's representativeness as a spatial formation was called into question for its inability to register local biophysical dynamics such as fire movement, wildlife habitat and patterns of soil-vegetation association. The watershed's representativeness as an institutional formation was also called into question due to the inability of watershed-based deliberative bodies and assemblies to speak for the knowledges and values of their constituents. The next chapter details the attempts of Karuk scientists and representatives to shift the scales of community-based resource governance beyond the watershed in order to define units of knowledge-production and governance more in-line with tribal perspectives and management approaches.

## Chapter 5

### ***Watersheds, Firesheds, Foodsheds:***

*towards multiscalar epistemologies and ontologies for ecological democracy*

#### **1. Sheds and Scapes: technologies of vision**

In this chapter, I compare watersheds, firesheds and foodsheds as different approaches to grounding democratic environmental governance in the social and ecological particulars of place in the Klamath. Comparing these three units of resource management opens up the question of scale in collaborative environmental governance by way of highlighting tensions among different ways of seeing, representing and living in Klamath watershed ecosystems. *Firesheds* are emerging areas of community-based fire management patterned according to the way fire burns across the western Klamath landscape. *Foodsheds* are another emerging unit of community-based resource governance taking shape in the Klamath around the spatial and temporal characteristics of food resources and their associated management practices in forest ecosystems. Like watersheds, firesheds and foodsheds are simultaneously spaces of knowledge generation, resource governance and collective action shaped around the specific biophysical and social processes of the Klamath. Each is a composite socio-natural formation built through resource conflict, technoscientific networks, everyday livelihood practices and material-semiotic relations between humans, nonhumans and the watershed-ecosystems they constitute and inhabit. In this chapter, I examine the flows of epistemic and political power through each space of governance and the implications of each for Karuk sovereignty, territory, resource-access and political and cultural self-determination. Following my community partners engage the more-than-human at multiple nested scales opens up new understandings of Klamath eco-cultural landscapes and new possibilities for democratic environmental governance. By comparing watersheds with firesheds and foodsheds, I argue that multiscalar perspectives can provide more inclusive grounds for community-based resource governance and multispecies world-making in the Klamath.

The etymology of the English word “shed” takes us through the layers of meaning that drive the operation of the concept<sup>867</sup>. In old English and middle English, (c950-1703), the term “*shaēd*” first signified a general distinction or discrimination between two things<sup>868</sup>. The then common term “no sheds” simply meant “no difference”. Shed also referred colloquially to a parting in one’s hair, as expressed in the proverb “shame is past the shed of his head”, meaning that one had lost all sense of shame. The term shed was later applied (c1648) to a parting made in the wool of sheep and then to the wool that was sheared and cast-away. Beginning in the 16th century,

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<sup>867</sup> Thanks to Dr. John Hartigan, University of Texas, Austin for drawing my attention to the rich etymology of the word “shed” and encouraging me to think about the modes of discrimination made possible through this concept.

<sup>868</sup> Oxford English Dictionary, “shed, n.1”. l.v. 12/2014.



the term was applied to land, as in the “schedde of an hyll” (1530), to refer to a ridge dividing two valleys or tracts of land. Only beginning in the early 19th century (1803) was the term watershed used to distinguish between waters flowing into different river systems<sup>869</sup>.

As we saw in the last chapter, the English term *shed* was first put to work in the 19th Century in the Klamath marking distinctions in water flows, but only in the last decade has it been mobilized to make sense of the movements of fire across a landscape and render visible the spatiality of forest foods. Watersheds, firesheds and foodsheds attempt to mark meaningful distinctions across the Klamath eco-cultural landscape. Each *shed* is a material-semiotic composition that reveals and conceals specific sets of human-nature relations in order to pattern collective action around the materialities of the Klamath. As Blomley remarks in regards to landscapes, watersheds, firesheds and foodsheds are all both *sites*, as in specific places, and *sights*, as in views, vantage points, or “ways of seeing”; simultaneously descriptions of how we live in nature and prescriptions for how to live in nature<sup>870</sup>. To counter the “God-trick” of science, which alleges “a view of everywhere from nowhere”, Donna Haraway reminds us of the situatedness and partiality of all perspectives and the “unequal parts privilege and oppression that make up all positions” to show how all ways of seeing are both embodied and power-laden<sup>871</sup>. But through what kinds of processes and around what kind of coagulant can we bring together the vast array of partial perspectives and situated knowledges to make-up fuller, more adequate, richer, and better accounts of our worlds? Watersheds, firesheds, and foodsheds provide different templates for weaving together partial perspectives in the Klamath, each one bringing together different kinds of scientific, local, indigenous and farmer knowledges embedded in different world-views and attached to distinct livelihood practices. Each *shed* is an attempt of those living in and managing Klamath eco-cultural landscapes to bring together multiple situated knowledges around a particular set of resource concerns without flattening the diverse range of views into a single view of naturecultures.

As we saw in the last two chapters, the watershed was leveraged and contested by numerous groups in the Klamath as a “way of seeing” particular webs of ecological and social relations maintained by particular “flow-regimes”, or patterns in the timing, quantity and temperature of water flowing through Klamath watersheds. While this “way of seeing” drew attention to important links between upstream/upslope practices and in-stream/down-stream flow patterns, the ability of watershed-based science to represent local hydro-ecosystems and of watershed-based governance to represent the interests and values of basin residents was also called into question by numerous communities. To invoke the “cultural politics of scale” again here (see Chs 1, 3) would entail moving from seeing each *shed* as something fixed and given by nature to a more

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<sup>869</sup> The term “*watershed*” did not enter common usage until the later 19th century, as evidenced by the J Ogilvie imperial dictionary adding the term in 1882. Ogilvie, John. *The Imperial Dictionary, English, technological, and scientific, adapted to the present state of literature, science and art*. 1850.

<sup>870</sup> Blomley, Nicholas. “Landscapes of property.” *Law and Society Review* (1998): 567-612.

<sup>871</sup> Haraway, Donna. “Situated knowledges: The science question in feminism and the privilege of partial perspective.” *Feminist studies* (1988): 575-599.

dynamic understanding of scalar and socio-spatial practices that acknowledges the roles that power, politics and culture play in shaping the ways we see the world and make sense of it. As with watersheds, however, fireheds and foodsheds cannot be seen as mere “social constructions” or power-moves in a frictionless vacuum, but are rather the outcomes or the enactments of specific material engagements in a lively world. As Sneddon (2002, see Ch 3) demonstrates, scalar politics always articulate in dialogue with specific biophysical processes, or in his terms, “ecological constructions of scale”<sup>872</sup>. Or as Harris, Alatout and Budds and have argued (Ch 3), scalar politics take shape around embodied and emplaced performances that materialize patterns of water, power and resource flows alongside state imaginaries and social formations<sup>873</sup>. Scalar politics are simultaneously ontological politics, what Mario Blaser terms the “power-laden negotiations involved in bringing into being the entities that make up a particular world”<sup>874</sup>.

The literature on landscape is a good pivot point from which to launch this discussion of the tensions between partial perspectives and collective vision in scaling democratic environmental governance processes. As Cosgrove puts it, landscape raises important questions of *composition* in the representation of naturecultures: how are views of the relationships between social formations and landscapes composed, by and for whom, what elements are included and excluded, and how does it relate individuals to one another and to the material worlds they take part in?<sup>875</sup>. According to geographer Kenneth Olwig, the term “*scape*” derives from variations of the term “*to shape*”, and the term *landscape* originally referred in multiple European languages to an area of land shaped by a particular people and their institutions, laws and customs<sup>876</sup>. For example, the Danish term *landskab* referred to a land-bound polity that found concrete expression in a specific place, with the characteristics of the land reflecting the character of the polity that formed it. The term *landschaft* emerged in the English language at the turn of the 16th Century, at a time when tensions between “the Court and the Countryside” brought the question of legitimate political and scientific representation to a fore<sup>877</sup>.

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<sup>872</sup> Sneddon, Chris. "Water conflicts and river basins: the contradictions of comanagement and scale in Northeast Thailand." *Society & Natural Resources* 15.8 (2002): 725-741.

<sup>873</sup> Harris, Leila M., and Samer Alatout. "Negotiating hydro-scales, forging states: Comparison of the upper Tigris/Euphrates and Jordan River basins." *Political Geography* 29.3 (2010): 148-156; Budds, Jessica, and Leonith Hinojosa-Valencia. "Restructuring and rescaling water governance in mining contexts: the co-production of waterscapes in Peru." *Water Alternatives* 5.1 (2012): 119-137.

<sup>874</sup> Blaser, Mario. "Ontology and indigeneity: on the political ontology of heterogeneous assemblages." *cultural geographies* 21.1 (2014): 49-58.

<sup>875</sup> Cosgrove, Denis E. *Social formation and symbolic landscape*. 2nd ed. Madison: University of Wisconsin Press, 1998 (1984), p. 13.

<sup>876</sup> Olwig, Kenneth. *Landscape, nature, and the body politic: from Britain's renaissance to America's new world*. Univ of Wisconsin Press, 2002.

<sup>877</sup> As Olwig (2002) demonstrates, the *landschaft* concept was strategically usurped by the Stuart court to portray the island of Britain as a “landscape” united for the first time under James I. *Landskab* districts in Jutland (Denmark) had created separate bodies of law and forms of political representation based on their distinction as place-based polities. In order to neutralize what they perceived as the dangerous decentralizing tendencies of the *landschaft* concept and control this emerging form of representation, an elaborate masque was staged by architect Inigo Jones and

If landscape is a “way of seeing” relations between humans and nature, after the turn of the 17th century, it largely became a very “restrictive way of seeing that diminished alternative modes of experiencing our relations with nature”<sup>878</sup>. Landscape provides a way of seeing “from above” rendered through techniques whose histories are tightly entwined with the capitalist transformation of Europe<sup>879</sup>. The techniques of single-point perspective, landscape painting, cartography and landscape architecture gained prominence between the 15th and 19th century in Europe and the United States due to their ability to overlay visions of harmony between the human and natural worlds on-top of rapid changes in ecology, land tenure and livelihood practices<sup>880</sup>. For Raymond Williams, landscape lent the countryside the appearance of being unworked, such that the constant motion of social struggle could be suspended in both images of landscape and in the material landscape itself<sup>881</sup>. According to Don Mitchell, the view of the landscape always emerges from within relations of power that seek “an imposition of order in which one or perhaps a few dominant ways of seeing are substituted for all ways of seeing and experiencing”<sup>882</sup>. The ability to view a landscape seems to many scholars to require a certain amount of distance from any particular place and from the labor that materializes those particular places<sup>883</sup>.

Other scholars have maintained that, underneath the “ideology of sight, distance and separation” implicit in the landscape perspective, there remains room for an “inalienable experience of home, of life and of the rhythms of diurnal and seasonal life”<sup>884</sup>. Peter Jackson claims that “If landscape is a way of seeing, then there are potentially as many ways of seeing as there are eyes to see”<sup>885</sup>. Other scholars such as Donald Moore, Don Mitchell and WJ Mitchell have drawn attention to the polyvocality of landscape and the multiple struggles and everyday practices involved in producing material landscapes and their associated representations, performances and interpretations. Though Don Mitchell sees landscape as an ideological device “dripping with power”, he also argues that “contestatory readings” of landscapes are always possible, and that individuals and coalitions with varying degrees of power work continually “to reshape both the morphology and view that is landscape”<sup>886</sup>. Following Lefebvre, Mitchell argues that landscape is best figured as a “kind of produced, lived and represented space constructed out of the struggles, compromises, and temporarily settled relations of competing and cooperating social actors”<sup>887</sup>. Landscape is figured

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playwright Ben Jonson to perform the Isle of Britain as a unified landscape, a “natural body politic”, in order to quell tensions about the legitimacy of Stuart rule over the country.

<sup>878</sup> Cosgrove 1998, p. 269.

<sup>879</sup> Cosgrove 1998.

<sup>880</sup> *Ibid*; see also Mitchell, WJ Thomas. *Landscape and power*. University of Chicago Press, 2002.

<sup>881</sup> Mitchell, Don. *The lie of the land: Migrant workers and the California landscape*. University of Minnesota Press: 1996.

<sup>882</sup> Mitchell 1996.

<sup>883</sup> *Ibid*.

<sup>884</sup> Cosgrove 1998, p 213.

<sup>885</sup> Mitchell 1996, p 27.

<sup>886</sup> Mitchell 1996.

<sup>887</sup> Mitchell 1996, p. 30.

thus an “uneasy truce” that gains shape through embodied and emplaced sets of representational and material practices. As soon as a particular view or shape of the landscape is settled, however, new “contestatory readings” develop and “the look of the land becomes at least partially determinate in the struggles that are to follow”<sup>888</sup>.

I see scapes, sheds and scales as different ways of constraining and enabling a certain range of vision. Each marks the bounds of what matters by filtering out unnecessary “noise” in order to obtain a “signal”, thereby rendering commensurate a range of data within specified parameters. Scapes, sheds and scales are all technologies of vision, simultaneously enabling and constraining vision by training sight on particular angles of natureculture and making sets of relations visible by obscuring others<sup>889</sup>. In Kaiser’s performative approach to scale, no singular construction of scale is possible, “because scales are not made but practiced...and all reiterative and citational practices that produce scale effects can be performed only within a multiscale discursive field.” Similarly, Jones (1998) concludes that “scale may thus be understood as situated relationally within a community of producers and readers who give the practice of scale meaning”<sup>890</sup>. Scales are performed by sets of actors and their engagements with the material world, the “scalar stances they take within particular sociospatial contexts as they engage in the politics of everyday life”<sup>891</sup>. In this view, though scales are the outcomes of resource struggles and always “dripping with power”, scales, like scapes and sheds, are also secreted through mundane everyday practices and attempts of people to get along with each other and with the non-humans that populate the worlds they inhabit. Scales are always the products of collective material engagements, both cooperative and contestatory, in a lively world.

Watersheds, firesheds and foodsheds are not attempts to see everywhere from nowhere, but rather attempts to see a particular place from multiple perspectives. These ways of marking distinctions across the Klamath eco-cultural landscape materialize particular ways of seeing and living in nature. Sheds are templates for seeing with others and for making worlds with others, including the more-than-human others that populate the Klamath. As we saw last chapter with watersheds, each “way of seeing” is the product of a long history of resource struggles, knowledge politics and everyday livelihood practices. Firesheds and foodsheds similarly emerge from these long histories of struggle and contestation over the representation of the landscape and the shapes of its material processes, forms and functions. Each way of seeing inherits a different institutional and material-semiotic baggage that it must grapple with in attempting to bring ecological democracy in more intimate contact with people and place. I argue in this chapter that a diffractive approach to scale trains us to a more subtle vision that processes “small but consequential differences” between different ways of seeing, which is useful in capturing generative tensions that emerge in

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<sup>888</sup> Mitchell 1996, p 32.

<sup>889</sup> Haraway 1988.

<sup>890</sup> Jones, Katherine T. "Scale as epistemology." *Political geography* 17.1 (1998), p. 26.

<sup>891</sup> *Ibid.*

gathering multiple partial perspectives together into a collective view of eco-cultural landscapes<sup>892</sup>.

In this chapter, I attempt a diffractive reading of each scalar formation as a space of knowledge-making and resource governance- or as a means through which humans represent and perform nature, organize institutions and act collectively in the Klamath. According to Karen Barad a diffractive approach entails considering two things together without forcing them into terms of commensurability or collapsing important differences between them. For Haraway, diffraction is a “welcome alternative to the well-worn metaphor of reflection and its connotations of mirroring and sameness”<sup>893</sup>. Diffraction is another strategy for moving beyond representationalist accounts of watershed-ecosystems and society and getting on with the material practices of watershed-ecosystem-making, or in Karuk terms, eco-cultural revitalization and “fixing the world”. Reading scales of governance diffractively through one another helps train attention on the way differences emerge between them and patterns get made across them. The purpose of this chapter is not to determine which “shed” better represents the nature or human communities of the Klamath, but to focus on the ways each shed brings about particular spaces of governance and makes possible certain modes of democratic politics, livelihood practices and ways of life. Comparing three scalar formations ultimately sheds greater light on the power of the watershed to organize knowledge production and shape collective action in relation to the multiplicity of other scales implicated in Klamath resource governance.

The focus in this Chapter is on how each shed is a lively engagement with others, human and otherwise, in a co-production of knowledge, social institutions and Klamath watershed ecosystems. Along with my community partners, I am searching for ways to bring these three scales of governance together, in the same way that each scale brings multiple viewpoints together, to allow differences, generative tensions and affinities to emerge from multiple views of the landscape. My goal is to lay the groundwork for the argument that multi-scalar perspectives can accommodate multiple ways of seeing and living in nature while avoiding homogenizing diverse situated and partial perspectives into a single way of seeing Klamath eco-cultural landscapes. Efforts to democratize environmental governance in the Klamath require an accompanying democratization of scale to accommodate the myriad ways people know, value, move through and live in nature. I argue in this chapter that multi-scalar perspectives make room for multiple situated viewpoints and allow for diverse eco-hydro-social relations to flourish. The next two sections analyze the recent emergence of two scalar formations, firesheds and foodsheds, as alternative spatial approaches to the watershed for grounding ecological democracy.

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<sup>892</sup> see Haraway 1997 and Barad 2007 on diffraction.

<sup>893</sup> Haraway, Donna. “The promises of monsters: A regenerative politics for inappropriate/d others” (1992)

## 2. Firesheds

*“Fire holds together the watersheds and ecosystems of the Klamath. The watershed communities in turn hold together the Karuk community and culture.”* - Ron Reed, Karuk cultural biologist

### a. Upslope v. In-stream

This section analyzes the emergence of the “fireshed” as a space of democratic environmental governance between 2007-2014. Specifically, I look at the process through which a coalition of Tribal, Federal, State and non-government agencies worked collaboratively to define scales of resource management that were appropriate for people and place. Through this process, new institutional configurations are temporarily stabilizing around “firesheds”, defined according to the spatiality of fire rather than according to the patterns of water flowing through drainage networks. This section looks into the political implications of the fact that the movement of fire across landscapes is now suggesting alternative sites and shapes to the watershed for the formation of democratic resource management institutions in the Klamath. I analyze the processes through which the Western Klamath Restoration Partnership attempts to bring together diverse perspectives on scale in order to manage resources collectively. Specifically, I consider the implications of this new spatial framework for producing knowledge about nature and guiding collective action in natural resource management on Karuk sovereignty and territory.

As last chapter showed, fire suppression began in the Klamath in 1911 and became effective by the 1940s. Recent studies have shown the devastating ecological and watershed effects of fire suppression in the Klamath and the resulting impacts on access to cultural resources in the Karuk community<sup>894</sup>. As early as 1996, the Karuk Tribe’s natural resource department had critiqued the lack of attention to fire processes in watershed-based governance. According to Bill Tripp, “for the past 20 years, the Karuk Dept. of Natural Resources has been trying to bring science and resource management back in line with people and place; trying to bring fire back to the ground and trying to take care of this place”. As mentioned last chapter, a watershed-centric gaze does not respond well to the way fire moves across landscapes. Though ridgelines and river channels can act as important fire control features, wildfires do not typically obey watershed boundaries. They frequently span drainage divides, run across ridge systems after lightning strikes and along road networks after human ignitions. And yet fire processes intersect with watershed dynamics in important ways, influencing vegetation composition and evapotranspiration, sediment transport, and the overall quantity, quality and temperature of water flowing through Klamath watersheds. Conversely, factors such as the amount of precipitation or the timing and location of

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<sup>894</sup> See e.g. Norgaard, Kari Marie. “The Politics of Fire and the Social Impacts of Fire Exclusion on the Klamath.” *Humboldt Journal of Social Relations* 36 (2014): 77-101.

thunder-storms and associated lightning strikes influence patterns of fire ignitions and the movement, intensity and severity of fires<sup>895</sup>.

According to the Karuk's former Water Quality coordinator, during the Summer 2013 fires, the Salmon River actually dropped an average 4 degrees in daily maximum temperature and both overall discharge and dissolved oxygen measurably increased due to the smoke and ash inversion layer. According to her, "smoke cover helped us get out of the worst water quality and fisheries situations we had seen in the last 5 years". A slew of research is now being conducted on the relationships between fire processes and sediment and nutrient fluxes, stream discharge, water quality, stream temperature and fish habitat<sup>896</sup>. Many agencies, including the Karuk Tribe, the Forest Service, the watershed councils, and the State Water Boards have pointed to fire exclusion, high fuel loading, and catastrophic wildfire as the primary threat to watershed function and ecological resilience in the Salmon and mid-Klamath watersheds. At the last Klamath Fire Ecology symposium (4/14), a director of a nearby watershed training center echoed what the Karuk tribe has been saying all along: "it turns out that fire might be the best tool we have for watershed and fisheries management".

Between 2000 and 2005, local watershed councils began to organize fire-safe councils and develop community wildfire protection plans. The communities of Orleans and Somes Bar formed the Orleans Somes Bar Fire Safe Council (OSB FSC), and published a Community Wildfire Protection Plan (CWPP) in 2012. This plan demonstrates how prescribed fire and fuels treatments can simultaneously accomplish watershed restoration, eco-cultural restoration priorities of the Karuk Tribe and fire protection goals of the local community, including safe access-egress routes and defensible space around homes. Unlike previous collaborative watershed forums, the "fireshed" planning process foregrounded Karuk sovereignty and self-determination. As Bill Tripp said, "With watershed management, we got some support from agencies, but that sometimes came at the expense of tribal sovereignty and authority. With the CWPP, however, it's subjected to tribal authority."

In 2007, a number of scientists and administrators from State, Federal, tribal and local agencies began meeting informally to tackle local fire issues. They termed

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<sup>895</sup> Taylor, Alan H., and Carl N. Skinner. "Spatial patterns and controls on historical fire regimes and forest structure in the Klamath Mountains." *Ecological Applications* 13.3 (2003): 704-719.

<sup>896</sup> See e.g. Rieman, Bruce, Robert Gresswell, and John Rinne. "Fire and fish: a synthesis of observation and experience." *Climate change, forests, fire, water, and fish: building resilient landscapes, streams, and managers. USDA Forest Service General Technical Report, RMRS-GTR-290. Fort Collins, CO: Rocky Mountain Research Station* (2012): 159-175; Rieman, Bruce E., et al. "Introduction to the effects of wildland fire on aquatic ecosystems in the Western USA." *Forest Ecology and Management* 178.1 (2003): 1-3; Dunham, Jason B., et al. "Effects of fire on fish populations: landscape perspectives on persistence of native fishes and nonnative fish invasions." *Forest Ecology and Management* 178.1 (2003): 183-196; Young, M. K., R. E. Gresswell, and C. H. Luce, editors. 2003. The effects of wildland fire on aquatic ecosystems in the western USA. *Forest Ecology and Management* 178. ; Gresswell, R. E. 1999. Fire and aquatic ecosystems in forested biomes of North America. *Transactions of the American Fisheries Society* 128: 193-221.

their efforts “the Upslope Working Group” to reflect their focus on the upper dimensions of local watersheds as opposed to the Task Force’s almost exclusive focus on “in-stream” issues such as water quality and Coho habitat. Many felt that the expiration of the Klamath Fisheries Task Force in 2006 had left a vacuum of viable forums for collaborative and integrated resource management. Meeting informally at first, the group attempted to approach the thorny issues related to wildland fire, timber plantations, spotted owl habitat, sacred sites and cultural resources in the “upslope” reaches of local watersheds.

The Upslope group might be described as what the ecosystem management literature terms a “shadow network”, an ad-hoc assembly of individuals coming together outside of their usual institutional confines to experiment with new approaches to “wicked” natural resource management problems<sup>897</sup>. Such groups assemble and form “loose alliances”, according to this literature, in order to “facilitate information flows, identify knowledge gaps, and create nodes of expertise (with) political independence outside the fray of regulation”<sup>898</sup>. Operating outside of their everyday roles and routines supposedly allows new ideas to emerge and leads to creative and flexible solutions to resource problems. According to theories of complex self-organizing systems, these shadow networks can catalyze the transition to “adaptive modes governance”, as they are more inclusive, flexible, polycentric, and more likely to build in “learning and revision loops” than standard modes of top-down, centralized resource governance<sup>899</sup>. While the past and future of the “upslope group” cannot be charted according to any linear or complex adaptive systems model, it did begin “in the shadows” of the Klamath water wars, dam relicensing debates, catastrophic fires and failed collaborations between Federal agencies, Tribes and local NGOs.

The Orleans Fuels Reduction catastrophe mentioned last chapter left a bad after-taste in people’s mouths, such that the word “collaboration” became a “4-letter word” (Ch 4), and the group felt it necessary to include the word “truly” when they identified a “*truly* collaborative process” as part of their vision statement<sup>900</sup>. Far from abandoning the watershed as a unit of governance, though, by shifting the scale of governance and collaboration to the Upslope areas, the group targeted one of the most important aspects of watershed management restoration in the western Klamath. Initially, however, due to the popularity of watershed-based collaboration and the availability of funding and political support at the time, the group continued to focus on in-stream

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<sup>897</sup> Sendzimir, Jan et al, “Assessing the Resilience of a River Managment Regime: Informal Learning in a Shadow Network in the Tisza River Basin”. *Ecology and Society* 13(1):11, 2008.

<sup>898</sup> Olsson, P., L. H. Gunderson, S. R. Carpenter, P. Ryan, L. Lebel, C. Folke, and C. S. Holling. 2006. Shooting the rapids: navigating transitions to adaptive governance of social-ecological systems. *Ecology and Society* 11(1): 18.

<sup>899</sup> Gunderson, L. 1999. Resilience, flexibility and adaptive management - antidotes for spurious certitude? *Conservation Ecology* 3(1): 7; Gunderson: 1999 Lance Gunderson and C. S. Holling, *Panarchy: Understanding Transformations in Systems of Humans and Nature*, Island Press, p.21, 2001.

<sup>900</sup> Author’s emphasis. See Harling, Will and Tripp, Bill. *Western Klamath Restoration Partnership: A Plan for Restoring Fire Adapted Landscapes*. MKWC/KDNR: 2014 for the Western Klamath Restoration Partnership vision statement.



fisheries habitat issues while they waited for a professional facilitator who could guide the group through the tricky business of up-slope management<sup>901</sup>.

Beginning in February, 2013, I was invited to sit in on some of the last meetings of the “Upslope working group” after which point they formally organized as the “Western Klamath Restoration Partnership” (WKRK). The Partnership received funding support from the USFS, the US DoI, and multiple other local and Tribal sources to enter into a year-long social learning process facilitated by the Nature Conservancy’s “Fire Learning Network”. The intention was to approach regional collaboration in fire management through an open and deliberative process modeled after the Fire Learning Network’s “Open Standards process for conservation”<sup>902</sup>. The WKRK set the Open Standards to work bringing a diverse group of tribal, Federal and local agency representatives, scientists, local residents and environmental advocates together to identify “Zones of Agreement”- or areas where they believed fuels treatments and upslope restoration could and should occur. From May 2013 to May 2014, the group held a series of monthly meetings that were open to all members of the public and attended by representatives of the Karuk Tribe, local firesafe and watershed councils, timber interests, environmentalists, emergency planners, and local community members. Through the open standards process, the group defined a collective vision and set of values to guide landscape-scale fuels treatments<sup>903</sup>.

The question of scale was foregrounded, beginning in the very first informal meetings of the “Upslope Working Group”. As the director of a local watershed council remarked:

“The Mid-Klamath Restoration Partnership began in 2007, the year after Task Force sunsetted. A big question for our collaborative was: where do we set the boundary and what is the logical scale to begin work at? With the FLN (now WKRK), our focal area on the Western Klamath is pretty much synonymous with Karuk ancestral territory. We set out to find zones of agreement and identify projects that meet the needs of all our stakeholders”

At one of the last Upslope working group meetings in 2013, Bill Tripp, the Karuk Tribe’s eco-cultural restoration director, brought up the question of the appropriate scale for directing collaborative fire management at the landscape scale:

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<sup>901</sup> Harling, Will and Tripp, Bill. *Western Klamath Restoration Partnership: A Plan for Restoring Fire Adapted Landscapes*. MKWC/KDNR: 2014, p 9.

<sup>902</sup> Conservation Measures Partnership. *Open Standards for the Practice of Conservation*. Version 3.0, April 2013.

<sup>903</sup> From Harling and Tripp 2014: Vision: Establish and maintain resilient ecosystems, communities and economies guided by cultural and contemporary knowledge through a truly collaborative process that effectuates the revitalization of continual human relationships with our dynamic landscape. Values: 1. Fire Adapted Communities, 2. Restored Fire Regimes, 3. Healthy River Systems, 4. Resilient Bio-diverse Forests, 5. Sustainable Local Economies, 6. Cultural and Community Vitality.

“Fire plays a role both for restoration and community building. People are ready to engage, but we need to identify the process that will bring us together. We need to build that process through arbitration and decide on a landscape to focus on. We need an integrated approach that restores fire-resilient landscapes and creates fire-adapted communities. We need to define the boundaries of collaboration based on cultural and ecological boundaries and not administrative boundaries- we need a scale framework that is conducive to habitat mosaics. We need to look at how to reduce large fire costs, restore elk habitat, huckleberry, tan oak, etc, by looking at what needs to be done at different elevations, slopes and aspects.”<sup>904</sup>

Following Tripp’s recommendation, one of the first priorities of the Nature Conservancy facilitators when they stepped in was helping the group design a management “scope” that spatially expressed the groups’ restoration vision.

*b. “Scoping”*

One component of the Open Standards process included a “scoping exercise” through which participants articulated a geographic and thematic “scope” to align and focus their collective vision and values<sup>905</sup>. As we will see, through numerous rounds of “scoping” exercises, the group was able to focus their restoration vision around priority areas of the landscape for fuels-treatments. In the last upslope working session (February 19, 2013), the group had defined the extent of their collaborative efforts loosely around the ~800,000 acre “Klamath Mixed Evergreen” bio-physical setting (BpS) layer drawn up to the ridgelines, which loosely followed the local extent of tan oak stands and the Karuk Aboriginal Territory<sup>906</sup>. In the first few meetings of the

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<sup>904</sup> Upslope Working Group meeting minutes, 2/19/13.

<sup>905</sup> “To establish the scope of the planning area, we broke out into subgroups and proposed various maps of potential scope on six separate maps. We discussed pro’s and con’s, developed a rationale, and set the scope boundary to the area identified.” From Harling and Tripp 2014, p 12.

<sup>906</sup> See meeting minutes from Middle Klamath Restoration Partnership Meeting Upslope Working Group, Happy Camp Ranger District Conference Room, February 19, 2013. “The focus of the mid-Klamath Landscape Restoration Strategy is to: prioritize fuels reduction treatments, stand protection and enhancement treatments; restoration of culturally important sites and landscapes; restoration of plant communities threatened due to fire exclusion, noxious weed eradication and/or containment, wildlife habitat restoration, and watershed and fisheries restoration within the Klamath Mixed Evergreen Biophysical Setting (BpS) landscape of the Western Klamath Mountains. This landscape strategy will: facilitate protection of life and property within WUI areas; include most of the culturally significant plant species and species assemblages, sites, and landscapes in Karuk Aboriginal Territory; restore meadows and hardwood stands threatened by conifer encroachment and conifer over-topping; restore and develop open multi-layered Douglas Fir dominated mixed evergreen forests threatened by excessive conifer density; eradicate or contain noxious weeds in many of the highest priority areas for treatment; restore habitat for threatened and sensitive wildlife species; restore critical watershed areas for water quality and fisheries; and facilitate restoration of fire-adapted communities and ecosystems within and beyond the WUI boundary by increasing options for responses to wildfires and for controlled burning in and outside of the WUI boundary”.

Restoration Partnership, the facilitators walked the group through a series of map-based exercises through which the community debated the pros and cons of different project boundaries, starting with the boundary drawn-up in the February meeting. In the first facilitated meeting (May 2013), we broke-out into 6 groups, each with copies of the proposed scope and a blank map. Each group was then asked to discuss their visions for the project, find “zones of agreement” and sketch their scope boundaries on the blank map. Each group then appointed a representative to stay and explain their scopes while the other emissaries toured around to talk with other groups’ representatives about their proposed scope boundaries.

By the end of the exercise, six very different proposals for where the project boundaries should fall were posted on the walls of the Happy Camp grange. Some called for boundaries at drainage divides or river channels, some for scopes around recent fire footprints, and others for administrative boundaries around forest district, neighborhood or reservation boundaries<sup>907</sup>. One member of my group argued that watershed divides provided good “natural boundaries” while another disagreed, arguing that drainage divides cut off certain wilderness plant communities and that soil-vegetation associations should be taken into consideration. Another person argued for expanding the focus beyond fire to “keep in mind all restoration priorities”. One landscape ecologist argued that using the “mixed evergreen BpS” allowed for a “good solid rationale” and was also strategic for fighting fire around communities and leveraging funding opportunities, as it extended into areas with high home densities. Another group also favored the Mixed Evergreen layer based on its somewhat manageable size and its clear justification, arguing “if we follow political boundaries, we fall outside of the rationale”. A watershed restoration specialist agreed that the scope shouldn’t follow political boundaries, but needed to be considered from an “all-lands” landscape perspective. The “Ridge-lines group” kept the original boundary, but included a chunk of the Salmon River watershed due to habitat and fuels connectivity. They argued that ridgelines were strategic fire control features, as ridgelines were where most lightning ignitions occurred, but were also the most neglected areas due to their remoteness from roads and homes.

We then retreated back into our original groups, where we made final adjustments to our maps before making a grand tour with the full assembly to discuss each of the final maps. The overall scope was debated in plenum, with much attention paid to the inclusions and exclusions, both social and ecological that accompanied each rationale. A Forest Service supervisor argued that 800,000 acres was “very ambitious, pushing the edge of what could be done” and that they would need clear justifications for their boundaries. The director of a local Watershed Council suggested that they keep it manageable by following the tan-oak BpS, while a USFS representative argued “people won’t want to come up to Happy Camp to plan for a sliver”. There were debates over including communities on the western, eastern and southern sides of the

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<sup>907</sup> See meeting minutes, Western Klamath Restoration Partnership, Workshop #1, 5/2013 for detailed description of different proposed project boundaries.

proposed boundaries. One participant argued “some people that manage lands we border may feel left out and stepped over, (so) they should be involved if we are planning for their landscape area”. Another agreed asking, “this is supposed to be a voluntary process, is it going to become mandatory?” to which another responded, “if people see maps with plans and they’re not involved in, it will get tossed”. The group then agreed not to include communities that were not present at the meeting in the draft scope.

At the end of the day, the six groups’ collective visions for the project scope were handed over to Bill Tripp, of the Karuk Tribe’s Dept. of Natural Resources and Will Harling, of the Mid-Klamath Watershed Council. Tripp and Harling were charged with leading a “working group” to bring all of the 6 scopes together. In the next meeting (FLN2 7/13) the working group presented a “straw-man” scope to the Partnership. Before they described their draft scope to the group, Tripp reiterated that it was a “draft” intended to spark discussion, saying “we don’t want to get it razor sharp yet; it’s not a done deal with a solid rationale. We don’t want it to be too fine or rigid at this point, we want a ‘fuzzy’ boundary”. The working group kept the scope boundary loose at first in order to accommodate the six draft scopes, take into consideration all proposed values, and leave room for iterative rounds of feedback from the group so as to most accurately tease out the collective vision. As a USFS landscape ecologist put it, “it’s not as easy as popping down a BpS”.

The “straw-man scope” incorporated administrative and private property boundaries, access and egress routes, community infrastructure as well as biogeochemical processes and topographical features such as ridge systems and drainage networks, soil-plant associations, fuels conditions, and wildlife and fish habitat. As an EPA representative explained, “the scope boundary is not one line, following one rationale; the lines emerged where they did for lots of reasons.” In addition to fire footprints, administrative boundaries and private property lines, watershed boundaries did figure into the proposed scope. For example, when considering whether to include Elk valley, Helkao, and the Dr. Rock areas, the working group relied on watershed boundaries to help them make decisions– “are these areas in or out? Well, they drain that way, so...” . For example, the Aikens Creek drainage divide on the west side became the scope boundary because extending it beyond that would bring in other players who were not represented at the meetings.

Through extensive discussions, the working group eventually settled on a final “Scope” for the Partnership that encompasses approximately 1.2 million acres, including the entire Salmon River Watershed and the portion of the Middle Klamath River sub-basin between Aikens Creek and Seiad Valley. The planning area covers most of the Karuk aboriginal territory, land administered by Klamath and Six-Rivers national forests, portions of the Siskiyou, Marble Mountain, and Trinity Alps Wilderness areas and the communities of Orleans, Somes Bar, Forks of Salmon, Cecilville, Sawyers Bar, Happy Camp and Seiad Valley<sup>908</sup>. The next task of the working group was to break up

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<sup>908</sup> Harling and Tripp 2014.

their scope into more nuanced “firesheds”, or areas within which fire could be managed across the 1.2 million acre planning area.

*c. Composing “Firesheds”*

Between September (2013) and May (2014) the working group divided the 1.2 million acre project scope into more manageable planning and working areas in which to implement pilot projects and experimental fuels treatments around the three communities of Orleans-Somes Bar, Salmon River and Happy Camp. Each community’s planning area was defined around place-specific restoration priorities and available funding streams, including the “need to identify projects in the Happy Camp and Somes Bar areas as required by the Region 5 Special Program Funds and the Fire Adapted Communities Pilot Project”<sup>909</sup>. According to the latest draft WKRP plan, “firesheds” are defined as areas where fires (both controlled and wildfires) can be contained or stopped”<sup>910</sup>.

Through the Orleans/Somes Bar CWPP, the Tribe and the firesafe council had begun to tie together roads, trails, ridges, firelines, rivers, and existing fuel breaks into “firesheds”, or areas that would “ provide opportunities to stop wildfires and safely light controlled fires”. Within each community, the working group took a similar approach to delineating firesheds based on a range of factors including local fire history, topographical features such as ridgelines and river channels, wildlife habitat, community wildfire protection needs, the Tribe’s eco-cultural revitalization goals, and the restoration vision and values laid out through the WKRP process. The working group also ran a series of GIS and flam map-based exercises to prioritize fuels treatments and help delineate firesheds around and within each community by modeling the features that influence the movement of fire across the western Klamath landscape.

The “prioritization exercise” was aimed at “visually representing where the WKRP felt work should be focused”<sup>911</sup>. The goal of the prioritization exercise was to articulate a “basic zone of agreement for all treatment types” which would then “serve as a guide to planning and prioritizing projects on the landscape scale for multiple social, ecological, and economic factors”<sup>912</sup>. The working group awarded points to areas based on a “prioritization matrix”- a ranking scheme that was developed to target the WKRP’s collectively defined vision and values. It targeted the most feasible and strategic areas for fuels treatment by giving “points” to areas for multiple different objectives such as fire and watershed management, protection of lives and homes,

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<sup>909</sup> The focus of the “Salmon River Integrated Large Fire Management project” is to develop inclusive partnerships for implementing zones of agreement, while the focus of the Somes Bar Integrated Fire Management and Capacity Development project aims to develop landscape level fuels reduction treatments. The Happy Camp Integrated Community Protection and Workforce Development Project is focused on accelerating the development of Fire Adapted Communities.

<sup>910</sup> Harling and Tripp 2014; Orleans/Somes Bar Community Wildfire Protection Plan, 2012.

<sup>911</sup> Harling and Tripp 2014.

<sup>912</sup> WKRP Prioritization Matrix, 2014.

wildlife habitat enhancement and cultural resources management. The “prioritization matrix” was designed so that, at the end of the exercise, areas that have the most number of points “pop-out” of the landscape, signifying that they are priority areas where fuels treatments would serve multiple resource benefits.

For example, points were awarded to areas for defensible space around structures and infrastructure, access/egress routes and the Public/Private boundary layers along the wild-urban interface (WUI). Points were also awarded to potential and existing “fuelbreaks” along firelines, ridges, and trails in order to “help tie in road and streams to establish firesheds”. Control features outside of the WUI, such as firelines, current and historic trails and the upper one-third of all slopes also received points in order to “slow the spread of larger “megafires” through the backcountry”<sup>913</sup>. The group also incorporated recent regional fire history into their decision-making through making a “time since last fire” map. When they visualized the region’s fire history, the group was astonished to learn that nearly 50% of the planning area hadn’t burned in over 100 years<sup>914</sup>. The working group also assembled and ran a *FlamMap* model under 97% moisture conditions to isolate the “fuels jackpots”, high-density pockets of fuel, based on the model’s flame-length outputs. The “matrix” also prioritized fuel treatments that would target different cultural and ecological resource benefits. For example, the group awarded points to areas that would “preserve plant and animal species that depend on habitats maintained by frequent fires”. Elk winter range and buffer zones around Spotted Owl nesting sites received points, as did areas with fire-dependent plant communities such as meadows, Black, Tan and White Oak stands, lower montane Serpentine woodlands and Baker Cypress stands. In order to “protect tribal practices dependent on the use of fire as a land management tool”, areas containing fire-dependent cultural foods and fiber resources such as Willow, Beargrass, Hazel, Iris and Huckleberry all received points as well<sup>915</sup>. According to Bill Tripp:

“You have to maintain complex habitat dynamics between species and that can’t be done with one blanket treatment. It will take 100 or more years to achieve the right mix of habitat mosaics. You can’t open it all up at once or noxious weeds will come in. You can’t keep fire out of the landscape for long either. When fires do start, which they will, we’ll move them around the landscape to where they do the most benefit.”

Through exercises and extensive discussions, the group finally settled on “zones of agreement” that broke up the landscape into project management units and firesheds. The resulting “firesheds” are collectively composed assemblages of natureculture that attempt to accommodate multiple forms of knowledge, resource values, livelihood practices and restoration priorities.

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<sup>913</sup> WKRP Prioritization Matrix, 2014:

- a. Existing firelines (300 foot buffer): 2 points
- b. Current and Historic Trails: 1 point
- c. Upper 1/3rd Slopes: 1 point

<sup>914</sup> Will Harling. 2014 Klamath Fire Ecology Symposium. 5/2014, Orleans, CA.

<sup>915</sup> From WKRP Prioritization Matrix, 2014.

To move towards implementation, the working group then split up the “zones of agreement” into different sections of the landscape prioritized for manual, mechanical and prescribed fire treatments “based on specific timing, location, access, and other specific needs and factors relating to each treatment type”<sup>916</sup>. Within prioritized areas, the partners are currently (Spring, 2015) developing specific fuels treatment prescriptions to target multiple public and tribal resource values. Dr. Frank Lake of the USFS is setting up research plots to monitor the multi-scale social and ecological effects of prescribed fire applications on different cultural resources, foods and fibers. Lake is working with multiple communities of resource users and cultural practitioners to identify the ecological and institutional conditions that support access to culturally significant resources and better understand how linked and nested dynamics across multiple stand, understory, patch, habitat, region and landscape scales impact access patterns, site mobility and use quality. In addition to working with the Tribe, the watershed council, and cultural practitioners, Lake is making an effort to involve tribal youth through education and capacity building. Through their collective efforts, the Partnership is piloting new way of implementing fuels projects and learning from them.

#### *d. Firescape Sovereignty*

After two decades of experiments in watershed democracy, the movement of fire across landscapes is now suggesting alternative sites and shapes for the formation of democratic resource management institutions in the Klamath. Community mobilization around fire issues is creating a new regional space of collective action, the “Western Klamath Mountains”, as well as new institutional configurations that are temporarily stabilizing around “firesheds”, defined according to the way that fire can be managed rather than according to flows of water through drainage networks. By shifting scales from watersheds to firesheds, the Partnership was able to define scales of resource management and collective action more suitable to pressing issues and an important biophysical and social dynamic that was being neglected in watershed-centric management.

However, rescaling from watersheds to firesheds was not a simple case of “scale-jumping”, or moving the scale of knowledge production, political action and decision-making in order to effect processes at another, and did not entail abandoning the watershed as the scale of governance either<sup>917</sup>. As seen in the scoping process, watershed boundaries, river channels and in-stream considerations did figure into the delineation of firesheds. Firesheds helped define the nuances and cross-scale linkages among resource flows and institutional boundaries across and within local watersheds, focusing collective vision and action around the important local social and biophysical

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<sup>916</sup> “Separate overlay assessments were then conducted in order to better prioritize within three types of treatment: manual, mechanical and prescribed burn treatments”. Harling and Tripp 2014.

<sup>917</sup> Smith, Neil. “Contours of a spatialized politics: homeless vehicles and the production of geographical scale.” *Social text* (1992): 55-81. In Smith’s words, to “jump scales” is to organize the production and reproduction of daily life and to resist oppression and exploitation at a higher scale-over a wider geographical field.” (1992, p. 60).

dynamics that matter to the local community and to the public agencies representing more expansive publics. In many ways, project boundaries and firesheds were designed to provide more place-based definition to watershed management by targeting planning and projects around the “best watershed and fisheries management tool we have”.

The Western Klamath partnership is pioneering new ways of collectively designing, planning, implementing and learning from experimental burns in the Western Klamath mountains. The “scoping” exercise was a first step towards developing a fair and balanced process for bringing together diverse perspectives and elaborating a common world. The group collectively defined the “scope” of collaboration to fit the “vision” and values that were simultaneously being elaborated by the group. As opposed to the fixed boundary of the watershed, the boundary of collaboration and integrated fire management was itself defined collaboratively through an open democratic process.

The “Open Standards” process was entirely voluntary in principle, allowing potentially anyone to show up and share their point of view. Some concern was expressed that the amount of uncompensated time and effort required to participate in the process would bias the project towards the views of those who were compensated to attend, leaving out the viewpoints of those, such as local community members and practitioners, who would have to come on their own “time and dime”. However, a few interested community members, scholars, advocates and even a couple of youth did attend meetings and participate in the discussions on their own. Rather than impose solutions, the facilitator walked the group through a number of exercises that worked across multiple learning and communications styles such as map exercises, origami, plenary and small-group discussion, group word-smithing exercises, field-trips and place-based learning. The workshops allowed new working relationships to emerge between USFS, Cal Fire, watershed and firesafe councils, Tribes, loggers and environmentalists on upslope and fire issues. The Open Standards process inspired new ways of planning, debating and collectively designing scopes, visions and values in the Klamath.

In rescaling from watersheds to collaboratively designed firesheds, the Karuk Tribe was able to exercise a different range of epistemic, political and legal authority. As mentioned last chapter, fire suppression has dominated scientific forestry in the Klamath since 1911. Since the first Rangers were sent to suppress fires, there were always recalcitrant indigenous pyro-practitioners, lighting rogue fires and writing letters to the Secretary of Agriculture. These protests largely fell on deaf ears, however, until Lewis’ patterns of Indian burning in 1973, and even more when Cronon’s *Changes in the land* came out in 1983<sup>918</sup>. In the Klamath, fire-ecologists have become interested in indigenous fire knowledges and practices

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<sup>918</sup> Lewis, Henry T. *Patterns of Indian burning in California: ecology and ethnohistory*. No. 1. Ballena Press, 1973; Cronon, William. *Changes in the land: Indians, colonists, and the ecology of New England*. Macmillan, 2011.



over the last two decades<sup>919</sup>. Fire ecologists and cultural practitioners are collaborating on research that combines tree-ring studies and pollen and charcoal analysis in lake sediments with indigenous knowledge on the use of fire to manage eco-cultural landscapes to piece together fire histories and recurrence intervals for the region<sup>920</sup>. As opposed to Gifford's portrayal of cultural fire as "superstitious" and a data point in abstract theories of belief systems and material culture, indigenous fire knowledge in these partnerships is seen as having epistemic value on multiple fronts.

Bill Tripp, the Tribe's director of eco-cultural restoration, has been a critical leader in the WKRP process. He has also been a co-chair of the scoping working group. Though they don't always agree on every point, the working group has worked through difficult epistemic issues through negotiation and dialogue. According to Tripp: "We're building a community of practice, where different factions are learning how to work together, from rivers to ridges. We're keying out the basic features of management scales through identifying zones of agreement and then further research can fill in details." There is a deep respect of traditional ecological knowledge among the group, many of whom have been working together for years, but some of whom are working together for the first time. The group is pulling together multiple sources of scientific, indigenous and local knowledge and experiences, attempting to define project boundaries that encapsulate the full range of values that are touched by fire. In addition to the epistemic leverage in shifting scales, there is a certain amount of legal and regulatory leverage in jumping from watersheds to firesheds.

In the last few years, California and Federal agencies have granted certain exemptions for Tribes' ability to light cultural fires and manage the air-quality impacts of prescribed fire. In California, Tribes maintain sovereignty over tribal "airsheds", the air that moves over and through tribal lands<sup>921</sup>. Some tribes have even developed airshed management plans and regulations with the California Air Resources Board. However, under the California Clean Air Act, prescribed fire is regulated as an

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<sup>919</sup> Taylor, Alan H., and Carl N. Skinner. "Fire history and landscape dynamics in a late-successional reserve, Klamath Mountains, California, USA." *Forest Ecology and Management* 111.2 (1998): 285-301; Taylor and Skinner 2003; Anderson, Kat. *Tending the wild: Native American knowledge and the management of California's natural resources*. Univ of California Press, 2005; Sugihara, Neil G. *Fire in California's ecosystems*. Univ of California Press, 2006.

<sup>920</sup> Crawford JN (2012) *Evidence for native American land-use impacts on forest structure and fire regimes in the lower Klamath River region of California*. PhD Thesis, University of Nevada-Reno; Crawford, Jeffrey N., et al. "Late Holocene fire and vegetation reconstruction from the western Klamath Mountains, California, USA: A multi-disciplinary approach for examining potential human land-use impacts." *The Holocene* (2015).

<sup>921</sup> Baehr-Jones, Vanessa, and Christina Cheung. "Exercise of Sovereignty: Attaining Attainment for Indian Tribes under the Clean Air Act." *Environ: Envtl. L. & Pol'y J.* 34 (2010): 189. "Tribes have the power under the Clean Air Act ("CAA") to obtain treatment-as-state status, create permitting programs for new or modified major stationary source polluters, design and carry out their own implementation plans for the CAA's air quality standards, and even influence surrounding states' air permitting decisions" (p 191).

anthropogenic source of emissions and often cited, along with fire danger, as a reason why prescribed fires cannot happen in California. To attempt to overcome these obstacles to lighting cultural prescribed fires, the Western Regional Air Partnership, a consortium of States, Tribes, Federal land managers, local air agencies and the US EPA, recently issued a policy that categorizes tribe's cultural burns as "natural" emissions as opposed to "anthropogenic" emissions that would be regulated under the Clean Air act<sup>922</sup>.

In 2013, Governor Brown issued an executive order affirming tribal sovereignty over land and air resources<sup>923</sup>. Rescaling from watersheds to community fireheds also accomplishes a different kind of maneuvering around yet other scale of governance, that of the airshed and the Air Quality Management Districts that manage them. The Tribe's ability to light prescribed burns and their specialized expertise in fire management are therefore sources of political and epistemic authority over the firehed as well as over the airshed. However, this move from the watershed to the firehed was not a simple case of jumping from one scale to another. Not only did fireheds incorporate watershed boundaries, they targeted the most critical threat to watershed resilience in the western Klamath. Lake, Harling and Tripp's work on fireheds has taken a multi-scale approach to looking at social and ecological processes across stand, patch, understory, habitat, bioregional and landscape scales. By involving Tribal youth in the process of designing plots, carrying out research, piloting experimental burns and monitoring them, Lake, Tripp, Harling and colleagues are pioneering a new way of multi-scalar social learning and ecosystem management in the Western Klamath. I will now consider a third emerging space of environmental governance in the Klamath, the "foodshed", before I return to considering the importance of multiscalar perspectives for ecological democracy in the Klamath.

### 3. Foodsheds

#### *a. Intro*

In 2012, the Karuk, Yurok and Klamath tribes and UC Berkeley researcher Jennifer Sowerwine initiated a Basin-wide food security initiative to expand access to traditional foods among indigenous communities in the Klamath<sup>924</sup>. Once regarded by

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<sup>922</sup> Western Regional Air Partnership, pg. 18: 3.2.3. RE: Native American Cultural Burning: *Native American cultural burning for traditional, religious, and ceremonial purposes is a "natural" source.* "This Classification Criteria statement applies to vegetative burning conducted by Native Americans for traditional, religious and ceremonial purposes. The purposes of burning may include, but are not limited to, burning grasslands and forestlands for basket materials (e.g., hazel, bear grass, tule, and iris), medicinal and ceremonial plants, and subsistence plants (e.g., acorns, huckleberry, and pine nuts). Where fire is used for traditional, religious or ceremonial purposes, that fire is classified as "natural", which recognizes that these fires have the opportunity for smoke management. Individual tribal governments may establish the vegetative burning that falls into this categorization."

<sup>923</sup> California State Executive Order B-10-11 (9-19-2011) states that "every state agency and department subject to executive control is to encourage communication and consultation with California Native American tribes."

<sup>924</sup> USDA-NIFA-AFRI Food Security Grant #2012-68004-20018

ethnographers for its abundance of food resources, the Klamath is now classified by the USDA as a “food desert” due to the lack of access to healthy food options for many Basin residents<sup>925</sup>. Tribal populations and rural communities in the Klamath are considered to be among the poorest and most “food insecure” in the country<sup>926</sup>. Many rely on food stamps, government commodity foods, liquor stores or gas stations to meet nutritional needs. Recent studies have linked denied access to traditional food sources with high rates of diabetes and heart disease in the Karuk community<sup>927</sup>. The term “food desert”, however, is a misnomer, as the indigenous communities of the Klamath have continued to rely on a range of local resources such as salmon, deer, eel, elk, acorns, mushrooms and berries as well as local gardens for subsistence despite numerous regulatory, economic and ecological barriers. Indigenous communities of the Klamath see the forests and watershed ecosystems they inhabit as vast sources of food, provided they can be managed and accessed in particular ways.

As a newspaper article on the initiative remarked, the Food Security initiative aims to “decolonize diet” in the Klamath<sup>928</sup>. By invoking this phrase, they make the claim that the Food Security initiative attempts to confront colonial legacies shaping the food system in the Klamath. This section looks specifically at the collective emergence of a new scalar approach to ecological democracy in the Klamath, the “foodshed”, which has accompanied efforts to “decolonize diet” in the Klamath. I argue that foodsheds spatially reorient the management perspective of Klamath resource management agencies from a timber and recreation-orientation to a focus on revitalizing indigenous food management and distribution systems and expanding access to traditional and cultural foods throughout the Klamath Basin.

The Klamath Food Security Project emerged out of conversations between Dr. Jennifer Sowerwine, representatives of the Karuk, Yurok and Klamath tribes, US Forest Service, local schools and the Mid-Klamath watershed council. The initiative received a \$4 million, 5-year grant through the US Department of Agriculture’s “Agriculture and Food Research initiative” and currently supports forty-three community-led objectives, including funding for multiple full-time staff positions, Tribal food crews and funding for workshops, training, youth empowerment and capacity building. The project supports a diverse array of community-based initiatives, everything from smart-phone-based youth adventure walks and K-12 curriculum development, butchering classes, beehive building workshops, policy analyses and wocus pond installations<sup>929</sup>. On one hand, the project takes a bioregional, Basin-wide approach, working across two states and three tribal communities to tackle food issues. However, while it takes in the entire

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<sup>925</sup> AFRI 5 Year Management Plan, 2013; USDA Food Security Locator 2013.

<sup>926</sup> AFRI 5 Year Management Plan.

<sup>927</sup> Noorgard 2005.

<sup>928</sup> Klamath River Keeper News. “Decolonizing Diet: How river restoration, environmental justice and traditional nutrition go hand in hand on the Klamath”. *Klamath River News*, Winter 2013, pgs 4-5.

<sup>929</sup> Wocus flower is traditionally harvested by members of the Klamath Tribes. <http://www.klamathtribes.org/background/wocus.html>, last visited 6/20/15.

Klamath Basin for its general scope, members are also exploring new socio-spatial concepts to provide a more nuanced reading of local watersheds and forest ecosystems.

The concept of the “*foodshed*” has emerged from conversations between representatives of Tribes, watershed councils and academics about local food systems and gained traction through this process as a way of conceptualizing the spatiality of local food resources and the ways they are managed, accessed, procured, processed and distributed. Foodsheds strategically visualize patterns of “food flows” and historic, contemporary and future desired conditions of access to food resources in the Klamath. The local watershed council has a “foodsheds” website and facebook page with information on local soils, hydrology, climate, agro-ecology, an events and gardening calendar and seasonal recipes. The term is mentioned, though far more infrequently than the watershed, in the resource management literature. According to Loeffler’s definition:

“A foodshed is a similar concept to that of a watershed. If a watershed follows the flow of water supplying an area from headwaters to spout, so a foodshed outlines the flow of food supplying an area. We are connected to a watershed or foodshed just like we are connected to our mother by an umbilical cord.”<sup>930</sup>

The term has a resonance within the community to denote where a particular family, community or neighborhood’s food is sourced from, as well as define the spatial extent of practices through which a particular food resource, such as a tan-oak orchard, fishing spot, or elk meadow, is managed. Foodsheds help conceptualize how access to traditional food resources is shaped by a variety of biophysical and institutional factors. The ability to hunt or harvest at a particular location depends on the material, spatial and temporal characteristics of each resource as well as the many-layered sets of institutions that condition access to that particular resource. Acorns, salmon, elk, deer, eel and wocus flowers, for example, all have life-cycles adapted to particular seasonal and inter-annual variabilities such as flow regimes and periodic disturbance patterns related to floods, landslides and wild and human-interacted fire regimes. Different resources are linked to particular site and stream characteristics such as slope, aspect, elevation, soil type, precipitation, insolation and temperature. Each resource is also surrounded by a meshwork of institutions that regulate access based upon various sources of legitimacy, from formal statutory charges, implementation regulations and court rulings to less codified factors such as cultural practices and ceremonies based on traditions passed down from time immemorial.

For example, Dr. Frank Lake and Arielle Halpern’s research on Karuk Tan Oak acorn management practices has demonstrated that the ability to access and harvest quality tan-oak acorns is dependent both upon land tenure and formal regulatory procedures such as burn permits and emissions standards as well as a range of

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<sup>930</sup> Loeffler, Jack, and Celestia Loeffler, eds. *Thinking Like a Watershed: Voices from the West*. UNM Press, 2012, p. 218.

biophysical characteristics and management practices that steward acorn orchards in view of a range of ecological and social factors. Through plot experiments, they have demonstrated that the ability to burn in the fall and spring, as prescribed by traditional management techniques, reduces infestation rates by killing acorn-boring insects such as weevils and moths, while opening up physical access to tan-oak stands. Their preliminary data show post-burn infestation rates to be much lower than pre-burn infestation rates. In addition, post-burn surveys with cultural practitioners showed better nut-meat, site-access and mobility, and better overall ability to identify good acorns. In this example, we see that access to an important traditional food resource is contingent upon particular biophysical factors of site characteristics and the life-cycles of acorns and pests that bore into them as well as a range of institutional factors that regulate access to the site and in particular the ability of cultural practitioners to manage the site with fire.

In rendering food flows visible, foodsheds also render visible how agro-ecosystem management conditions patterns of access to food resources for tribal communities in the Klamath. Representing foodsheds and foodflows is difficult, however, as the location of particular orchards, fishing spots or mushroom gathering locations as well as the management practices associated with a particular site and the distribution of its resources is considered culturally sensitive information. On one hand, mapping out foodsheds and food-flows is seen as having strategic value in advocating to the USFS, Cal DFW and the DoI the specific management and access requirements for tribal trust resources and traditional cultural properties. From a legal and regulatory perspective, foodsheds visualize how sovereignty scales differently and entails different substantive and procedural requirements depending on the particular food resource and its associated management practices. However, on the other hand, people do not want the locations of their food sources or the details of their indigenous knowledge and management techniques made available to authorities or the general public. Almost every conversation I have had about food systems has entailed a conversation about the need to keep certain sensitive information private, out of official documents and off of official maps. Therefore the process of defining local foodsheds treads sensitive ground between revealing enough information about the spatial and temporal dimensions of local food resources in order for them to be recognized and managed by Federal agencies and concealing precise information about the locations and cultural practices associated with traditional foods.

The concept of “food sovereignty” has emerged from discussions about sensitive cultural information involved in mapping local foodsheds to highlight the importance of recognizing tribal sovereignty over knowledge, territory and people as a necessary compliment to conversations around food security and food system management. Food sovereignty attempts to invoke cultural and political sovereignty over local foodsheds in the ability to define and manage them, as well as over the knowledge and practices that accompany their management. In this chapter, I argue that, by orienting the spatiality of ecosystem management around foodsheds, cultural and political self-determination is tied to the ability to manage and access food and fiber resources on National Forest and private lands in particular ways as well as to the ability to define

the contours of local agro-ecosystems and determine how they are represented and managed.

Foodsheds attempt to reverse the resource management paradigm in National Forests by shifting the focus away from recreation and timber production and towards a view of forest ecosystems as sources of food, fiber and cultural resources that can be managed for the benefit of multiple species and human uses. Foodsheds are also a way of operationalizing food sovereignty by visualizing the spatiality and temporality of food resources and food flows in order to enhance local control over local food systems. Once rendered visible in a culturally appropriate way, foodsheds can be monitored so that community partners can measure the on-the-ground impacts of their projects on local food security and food sovereignty. “Decolonizing diet” therefore involves decolonizing the way watersheds, forests, landscapes, ecosystems and food systems are both conceptualized and managed. Rather than separate food systems, watersheds and ecosystems into distinct categories of resource management, Klamath indigenous communities argue that human food resources, wildlife habitat and watershed-ecosystem resilience should be managed for simultaneously.

While I think it is important to highlight the ways this emerging concept is attempting to shift the focus of community-based environmental governance in the Klamath, I want to be careful not to fix this term in one catch-all definition because individuals and institutions are using it in diverse ways. Instead, I ask whether foodsheds have the potential to carry multiple meanings and distinguish the social and ecological characteristics of Klamath food and fiber resources in diverse ways for multiple audiences. In the next section, I work through the foodshed concept by analyzing the specific biophysical and political spatiality of elk foodsheds. I attempt to detail the spatial and temporal outlines of the elk “foodshed” and the biocultural and institutional factors that enable and inhibit Karuk’s ability to manage elk habitat and harvest elk for subsistence and ceremonial usage in their aboriginal territory. I consider the implications of the politics of scale in the management of elk habitats for Karuk sovereignty. I argue that elk foodsheds have the ability to bring together multiple perspectives on place and target local priorities for resource management. Elk foodsheds contain multiple scales of intersecting biophysical, hydrologic and ecological processes while elaborating the contours of community-based ecosystem management across Klamath eco-cultural landscapes.

### *b. Elk Foodsheds*

Since January 2014, I’ve been exploring different ways of visualizing “elk foodsheds” along with members of the Karuk Department of Natural Resources, in particular Karuk Eco-Cultural Resource Director Bill Tripp. Elk move seasonally between their summer range along ridgetops and upslope meadows, down into river valley bottoms during winter and then back up again, along river corridors and

ridgelines, into their summer range in upslope meadows<sup>931</sup>. According to my community partners, targeting fuels treatments according to Elk's seasonal habitat needs related to migration, forage, parturition and calving would accomplish a number of different watershed *and* fireshed management objectives such as shaded riparian fuel breaks in elk's transitional range, strategic fire control features in their summer habitat in upslope meadows and defensible-space in their winter range near valley bottoms and communities. In this section, I explore the ways in which elk foodsheds attempt to chart new ways of conceptualizing scale in community-based environmental governance. Thinking about how to manage Western Klamath landscapes for elk brings into play multiple nested scales of interconnected social and ecological processes. Elk foodsheds mobilize and elaborate multiple scales and socio-spatial formations without "fixing" any of them in the landscape. They interweave with firesheds and watersheds, breaking them up into manageable units and defining their spatio-temporal contours according to community values and the social-ecological specifics of place.

In addition to the wide-ranging ecological benefits of managing elk's seasonal habitat needs at different elevation bands, elk play important political and cultural roles in Karuk communities. Elk populate Karuk stories, animate ceremonial regalia and play an important role in dances. Karuk tribal members have managed elk habitat and hunted elk for food, materials, medicine and ceremony in their aboriginal territory since time immemorial<sup>932</sup>. Karuk traditional laws, oral traditions and ceremonies incorporate specific land management practices for elk, including seasonal application of prescribed fire to support their habitat and regulation of take for subsistence, ceremonial and commercial use based on seasonal ecological indicators and herd population dynamics<sup>933</sup>.

Due to fire suppression, habitat loss, and hunting for meat and hides during the Gold Rush, nearly all elk were extirpated from the Karuk Tribe's ancestral territory as early as the 1870s<sup>934</sup>. Beginning in 1985, six Roosevelt Elk from Redwood National Park were re-introduced into Elk Creek in Klamath National Forest. By 1996, 232 Roosevelt elk had been re-introduced into Klamath National Forest and the Marble Mountain

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<sup>931</sup> Klamath National Forest. *Elk Management Strategy*. 2007; Toweill, Dale E., and Jack Ward Thomas, eds. *North American elk: ecology and management*. Smithsonian Institution Press, 2002.

<sup>932</sup> Karuk Tribe Dept. of Natural Resources, 2011. *Eco-Cultural Resource Management Plan*, p. 69-70, 2011; US Department of the Interior 1982. Archaeological study of Hupa, Yurok, Karok Tribes, p 143.

<sup>933</sup> Karuk Tribe 2011, pgs. 18, 69-70.

<sup>934</sup> Habitat loss and hunting for meat and hides during the gold rush is considered a major factor in the extermination of Roosevelt elk in the Klamath-Siskiyou see e.g. Harper, J. A., J. H. Ham, W. W. Bentley, and C. F. Yocum. 1967. The status and ecology of Roosevelt elk in California. *Wildl. Monogr.* No. 16. The Wildl. Soc., Bethesda, Maryland. 49 pp; Doney, A. E., P. Klink, and W. Russell. 1916. Early game conditions in Siskiyou County. *Calif. Fish and Game* 2: 123-125. Some contested accounts hold that a few herds managed to survive in the Scott and Salmon mountains. See e.g. Harper, J. A., J. H. Ham, W. W. Bentley, and C. F. Yocum. 1967. The status and ecology of Roosevelt elk in California. *Wildl. Monogr.* No. 16. The Wildl. Soc., Bethesda, Maryland. 49 pp.

wilderness by the US Forest Service and California Dept. of Fish and Wildlife<sup>935</sup>. Since reintroduced, the elk have thrived and there now exist at least four vibrant elk herds in the Marble Mountains, with a total population size of ~3,000<sup>936</sup>. A tightly regulated elk hunt was initiated by Cal DFW in 1995. To the 3,000-4,000 eager hunters who apply very year, CDFW gives out about fifty Marble Mountain elk tags per year through various means such as auctions and lotteries. Though the habitats of at least four of the Marble Mountain herds lie within Karuk ancestral territory, the Karuk community has not yet been able to meaningfully participate in the Cal DFW-sponsored Marble Mountain elk hunt due to a suite of political, biophysical, legal and regulatory issues that will be explored below.

As stated in their Eco-Cultural Resource Management Plan (2011, p78): “the Karuk Tribe desires to regain the rightful entitlement to manage and restore elk habitat, populations and harvest these culturally significant wildlife species“. Elk are identified as a culturally and ceremonially significant resource and an ecosystem management indicator: “of greatest concern in terrestrial environments are the management and population viability of elk and deer and the restoration of habitats needed to support these animals”<sup>937</sup>. Restoring elk habitat ties into wider ecological restoration goals. Elk fit into a strategic landscape-scale restoration plan that targets seasonal burns at different elevation bands according to elk’s seasonal habitat needs for forage, cover, migration corridors, parturition and calving.

As mentioned last section, the Tribe is currently working with the Forest Service to set up experimental plots to explore different ways that Karuk prescribed fire can enhance elk habitat and at the same time benefit other traditional food and fiber resources such as tan-oak and bear-grass, achieve fire and watershed management objectives and support habitat for other wildlife such as spotted owl, porcupine, elk, deer and salmon. According to my community partners, elk habitat cannot be isolated and managed apart from its connections to these many other webs of social-ecological relations. Through this perspective, prescribed fire can serve multiple social and ecological values while opening up meadow mosaics in elk summer habitat, dispersal corridors along riparian zones and ridges and wintering habitat along river bottoms<sup>938</sup>.

Managing resources on a landscape-bioregional scale through seasonally rotating applications of cultural fire according to elk’s seasonal habitat needs is

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<sup>935</sup> See Klamath National Forest 2007 Elk Management Strategy, Table 1: History of Klamath National Forest cooperative Roosevelt Elk reintroduction program.

<sup>936</sup> 1500-3000 depending on estimate, USFS 2007.

<sup>937</sup> Karuk Dept of Natural Resources 2011, p 69.

<sup>938</sup> Karuk Dept. of Natural Resources 2011, p. 71: “Restoration of traditional management practices with the use of fuels reduction, prescribed fire and wildland fire should significantly improve wildlife habitat and correlating population densities...These practices can restore fire adapted, dependent, and resilient habitats of grasslands, oak and pine forests, selected riparian zones, mixed conifer/hardwood forests, and high elevation meadows...restored habitat and species composition will in-turn increase population viability, assist in the maintenance of fire-resilient landscapes and help reduce the threat of uncharacteristically intense wildland fires.”



intended to shift the management paradigm in national forests away from a focus on timber production, fire suppression and recreation and towards an agro-ecology framework that targets multiple wildlife, public and tribal trust, local subsistence and cultural resource benefits through seasonally rotating applications of prescribed fire. In addition to the benefits to Klamath ecosystems, watersheds and wildlife, vibrant elk populations and expanded access to elk meat supports local food sovereignty efforts. Managing seasonal elk habitat and harvesting elk for subsistence purposes is seen as an important component of “decolonizing” the Karuk diet by expanding access to cultural foods and re-establishing traditional food management and distribution, thereby reversing colonial patterns of resource management in the Klamath<sup>939</sup>. Defining the elk foodshed is therefore linked with the twin projects of decolonizing diet and decolonizing the management of forest ecosystems and watersheds in the Klamath. Decolonization in this instance entails reversing colonial patterns of thought and land management policy, revitalizing eco-cultural resources and re-establishing sovereignty over foodscapes. Reinstating Karuk elk habitat and herd management therefore has far ranging implications for social and environmental justice in the Klamath: restoring local ecosystems, watersheds and wildlife habitat, expanding access to cultural foods and fibers, supporting local subsistence economies, improving community health, revitalizing cultural and ceremonial practices and enhancing self-governance and tribal sovereignty.

*c. Elk Co-Management: legal and regulatory landscape*

There currently exist numerous legal, regulatory and political barriers to Karuk participation in both habitat restoration and herd management in their aboriginal territory. In this section, I will briefly analyze the clusters of law and regulatory policy that configure the range of opportunities for the Karuk Tribe and Tribal members to manage and harvest elk in their ancestral territory. On reservations, Tribes maintain sovereignty over natural resources and wildlife management apart from state authority or oversight<sup>940</sup>. Off-reservation rights are created primarily by treaty provisions that explicitly cover fishing, hunting, or food-gathering activities outside of reservation boundaries<sup>941</sup>. The Supreme Court has been willing to recognize off-reservation hunting and fishing rights, but typically only when there are explicit treaty provisions covering them. In exceptional cases, Courts have recognized off-reservation fishing and hunting rights without specific treaty language, as long as such activities are not prohibited by law or Statute. For the Karuk Tribe and the many other California tribes without ratified treaties or even reservations, let alone off-reservation hunting provisions, the status of their “off-reservation” hunting rights is currently undetermined. While they have never been codified or litigated, their rights have also

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<sup>939</sup> see e.g. Klamath River Keeper, Winter 2013, Pgs 4-5.

<sup>940</sup> see Sanders, Jason. Wolves, Lone and Pack: Ojibwe Treaty Rights and the Wisconsin Wolf Hunt. *Wisconsin Law Review*, 2013, p 8; Royster, Judith V. & Rory Snow, Arrow Fausett, Control of the Reservation Environment: Tribal Primacy, Federal Delegation, and the Limits of State Intrusion, 64 *WASH. L. REV.* 581, 601–05 (1989).

<sup>941</sup> See e.g. *United States v. Winans* 198 U.S. 371 (1905); *Kimball v. Callahan*, 493 F.2d 564 (9<sup>th</sup> Cir. 1974).

never expressly been extinguished. The Supreme Court has repeatedly held that “unequivocal congressional intent” is required to terminate an aboriginal hunting right<sup>942</sup>. The Karuk and many other California tribes lack clarity on the status of their sovereignty and the extent of their rights related to elk habitat and herd management in aboriginal territories.

The latest elk management plan for the Klamath National Forest (2007), co-authored by USFS and DFW, acknowledges the importance of indigenous ecological knowledge and stewardship practices, especially with regards to the use of fire to maintain elk habitat<sup>943</sup>. USFS is interested in managing for elk as a landscape-ecological indicator due to the multiple-resource benefits of elk habitat<sup>944</sup>. As mentioned last section, Klamath and Six Rivers National Forests have been engaged in the Fire Learning Network to plan, prioritize and execute fire and fuels management projects in the Western Klamath mountains. As Elk are seen as an important component of fire-adapted ecosystems and communities in the Western Klamath Mountains, their wintering range received two points for high-priority restoration sites and even one point for low-priority restoration sites<sup>945</sup>.

However, despite *de jure* support for Karuk cultural and political sovereignty in State and Federal executive orders and case law, *de facto* “sovereignty” in elk habitat and herd management is severely curtailed. On the ground, the ability of Karuk tribal members to use fire to manage elk habitat and to harvest elk for ceremonial and subsistence use is limited on multiple fronts. While USFS claims jurisdiction over most of the elk habitat in Karuk Ancestral Territory, the California Department of Fish and Wildlife maintains jurisdiction over the Marble Mountain elk herds<sup>946</sup>. The California Fish and Game Commission, composed of five members appointed by the Governor, is authorized by the California Constitution and the Fish and Game Code to regulate the

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<sup>942</sup> e.g. *Menominee Tribe v. United States*, 391 U.S. 404 (1968); *Minnesota v. Mille Lacs Band of Chippewa Indians*, 526 U.S. 172 (1999).

<sup>943</sup> From Klamath National Forest 2007, p 3: “Large herds of Roosevelt elk once roamed across much of Northern California....Their existence is documented by numerous place names and in anthropological accounts of tribes such as the Shasta, Karuk, Hupa, Chilula, Chimariko and Yurok (Bright 1978)...Landscapes once shaped by Indian burning have changed dramatically over the last 150 years (Huntsinger and McCaffrey 1995). By setting back vegetative succession and reducing overstories, these traditional burning practices created favorable elk habitat conditions (Higgins 1986). By the mid 1800s, traditional burning practices of Northern California Indian tribes had virtually ceased. Many areas once managed for oak woodlands and grasslands now have dense canopies of Douglas-fir and other conifers (de Rijke 2001)”; See also Bright, W. 1978. *Karok*. pgs. 180-189 in R. F. Heizer, ed., *California. Handbook of North American Indians*. Vol. 8 Smithsonian Instit. Press, Wash. D. C.; Huntsinger, Lynn and Sarah McCaffrey. 1995. *A Forest for the Trees: Forest Management and the Yurok Environment*. *American Indian Culture and Research Journal*, Volume 19, No. 4, pp. 155-192; De Rijke, Ellen A. 2001. Current status of the vegetation in historic Karuk cultural use areas. M. S. Thesis, Humboldt State University, Arcata, CA.

<sup>944</sup> KNF Elk Management Plan 2007, pg. 24.

<sup>945</sup> See WKRP Prioritization Matrix point scheme 12\_2013.

<sup>946</sup> See Fish and Game Code, Sections 200, 202, 203.1 and 240.

taking of fish and game within the borders California<sup>947</sup>, including specifying hunting seasons, bag limits, and the territorial boundaries of hunting<sup>948</sup>.

Members of the California Dept. of Fish and Wildlife I have spoken with have expressed interest in exploring possibilities of working with Tribes to manage elk habitat and herds. However, there is currently no legal or policy framework in place that spells out the authorities, government-government relations or specific processes for co-management of elk. Jurisdiction over elk is uncertain in the case of the Marble Mountain herds, who inhabit mostly Federal lands which lie mostly within Karuk ancestral territory, but only some of which is designated as cultural management areas or tribal trust lands.

From the Commission's perspective, wildlife belongs to the "people of the State" and therefore they see it as their duty, acting on behalf of the California public, to regulate the taking of fish and game within the borders California by specifying hunting seasons, bag limits and territorial boundaries. As one Cal DFW representative put it: "in general, CDFG is supposed to treat all citizens of the state equally; it's very rare where we can segregate groups and give them special treatment." However, case law such as *Morton v Mancari* holds that Tribes are distinct political communities with rights based on specific historical relationships and legal arrangements between the Federal government and Tribes as sovereign political bodies<sup>949</sup>. There are numerous mandates under federal law to authorize states to treat tribes and tribal members differently from the average public citizen. What is up in the air, though, is what exactly sovereignty in the case of elk habitat management and hunting entails in relation to general rights held by the "public" and the State and Federal agencies authorized to represent "public" interests in land and wildlife management. The definition of the "public" interest *vis-à-vis* "tribal trust" is a complex hypothetical legal question that shouldn't have to be addressed, since managing for the Tribal resource in this case actually enhances the public trust resource.

However, scientifically and legally proving that Tribes should be allowed to hold special elk hunting privileges based on their stewardship of the public trust risks subjecting the Tribe's sovereign hunting rights to Cal DFW regulatory oversight processes that could effectively diminish Tribal sovereignty. Tribal sovereignty and Tribal Trust should not be subservient to Public Trust, "else there would be nothing worth separating from rights held by the general public"<sup>950</sup>. The question of off-reservation rights in absence of specific treaty provisions is a difficult legal and political question that I will not attempt to address here due to the sensitivity and complexity of

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<sup>947</sup> Article IV, Section 20 of the CA const, by Sections 200-221

<sup>948</sup> "General statutory powers and duties vested in the Commission related to the take of birds, mammals, fish, mollusks, crustaceans, amphibians reptiles include the following: 1. Establish, extend, shorten or abolish open and closed seasons; 2. Establish, change or abolish bag, possession and size limits; 3. Establish and change territorial limits for taking any or all species or varieties; and 4. Prescribe the manner and means of taking any species or variety."

<sup>949</sup> *Morton v. Mancari*, 417 U.S. 535 (1974).

<sup>950</sup> *United States v. Winans*, 198 U.S. 371 (1905).

the issue. What these rights would entail with regards to ceremonial or subsistence elk harvest is an equally complex and sensitive question that touches on issues of territorial and criminal jurisdiction, epistemic questions about habitat conditions and population demographics, and political questions related to the State's relationship to recognized tribes with unrecognized treaty rights. Below, I will briefly explore two different legal avenues for Karuk elk co-management. I will then discuss the importance of visualizing elk foodsheds and performing their multiple social and ecological benefits to regulatory, legal, scientific and public audiences. In the conclusion of the chapter, I consider the possibilities elk foodsheds present for multi-scalar approaches to ecological democracy.

Given hesitation around the question of special hunting rights not held by members of the general public, it would be much easier for Cal DFW to set-up an elk co-management program with Karuk DNR if a law or a treaty provision explicitly covered Karuk off-reservation hunting that was specific to the tribe. There exists on the books an obscure provision of law- the California Dept. of Fish and Game Code Section 186- about which not much is known among either commissioners or tribal representatives I have spoken with, but which apparently relates to a 1985 State Supreme Court Case that codified the Tribe's fishing right. The provision allows for Karuk ceremonial game-take along a narrow section of the Klamath river corridor, but limits it to "ceremonial purposes in such manner as the commission deems proper"<sup>951</sup>. The permitting process laid out in the code has never been formally used, as it implies a diminishment of Karuk sovereignty and self-determination by requiring a permit that is contingent upon verification by Cal DFW of whether or not the take counts as a traditional or ceremonial practice. Another issue with Section 186 is the zoning restriction- "contiguous to the portion of the Klamath River between the mouth of the river and Katamin Rancheria", as Elk do not currently use the section of the river specified in the Code due to its proximity to roads and lack of refuge and forage<sup>952</sup>. Despite its significant flaws, Section 186 is a unique legal resource that, if amended to address the zoning and sovereignty issues, could potentially provide an opportunity for the Karuk Tribe to co-manage elk habitat and herds in their ancestral territory. Amending the DFW code, however, would take a lot of back-end work with the Cal DFW tribal committee, including rounds of drafting and word-smiting, complying with environmental regulations, lobbying commissioners and attending public hearings.

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<sup>951</sup> CDFW CODE Sec 186: (a) such portion of the public domain of the State of California as is contiguous to the portion of the Klamath River between the mouth of the river and Katamin Rancheria...and (e) Indians taking fish and game under this section shall do so in accordance with the rules and regulations of the Fish and Game Commission and under permit issued by the Department of Fish and Game. The commission may adopt rules and regulations and impose conditions on the issuance of such permits which shall limit the taking of fish and game to taking for ceremonial purposes in such manner as the commission deems proper. Sec 186 purportedly has its origins in CA case law related mostly to salmon fisheries.

<sup>952</sup> Pers com 3/14: However, a recent prescribed burn near Katimiin at the confluence of the Salmon and Klamath rivers has opened up habitat and, reportedly, elk moved in only three days after the treatment.

Another approach to Karuk elk co-management involves developing an MOU between the Tribe, the US Forest Service and Cal DFW that awards the Tribe a hunt allocation in exchange for their elk habitat management and enhancement initiatives. There currently exists a Cal DFW landowner set-aside program whereby private landowners manage their lands for elk in exchange for a draw in the lottery for that year's elk hunt tags. Landowners need at least 640 acres to enter the program, and the landowner signs a contract with Cal DFW stipulating the kind of restoration work they will do on their property. Then, based on an assessment of habitat enhancement, carrying-capacity, acreage, etc., the landowner gets a certain number of draws in the tag lottery. This could potentially be an avenue for KDNR to get an elk allotment in proportion to its elk habitat enhancement work. The main drawback with this approach is that the Tribe does not want to enter the tag lottery as merely another stakeholder in the draw; they demand to be negotiated with as a sovereign government with place-specific management expertise. If a similar acres-for-tags formula could be applied to public lands used to figure out an actual allotment each year, rather than a draw proportion, then a habitat-for-hunting rights MOU or government-to-government agreement might be a good entry point into elk co-management. The Tribe could then leverage their management expertise and ability to do cultural burns on public lands in exchange for sovereign authority over elk management and an allocation of harvest opportunities.

From Cal DFWs perspective, the Tribe is leading the Nation in wildland fire management, which is outside of their jurisdiction but one of the most critical components of wildlife management. A partnership with an entity like Karuk Dept. of Natural Resources or the Western Klamath Restoration Partnership is exactly what is envisioned in their latest State Wildlife Action Plan (2014)<sup>953</sup>. However, another drawback of the landowner set-aside program is that it focuses primarily on private lands and most of the elk habitat enhancement projects are slated for federal lands. If the State was interested in providing special access to elk for tribal members on public lands, they could create a "public lands management set-aside" program whereby they could set aside a share of the allowable harvest to a particular tribe or tribes in exchange for habitat enhancement work.

Sovereignty around the elk foodshed is currently undetermined on all sides. The Tribe's sovereignty over elk habitat, their ability to light cultural fires to manage elk habitat, and their ability to hunt elk in their ancestral territory have not been clearly defined by US Courts. The Department seems eager to work with the Tribe to find a solution that works for all parties, but is hesitant to open up the issue of off-reservation hunting rights for Tribes without ratified treaties. The next steps that KDNR and CDFW take in initiating the conversation around elk co-management are critical, with far-ranging implications not just for the Karuk Tribe, but for the self-determination and ecological and cultural revitalization initiatives of tribes across California.

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<sup>953</sup> California Dept. of Fish and Wildlife. *State Wildlife Action Plan*. 2014.

There is an epistemic dimension of the conversation that is important to address. As mentioned earlier, the Tribe does not want to be put in the position of having to prove scientifically to Federal and State agencies and the general public that its ceremonies and traditional elk habitat management practices are beneficial ecologically and for the habitat conditions and populations of species like spotted owl, salmon and porcupine. While that would enhance its epistemic authority, it could potentially jeopardize its legal authority and sovereignty. Having to prove that cultural practices “live up” to either to liberal multicultural standards of indigeneity or to scientific standards of viable population size perpetuates institutional racism and colonial modes of governance. Basing self-governance and eco-cultural revitalization on the outcomes of field experiments could easily subject their sovereignty to another “combat biology” battle over the “magic number” to balance Tribal harvest with population size<sup>954</sup>.

The tribe does engage “Western” science and technology in multiple ways to articulate tribal perspectives and push for eco-cultural restoration in its ancestral territories. As mentioned earlier, numerous wildlife biologists and fire ecologists have expressed support for their elk habitat restoration plans. However, the goal in articulating the importance of landscape-scale elk restoration is not to scientifically prove that it is ecologically beneficial, but to demonstrate the potential for far ranging social and ecological benefits while exploring a decolonial process for thinking about integrated resource management.

The elk foodshed is a reminder that decolonizing diet involves a thorough decolonization the way we conceptualize scale in integrated environmental governance as well as a decolonization of the laws, policies and institutions that govern how elk habitats and hunts are managed. How, then can the Karuk DNR convey the multiple social and ecological benefits of its elk habitat and herd management goals without either subjecting its rights and sovereignty to a high-stakes “prove it or loose” it experiment presided over by a science that may not be in touch with tribal perspectives?

#### *d. Prototyping Elk foodsheds*

I have been working with members of the Karuk Department of Natural Resources since January 2014 to explore different ways of articulating elk foodsheds to convey the social and ecological benefits of restoring elk habitat on a landscape scale as well as the importance of eco-cultural revitalization and food sovereignty to tribal communities living in the Klamath. Elk foodsheds aren’t an attempt to replace landscapes, firesheds or watersheds, but rather an attempt to make render them more responsive to people and place. Articulating an elk foodshed is piloting a means of landscape-scale eco-cultural revitalization that targets both watershed and fireshed management objectives and works towards reframing the perspective of agro-ecosystem management. The process of performing elk foodsheds has itself become an

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<sup>954</sup> see Ch 3 for discussion of the “magic number” in minimum in-stream flow debates.

experiment in learning and learning to live with multiple others, more-than-humans included. For me, the conversations with community partners about elk foodsheds have inspired new ways of thinking about scale in environmental governance as well as different ways of knowing nature and living in the world. However, the question of how to best communicate this concept to multiple audiences such as wildlife biologists, environmentalists, State and Federal agency administrators, recreational hunters and members of the general public has proven difficult, given the diversity of perspectives on elk habitat restoration and herd management and the sensitivity of the issues and interests at stake. We have therefore sought out low-entry barrier platforms and ways of exploring elk foodsheds that are easily accessible and open to input from multiple perspectives and types of situated knowledge.

We are currently (12/14) exploring ways of collecting multiple forms of data across elk's seasonal ranges, combining historical plot and aerial photo data with contemporary equipment such as radio collars, satellite imagery and go-pro cameras attached to kites. We're exploring ways of connecting the process of studying and monitoring elk foodsheds with other Tribal objectives related to food, fire and water management, youth empowerment and K-12 curriculum development. In addition to demonstrating the far-ranging ecological benefits of properly managed elk foodsheds, it is also important to educate policy and law-makers as well as the general public about the cultural and political significance of Karuk elk management. The goal of the elk foodshed concept is to convey a sense of the intricate connections between ceremonies, cultural practices and the ecological dynamics of place implicated in elk management from multiple perspectives. It is especially important to address the sensitive issue of "take" not shared by members of the public by demonstrating that being able to "take" in Karuk culture means reciprocally "taking care" of your relations. It is important to convey how Karuk elk management is driven by a spiritual sense of duty to steward eco-cultural landscapes<sup>955</sup>.

As Bill Tripp has expressed:

"It all Comes back to the principle that you can't take elk without caring for it, providing ample opportunities for them to thrive so that we can thrive. It's our identity as a people, our association with place that drives management".

Or as Ron Reed has put it:

"Taking care of the foodshed means taking care of your relations so they can take care of you".

It is important to convey to the public successful examples of elk habitat restoration projects that have supported diverse wildlife habitats and served multiple

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<sup>955</sup> e.g. "One should not take any creature (plant or animal) without first providing it a healthy environment in which to live, and ample opportunity to reproduce," in Karuk Tribe 2011, p 9, see also p. 18.

resource benefits for the local community. For example, Will Harling gave the example of the fireline from the '87 fire which, due to lack of maintenance, had turned into an "ignition strip". It was restored to an oak-woodland savanna by the Tribe through cultural fire and it later became a well-trafficked "elk highway". Another example given in the WKRP management plan (Harling and Tripp 2014) is a fuelbreak in a tan oak forest near a home that benefits the landowner by protecting them from wildfire, the elk that visit the stand to feed and bed down, and Tribal members who gather tan oak acorns on the property<sup>956</sup>. A shaded riparian fuel break in elk's wintering range provides shade for fish habitat, acts as a fuel break to stop the spread of fire and prevents erosion while supporting multiple cultural resources uses such as willow and hazel for use in basketry material. A recent (Spring 2014) burn near the Somes Elementary school ended up opening up mid-slope meadow habitat and elk who had not previously used the area moved in a mere three days after the burn, providing an excellent learning opportunity for local school children<sup>957</sup>.

Given the sensitivity of subjects like colonization, eco-cultural genocide and environmental racism, they must be approached with care to avoid perpetuating further epistemic injustice or shutting down the conversation on decolonization. Too soft an approach could cede sovereignty by subjecting Karuk management to State or Federal oversight, yet too strong and uncooperative an approach could backfire and end up in court cases and a litigious relationship with the Fish and Game commission, who have already expressed sympathy for the tribes position and demonstrated willingness to engage in exploratory conversations. Therefore a well articulated elk foodshed, with a well-thought out proposal for a phased piloting, implementation, monitoring and adaptive management plan is a good "public relations" strategy.

In community-mapping workshops co-sponsored by the Berkeley-based community mapping cooperative "Local Ground", the Karuk-Berkeley Collaborative and the AFRI Food Security project, we've explored a range of mapping approaches such as counter-mapping, crowd-sourcing, narrative approaches and mobile phone applications to tell place-based stories<sup>958</sup>. In the two workshops held so far, the scale or extent of the map is never given ahead of time, but is always up for discussion. The conversations and exercises encourage numerous ways of performing scale at multiple sites and the linkages between them.

At one place-based social learning workshop (8/2013) led by KBC member Sibyl Diver and Local Ground colleagues, teams of youth walked around Ti-bar flat with cultural practitioners, KDNR reps and UC Berkeley students to explore the habitat conditions of different traditional foods and cultural resources at different sites. Cultural practitioners and KDNR representatives toured with the youth groups around

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<sup>956</sup> Harling and Tripp 2014.

<sup>957</sup> Bill Trip Pers. Com. 3/14.

<sup>958</sup> See e.g. Van Wart, Sarah, K. Joyce Tsai and Tapan Parikh. "Local Ground: A Paper-Based Toolkit for Documenting Local Geo-spatial Knowledge". ACM DEV'10, December 17-18, 2010, London, United Kingdom.



the flat while the youth teams collected audio interviews with cultural practitioners, took videos and pictures and made hand-drawings at multiple sites. The activity was structured to be open to multiple forms of learning and communication from multiple perspectives. After the different groups shared their experiences, everything was gathered together and uploaded one the Local Ground platform, where it can be stored securely and arranged spatially.

In another workshop held at the Karuk Department of Natural Resources (7/14), we had conversation about how to move from the collection of spatial data to curation and communication, which again brought up questions related to data security and culturally sensitive information. Participants were clear that they did not want the locations of culturally significant foods and other sites such as cemeteries, sacred sites, medicinal plant or food gathering sites, and fishing spots ending up on publically available maps. We made an effort at this workshop to survey different ways of using community mapping tools to strategically tell place-based stories. We discussed different tools for stitching together local and indigenous knowledge at different scales and spatial-extents, while ensuring that certain sensitive and spatially-explicit information remains hidden so that the important course-scale contours of the stories can be shared out. We discussed ways in which “scalar strategies” can be used to keep sensitive information private while strategically sharing-out less spatially-explicit information out at more course and generically defined scales such as “cultural resource areas”.

This dynamic of inclusion and exclusion is critical to the ability of maps to be trustworthy vehicles for translating community-based information and transporting it into scientific journals or putting it in front of law and policy makers. We then facilitated a “prototyping” activity where we built working examples of map ideas. In attempting to bring them to life, we talked about the difficulties and challenges that emerged in the processes of creating them. The group identified over 40 different mapping ideas they would like to pursue in the near future. Even with the excitement around the potential for map-based communication to advocate for Tribal resource rights, and even with security protections in place, putting information on paper or in a map is still a very sensitive subject that needs to be approached delicately in this community.

As Bill Tripp remarked to me while discussing visually representing elk foosheds, the maps’ ability to travel depends on their being able to convey the general idea and principle rather than the specific characteristics of the site:

“It’s about how to look at the landscape, not about getting too specific on where to burn and when, etc., it’s more to convey they general idea of a foodshed. It’s a *purposeful and participatory abstraction* of the idea. It’s about a coarse-level conceptual alignment of the habitats, ecological mosaics, patches and stands that make up a foodshed, the mosaics of foodsheds that make up a fireshed and the firesheds that fit together in a firescape.”

Representing elk foodsheds for me is less about objectively identifying areas with elk habitat restoration potential and more about conveying the many-sided connections between ecology, cultural knowledge, resource management and availability of food resources. It's also about moving various audiences- academics, policy and law makers, environmental groups and the general public- to understand the histories and legacies of colonialism and environmental degradation and the motivation behind contemporary attempts to decolonize agro-ecosystem management in the Klamath. The process of representing foodsheds or agro-ecosystems cannot be separated from the practice of managing them and living in them. For these reasons, it is important to make the process of producing knowledge about elk, representing their movements across the landscape and monitoring their seasonal habitat needs more than a search for "magic numbers" (see Ch 3). Through Local Ground and Food Security workshops, we are experimenting with ways of making knowledge about foodsheds as inclusive as possible and open to multiple diverse perspectives of all ages. These workshops pilot an approach to learning that simultaneously builds local workforce capacity, facilitates learning and communication between youth and elders, and empowers the Karuk community to articulate their resource values and restoration goals in an open forum. The Local Ground platform is able to take in multiple perspectives at multiple scales and bring them together, holding them together in their contradictions and tensions as well as facilitating harmonies between different ways of knowing nature and living in the world.

#### **4. Conclusion: Decolonizing scale**

Elk foodsheds attempt to chart new ways of thinking about scale in community-based environmental governance by elaborating multiple socio-spatial formations without fixing them in the landscape or closing them off for discussion. Rather than plopping down expert-drawn watershed boundaries as the backdrop for democratic environmental governance, the elk foodshed reveals a scalar perspective that is nested, mobile, seasonal, adaptive and defined according to place and community. Elk guide fire across the landscape according to their seasonal movements and the community-specified cultural and ecological values they touch along the way. In tying together diverse wildlife species' habitats and the spatial contours of foodsheds, firesheds and watersheds, elk foodsheds weave different scalar perspectives together according to community values and the social-ecological specifics of place. The Local Ground workshops attempt to bring together different perspectives on ecosystem restoration without flattening them into terms of equivalence or into a single way of seeing or performing naturecultures.

The place-based stories that come out of Local Ground mapping activities or Food Security workshops are equipped to travel around the basin, to regional and national publics, wildlife biology and fire ecology journals, potential funders, and eventually to policy and law makers. As the elk foodshed concept travels and circulates, the hope is that it becomes something like an open-whole, or a "concrete-universal", what Bill Tripp terms a "purposeful and participatory abstraction" that will work to reverse legacies of colonialism and further the process of eco-cultural revitalization and

the Karuk cultural practice of “fixing the world”<sup>959</sup>. Elk foodsheds attempt to arrive at better, more adequate descriptions of social-ecological dynamics and restoration goals, where descriptions of place become stronger the more diverse viewpoints they include. The elk foodshed attempts to incorporate many people’s viewpoints and travel between different epistemic communities while maintaining its basic shape and its ability to shape perceptions, resource management institutions and practices along certain lines. Yet, due to cultural sensitivity issues, elk foodsheds are also equipped to travel responsibly, with an oversight process in place to make sure that information being shared out is not putting culture or sovereignty at risk.

My hope is that, as the elk foodshed circulates it doesn’t hide the process of its production, but highlights the complex social and political considerations and the messy mixing of situated knowledges and partial perspectives that give rise to this collective eco-cultural composition. The foodshed approaches the question of scale in environmental governance through a process that is open to perspectives of people of all ages and walks of life. The scales nested within and across elk foodsheds- such as forest stands, soil-vegetation associations, meadows, ridge systems, road networks and riparian corridors- are patterned around collectively identified social and ecological dynamics, in dialogue with the seasonal movements and habitat needs of a particular nonhuman and its relationships with the watersheds and firesheds that they move across and inhabit. Thinking through how to manage elk seasonal habitat implicates multiple other spatial dynamics related to road networks, firesheds, watersheds, households, soil-vegetation interactions and multiple other species’ habitat dynamics. Rather than a hierarchical relationship, these scales are positioned within a “flat ontology” where they reciprocally and relationally define one another<sup>960</sup>.

The elk foodshed and the WKRP “scoping exercise” are innovative technologies of vision that open up new ways of thinking about scale in community-based resource governance. The “scoping process” of the Fire-Learning Network similarly brings together multiple forms of situated ecological knowledge through an open and democratic process, moving the group towards a collective vision that guides prescribed fire in view of multiple resource values. While the process of defining the scope and breaking it up into “firesheds” was inclusive and attempted to accommodate multiple perspectives, it had a different method and focus than the process behind defining and delineating the foodshed. These two concepts and the institutions shaping up around them are complimentary. The foodshed makes an effort to take-in multiple perspectives on space from multiple angles and all ages. It is also aimed specifically at

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<sup>959</sup> On the “open-universal”, see: Grosfoguel, Ramón. "Transmodernity, border thinking, and global coloniality." *Eurozone: Decolonizing political economy and postcolonial studies* (2008); Grosfoguel, Ramón. "Decolonizing Post-Colonial Studies and Paradigms of Political Economy: Transmodernity, Decolonial Thinking, and Global Coloniality." *Transmodernity* 1.1 (2011): 1-36.

<sup>960</sup> For debates about “flat ontologies” see e.g. Marston, Sallie A., John Paul Jones, and Keith Woodward. "Human geography without scale." *Transactions of the Institute of British Geographers* 30.4 (2005): 416-432; Collinge, Chris. "Flat ontology and the deconstruction of scale: a response to Marston, Jones and Woodward." *Transactions of the Institute of British Geographers* 31.2 (2006): 244-251.

decolonizing the way we see ecosystems and watersheds, a longer-term “scope” than targeting the most strategic and efficient places to treat fuels across the landscape.

By comparison, the WKRP needed a process that was both inclusive and anchored in the best available data and modeling technology so as to put forth a rigorous scientific rationale for legal reasons and to show the general public that they were basing public decisions on solid scientific grounds. Firesheds and foodsheds highlight different but overlapping dimensions of biophysical and social processes in the Klamath. As mentioned earlier, the foodsheds around many traditional foods are maintained by frequent or seasonal applications of prescribed fire. Firesheds and foodsheds are designed to work together as well as target strategic dimensions of watershed management in upslope and riparian areas. One aspect of decolonizing scalar perspectives involves the ability to think multiple overlapping and sometimes contradictory scales together without hierarchizing them or collapsing important differences between them. It is not that Karuk representatives “jumped scale” and abandoned the watershed for the fireshed or the fireshed for the foodshed. Read diffractively, watersheds, firesheds and foodsheds reciprocally define one another through illuminating significant differences between distinct ways of seeing naturecultures and acting collectively in the world. Rather than requiring that each scale is rendered commensurate with a “master-scale”, in “emergent mapping”, connections between scalar perspectives are created by “stitching together templates and partial mappings from context to context”<sup>961</sup>.

The elk foodshed explores decolonial perspectives on scale by opening up multiple ways of forging paths between sites of knowledge generation and the regional, global and “pluriversal” spaces of knowledge circulation. The elk foodshed attempts to articulate a perspective on scale that is at once open to multiple human perspectives and resource values, and at the same time responsible to the habitat needs of multiple species. Watson and Huntington similarly narrate a process of “walking-with” to describe Koyukon hunting practices and indigenous knowledge by “co-narrating their movements and conversations through the physical and epistemic spaces shared during a moose hunt”<sup>962</sup>. They develop an epistemic and writing practice that enables them to “walk alongside other epistemic worlds”, facilitating learning and dialogue between different epistemic cultures.

I’ve argued in this chapter that Elk foodsheds provide a good multiscale template through which to bring together situated knowledges through material-semiotic engagement with elk and their movement across Klamath eco-cultural landscapes. Elk lay down a different kind of spatial fabric than the watershed for the formation of political collectives in the Klamath. Instead of rendering knowledges

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<sup>961</sup> Turnbull, David. “Maps narratives and trails: performativity, hodology and distributed knowledges in complex adaptive systems—an approach to emergent mapping.” *Geographical Research* 45.2 (2007): 140-149.

<sup>962</sup> Watson, Annette, and Orville H. Huntington. “They’re here—I can feel them: the epistemic spaces of Indigenous and Western Knowledges.” *Social & Cultural Geography* 9.3 (2008): 257-281, p. 77.

commensurable through “combat biology” (Ch3) at the pre-given scale of the watershed, the scale or space of collaboration is itself defined democratically by humans of all ages in dialogue with the movements and habitat needs of a particular non-human. Elk foodsheds are “living maps”, deliberately working against what Turnbull terms the “cartographic illusion”, or the idea that maps represent pre-existing reality-“when movements of the traveling story are erased or suppressed, illusion is created that the structure of the map represents the structure of the world”<sup>963</sup>.

As discussed extensively in Chapter 3, in contrast to representationalist accounts of nature that emphasize the correspondence between representation and reality, a performative approach to knowledge-generation emphasizes an embodied engagement with material reality that transforms that reality in the act of representing it. It entails working with multiple ontologies across multiple scales, forging trails across diverse sets of epistemologies and ontologies through forging connections between people and places. It is not neutral, disinterested correspondence with objective reality that enables harmony among partial perspectives or makes collective action possible, but rather collectively designed processes for bringing multiple partial perspectives together at collectively defined scales and socio-spatial formations. The WKRP scoping process and the elk foodshed demonstrate how multi-scalar perspectives and deliberative approaches to questions of scale in resource management open up new possibilities for ecological democracy beyond the watershed.

In the next chapter, I follow the waters of the Klamath underground in one of its most contested Basins, the Scott Basin, which is just upstream from Karuk aboriginal territory, but home to some of the best Salmon spawning habitat in the Klamath and also to some of the most intensive groundwater pumping in the Basin. I analyze the production of hydro-social scale by a particular non-human, Beaver, and examine how beaver-based collaboration is creating new ways of producing knowledge about watershed processes as well as new ways of governing access to watershed resources.

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<sup>963</sup> Turnbull 2007; Turnbull, D., 2001: Cultural encounters, go-betweens, and the tense topography of the intercultural zone. In *William Buckley: Rediscovered*. Geelong Gallery, Geelong, 18–25.

## Chapter 6

### *Beaver believers, beaver deceivers and the hydropolitics of the Scott subterranean*

#### **1. Intro**

This chapter follows the waters of the Klamath underground in one of its main tributaries, the Scott River, where the science of groundwater hydrology entangles with property regimes to arrange relations between State and Federal agencies, landowners and non-human watershed inhabitants. Debates over how water does and should flow through the subsurface of the Scott interlace with struggles over the watershed resources, aquatic ecosystems, local economies and livelihoods supported by Scott river flows. The Scott River drains a remote 520,184-acre watershed inhabited by around 8,000 people<sup>964</sup>. It has taken center stage in Klamath resource conflicts and become a central site for State-wide negotiations over the authority of California wildlife and water agencies to regulate groundwater-use on private lands. Regulatory conflict in the Scott centers around whether or not the watershed can furnish adequate baseflows in the dry summer months to support endangered Coho Salmon, at the same time that ranchers depend on groundwater withdrawals to grow alfalfa and graze cattle. The geohydrology behind the precise effect that ranchers' groundwater pumping has on subsurface flows and, in turn, on in-stream flows and habitat conditions has become a focal point of Klamath resource conflict.

In Scott watershed debates, downstream tribes, fisherfolk and environmental NGOs pit their groundwater models against models assembled by cooperative extension specialists at the behest of ranchers and local agencies in attempts to influence court and regulatory agency decisions. The authority of public agencies to regulate land and water use on private lands in turn depends on being able to prove connections between isolated instances of groundwater pumping and their cumulative watershed-scale effects on in-stream flow dynamics and Coho habitat conditions. In the first half of this chapter, I examine how debates over groundwater hydrology negotiate the boundary between public trust and private property in Scott groundwater governance regimes. Beyond merely representing or simulating Scott subsurface processes, the outputs of these models and outcomes of these modeling wars materially compose the hydrologic regime of the Scott. Alongside seasonal and annual fluctuations in precipitation, diversions and groundwater pumping, Court decrees and regulatory agency decisions

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<sup>964</sup> Foglia, Laura, Alison McNally, Courtney Hall, Lauren Ledesma, Ryan Hines, and Thomas Harter. *Scott Valley Integrated Hydrologic Model: Data Collection, Analysis, and Water Budget Final Report*. 2013, p. 29: "Approximately 8,000 people live in Scott Valley and its two towns of Fort Jones and Etna. Land use and the local economy are dominated by agriculture, primarily beef cattle-raising and forage production (alfalfa and grain hay and pasture)".

choreograph how, when and in what quantity and quality water flows through the Scott watershed. Beneath the surface of the Scott, publics and property relations, knowledge of groundwater hydrology and actual hydrologic regimes are all co-produced.

In “Notes on the Underground: an Essay on Technology, Society and the Imagination”, science studies scholar Rosalind Williams takes the reader on a journey into the underworld to examine how geologic representations of subsurface processes combine with sociotechnical imaginaries to create speculative fictions that serve as outlets for social anxieties about the environmental future<sup>965</sup>. According to Williams, “since the 19<sup>th</sup> century, narratives about underground worlds have provided a prophetic view into our environmental future”<sup>966</sup>. She explores the subterranean environment as a contested techno-scientific and material space, but also as a “mental landscape, a social terrain and an ideological map”. Debates over the state of the Scott subterranean similarly entwine cultural politics, geohydrology and imaginaries, but they are also linked to very material everyday concerns. The “social anxieties” at play here implicate local economies and rural livelihoods, climate change-induced changes in snow pack and either an overactive or an underactive State, depending on whom you talk to. Scott Valley farmers and ranchers fear State and Federal agencies will regulate land and water use on and under their property while downstream fisherfolk are anxious about State agencies *not* regulating groundwater pumping and the stream running dry and stranding fish. These anxieties are more than speculative. While groundwater models battle it out in courts, the Scott dries up completely in sections of the mainstem almost every summer<sup>967</sup>.

This chapter seeks a way out of the regulatory and epistemological gridlock plaguing Scott groundwater debates by following a number of Scott landowners, fisheries biologists, and watershed advocates who are themselves taking a cue from beaver (*Castor canadensis*) on how to restore flow regimes and fish habitat in the Scott. Beaver dams create deep ponds, act as sediment traps, maintain stream complexity and support diverse aquatic and riparian habitat. They reduce stream-flow velocities and increase surface water storage, thereby recharging aquifers and maintaining base flows throughout the dry season. In the first decade of the 21<sup>st</sup> century, fisheries biologists and watershed activists began arguing that beaver dams can recharge depleted aquifers, mitigate against climate change, and restore endangered Coho runs. Beginning around 2011 there has been tentative political and epistemic alignment in the Scott Basin among ranchers, county supervisors, watershed councils, Federal and State agencies, Tribes and fisherfolk who are all interested in exploring the potential of working with beaver to restore flow

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<sup>965</sup> Williams, Rosalind. *Notes on the Underground. An Essay on Technology, Society, and the Imagination*. MIT Press. 2008.

<sup>966</sup> Williams 2008, p. 4.

<sup>967</sup> Terence, Erica. “The Ongoing Struggle for Water on the Scott River Threatens Coho Survival”. *Klamath River Keeper*. 2012.

regimes and Coho habitat. This chapter examines what is at stake in this emerging “beaver turn” and its enactment of multi-species collaborative watershed restoration.

I follow beaver as they seed new alliances between Scott landowners and State, Federal and local agencies and facilitate new up-stream/down-stream and in-basin/out-of-basin relations between ranchers, Tribes and environmental groups. Beavers seem to be convening new kinds of “publics”, or sites of mutual witnessing and collective deliberation, and opening up space for the elaboration of common worlds across species lines. Encounters with beaver are changing how State and Federal representatives conceptualize their relationships with non-human watershed inhabitants and their sense of duty as trustees or stewards of public land and collective wellbeing. Debates around beaver also seem to be maintaining spaces of non-interference and secrecy, especially with regards to the right of landowners to trap beaver and take down their dams if beaver are damaging “land or property”. In the “Beaver turn”, I see an opportunity to challenge subject-object positions and citizen-state relations assumed in liberal democratic theories of property. I also explore how beaver collectives have shifted the epistemologies and ontologies of the Scott watershed from a representationalist, human-centric approach inclined towards modeling wars to a more performative, collaborative and adaptive multi-species approach to knowledge generation that materially engages the watershed and its non-human inhabitants.

## **2. The Scott Subterranean**

The headwaters of the Scott River rise in Marble Mountains to the West and in the Scott-Trinity Mountains to the South. In these 8,000 ft alpine drainages, precipitation falls in the 60-80 inch/yr range, compared to 21-25 inches/yr in the valley bottom and 12-15 inches/yr in the rainshadow of the Basin’s east side<sup>968</sup>. As soon as the mountain streams leap out of their steep headwater drainages, they hit the flat valley bottom of the Scott and disappear into the coarse gravel and cobble of their flood plains and alluvial fans. These regions where the tributaries meet the flat valley bottom are generally the areas of highest recharge of the Scott Valley groundwater basin<sup>969</sup>. This 400,000 acre-ft aquifer resides in the water-bearing alluvium that sits inside a tectonic graben formed between the Greenhorn and Scott Valley faults<sup>970</sup>. What happens after the headwater streams disappear into the subterranean abyss of their fanheads presents the crux of this chapter’s drama.

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<sup>968</sup> Harter 2013 p 24; North Coast Regional Water Quality Control Board, *Scott TMDL Staff Plan 2005*, p 32.

<sup>969</sup> In addition, the floodplains and underflow of the Scott mainstem and tributaries are major areas of recharge, see Foglia 2013..

<sup>970</sup> The basin ranges from 28 miles long at its widest point to .5-miles at its narrowest. From Foglia 2013, p 21.



The Scott tributaries and mainstem channels alternately gain water from and lose water to sub-surface flows at different points along the stream system and at different times of the year, depending on relative levels of precipitation, snowfall and amounts of groundwater withdrawal. The complex lives of the subterranean waters of the Scott as they flow under the valley floor, into the mainstem and eventually into the Klamath have become the main subject of recent court-cases and regulatory debates that pit ranchers, environmentalists, Tribes and State regulatory agencies against one another.

The hydrology and geomorphology of the Scott supports important spawning and rearing habitat for endangered Coho Salmon while its flat valley bottom makes for choice cattle pasture, provided it can be irrigated. The use of water for pasture irrigation and for fish habitat are positioned in direct conflict during the low-flow periods of late-summer, when fish need water in-stream and farmers need it in their fields. As Coho and Chinook Salmon migrate from the Pacific Ocean, up the Klamath and into their natal tributaries to spawn, they depend on connected habitat and cold-water refugia in deep, cool, shaded pools. Farmers can't divert surface flows in the dry summer months and must therefore rely primarily on groundwater pumping to grow hay and irrigate their pastures. As one landowner told me, "Groundwater is the heart and soul of this economy; take the groundwater away and it's all gone"<sup>971</sup>. However, as a result of summer groundwater pumping and legacies of watershed degradation, sections of the Scott's mainstem completely dry up almost every summer, disconnecting stream reaches and stranding salmon. While the Department of Fish and Wildlife frantically scrambles to scoop up and transfer the thousands of stranded salmon, downstream Tribes, fishermen's associations and environmental NGOs desperately work the courts and regulatory agencies to get more water dedicated to instream flows. Scott groundwater is just as much at the "heart and soul" of the economies and cultures of downstream tribes and fisherfolk, who depend on salmon for ceremonial, subsistence, and economic purposes. As the former chairman of the Karuk Tribe recently expressed, "we support Siskiyou County's agricultural economy, but we have to find a better balance between agriculture and fisheries so we can all thrive economically and culturally"<sup>972</sup>.

As early as the 1930s, California and Federal water and wildlife agencies began researching strategies for augmenting in-stream flows, proposing everything from beaver and check dams to water transfers and cut-backs in irrigation deliveries. However, most attempts to get water back in the stream have been resisted by local water-users, who see State and Federal regulation as a violation of their vested property rights in land and water. Scott Valley lies squarely within Siskiyou County and the "State of Jefferson", a long-time "separatist" region in Northern California and Southern Oregon allied around ranching and farming economies, libertarian political culture and belief in the sanctity of private

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<sup>971</sup> Pers com 11/14/13.

<sup>972</sup> Bacher, Dan. "Groundwater Conditions in Scott Valley". Karuk Tribe press release: 6.1.12.

property. The Scott is home to a local chapter of the Tea Party as well as to “Scott Valley Protect Our Water (POW)”, a political collective who define themselves as an:

“ad-hoc group of like-minded individuals, who have decided to stand-up against governments, its agencies and officials, when those governments, agencies and officials are invasive and threaten OUR Individual and Property Rights”<sup>973</sup>

Regulatory processes such as California Department of Fish and Wildlife’s (Cal DFW) streambed alteration permitting, the North Coast Regional Quality Control Board’s TMDL implementation plan, and the National Marine Fisheries Service’s SONCC Coho Salmon Recovery efforts have all met with opposition in the Scott. Members of the Tea Party, POW and other right wing rural advocacy groups like Save Our Scott and Shasta (SOSS) picket and protest outside agency meetings, and in May, 2013, even staged a walk out from a Cal DFW meeting. During a discussion about stream and riparian condition monitoring on private property at a TMDL meeting I attended in 2011, an audience member subtly made reference to their ability to “exercise their 2<sup>nd</sup> amendment rights” if Regional Water Board scientists were seen on their property.

In September 2014, in an extreme move, the Siskiyou County Board of Supervisors actually voted 4-1 to declare to the California Legislature their intent to secede from California<sup>974</sup>. Supervisors who voiced support for secession cited the “negative impact of State rules and regulations associated with water quantity and quality” and “concerns regarding the increasing State rules, regulations, and policies and the associated negative impacts to rural citizens”<sup>975</sup>. The declaration came after POW pleaded with the Board to create a separate State for Siskiyou due to “lack of representation for rural/frontier counties in the California legislature, increasing regulatory burdens, and disregard for property and Second Amendment rights”<sup>976</sup>.

The regulatory gridlock over groundwater often ends up in Courts, with State regulatory agencies caught directly in-between ranching and fishing interests.

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<sup>973</sup> Scott Valley POW mission statement: “We say “NO” to those regulations that are attempting to destroy our Constitutional Rights. We will not submit, nor sign our rights away; we will stand on those Constitutional Rights with all the resources at our command”.  
[http://pienpolitics.com/?page\\_id=837](http://pienpolitics.com/?page_id=837) (3/21/14)

<sup>974</sup> Siskiyou BoD minutes, Vol 72, 268 September 3, 2013: “It was moved by Supervisor Armstrong and seconded by Supervisor Kobseff to adopt the Declaration to the California State Legislature supporting the withdrawal of Siskiyou County from the State of California, authorizing the Vice Chair to sign the Declaration and requesting that the County’s State Assembly member and State Senator read the Declaration into their respective legislative records on behalf of Siskiyou County”. See also Mather, Kate. “Siskiyou County votes to pursue secession from California”. *LA Times*, Sep 4, 2013.

<sup>975</sup> Supervisors Chris, Kobseff respectively, Siskiyou BoD minutes, Vol 72, 268 September 3, 2013.

<sup>976</sup> Siskiyou BoD Minutes, Vol 72, 254, August 13, 2013.

On one hand, State agencies are sued for overstepping their authority by Scott Basin residents and local agencies, while on the other, they are sued for doing too little by downstream tribes, commercial and recreational fisherfolk and out-of-basin environmental organizations. For example, in 2010, when the California Dept. of Fish and Wildlife (Cal DFW) attempted to require §1602 stream-bed alteration permits for all water withdrawals in the Scott, the Siskiyou County Farm Bureau sued them for breach of authority in regulating the exercise of valid water rights<sup>977</sup>. In December 2012, the Siskiyou County Superior Court sided with the Farm Bureau and enjoined Cal DFW from “require(ing) notification of the act of extracting water pursuant to a valid water right where there is no alteration to the bed, bank, or stream”. Around the same time in the same Court, the environmental group Klamath Riverkeeper successfully sued Cal DFW over their watershed-wide “Incidental Take Permit” program for Scott endangered Coho. The Superior Court held that their Environmental Impact Reports were inadequate due to faulty environmental baselines based on already-occurring illegal takes<sup>978</sup>. In another recent case, the Environmental Law Foundation brought suit against the California State Water Resources Control Board (State Water Board) and Siskiyou County for “failing to manage groundwater resources interconnected with the Scott River in a manner consistent with the Public Trust Doctrine of California”<sup>979</sup>. On July 15, 2014, Judge Allen Sumner of the Sacramento Superior Court ruled for the first time in California’s history that groundwater pumping must be regulated to protect Scott in-stream flows under the “public trust doctrine”<sup>980</sup>.

These debates over the subterranean waters of the Scott call forth multiple publics with interests and values attached to the various resources supported by Scott subsurface flows. California State Agencies and Federal Agencies are charged with stewarding different components of the Scott watershed system on behalf of the publics they represent. However, State and Federal agency jurisdiction is held in check in the Scott by Siskiyou County authorities that represent local publics, such as the Board of Supervisors, the Resource Conservation District, the Groundwater Advisory Committee and the Sherriff’s office as well as Scott sub-basin committees and watershed councils that are established through Basin-wide and other bioregional planning processes. Dewey’s definition of a public as a general relation among “indefinite others” implicated in the scope of a problem does not here capture the multiple competing publics drawn together around the

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<sup>977</sup> *Siskiyou County Farm Bureau v. California Department of Fish & Game*, Siskiyou County Superior Court Case No. SC SC CV 11-00418

<sup>978</sup> *Klamath Riverkeeper et al v. California Department of Fish and Game*- CPF-09-509915- Statement of Decision Granting Writ of Mandate: “DFG abused its discretion in adopting this baseline and precluding meaningful analysis of increased take, which was a foreseeable result of increased water diversions. Accordingly, the Court finds DFG abused its discretion by failing to adequately consider the Programs’ significant environmental effects, as required by CEQUA”, p. 16.

<sup>979</sup> *ELF v. State Water Resources Control Board et al. (2014)*

<sup>980</sup> See Environmental Law Foundation. “*Court Rules Groundwater Protected as Public Trust*”. Press release, July 16, 2014.

multiple resources, livelihoods and cultures implicated in Scott flow debates<sup>981</sup>. As local, State and Federal agencies engage in Scott flow debates on behalf of their constituents, they negotiate the boundaries and composition of “the public” and determine whose voices, values, knowledges and interests will come to matter in shaping the Scott subterranean.

The contested public spaces of the Scott are also dotted with numerous private spaces, or zones of regulatory non-interference carved out around private property rights in land and water. About sixty-one percent of the Scott Watershed, or 316,471 acres, is privately owned, compared to around three percent of the Salmon Watershed (Chs 4-5). In 1980, the Basin was fully adjudicated and rights to specific quantities and applications of water were allocated and their priority rankings and schedules specified<sup>982</sup>. In addition, Tribes downstream from the Scott argue that they hold traditional cultural property rights in salmon that spawn and rear in the Scott as well as to certain habitat conditions needed to support these populations. Environmental NGOs based downstream and out-of-basin see in the Scott one of the most degraded watersheds in the Klamath, but also one with extremely high restoration potential that could benefit from their expertise and resources. To complicate a neat upstream-downstream or in-basin/out-of-basin depiction of the political and cultural geography of the Scott watershed, it is important to note that many ranchers, environmental NGOs, and tribal members living within the Scott Basin care deeply about their watershed and attempt to steward their private ranches and streams in view of downstream, out-of-basin and public water quality and fisheries concerns. As one Scott rancher told me, “My wife and I think that ranching, fisheries and wildlife can go hand and hand”<sup>983</sup>. As another put it:

“People remember when you could fish in your backyard. These are family farms, people want something left behind for kids. They are stewarding their land and streams for future generations.”<sup>984</sup>

### **3. Property, watershed, effect**

In the Scott, the meaning and scope of private property rights in land and water and the privileges and obligations these rights confer are being negotiated alongside debates about the connections between subsurface and surface flows. The next section examines the role that knowledge politics play in negotiating the boundaries between public and private in Scott groundwater governance. This section recruits legal geography and political ecology literature on property to help force open the subject-object and state-citizen relations that anchor liberal democratic property theory. In addition to political economic interpretations of

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<sup>981</sup> Dewey, John. *The Public and Its Problems*. 1927. See also Ch 1.

<sup>982</sup> Scott River Decree (No. 30662) 1980.

<sup>983</sup> Pers com. An. 11/13.

<sup>984</sup> Pers com. An. 11/13.

property as a means of regulating access to scarce resources, property theorists have drawn attention to the moral and cultural dimensions of property relations. Political theorists and legal scholars point to the etymological connections between *propriety*, what is considered proper, and *property*, allocating to each that which is proper or appropriate<sup>985</sup>. John Locke used the two terms interchangeably in his late 17<sup>th</sup> Century writings on property. According to legal theorist Carol Rose, what is proper in this notion of property is “that which is needed to keep good order in the commonwealth or body politic”<sup>986</sup>. Property is one among many institutions that works to reproduce social relations and maintain a particular social order. To Scott ranchers as well as to Tribal and commercial fisherfolk, property rights in land, water or fish are not mere commodities that can be rendered commensurate and exchanged along a single scale of value. Rather, property regimes are tied to specific cultural practices, cosmologies and livelihoods.

For Locke, humans mixing their labor with nature is the natural origin of both property and civil government. His narrative depicts “Man”<sup>987</sup> as possessing original property in his person, which he then freely mixes through his labor with nature in order to make more property. Property to Locke is not a social convention or contract, but a “natural right, exercised by the objectification of the person in his works”<sup>988</sup>. It thus follows for Locke that the main role of government is to protect Man in his natural freedom to dispose of his bodily, real and intellectual property at will. Thomas Jefferson, borrowing heavily from Locke, also posited a natural connection between the freedom of the individual, private property, and liberal democratic government<sup>989</sup>. From freedom in person and the natural right of “Man” to think and act freely followed the means, ends and limits of the powers granted to the State. For Jefferson, democratic order was firmly anchored in private property, family-operated 160-acre homesteads and a rural agricultural lifestyle.

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<sup>985</sup> Humphrey, Caroline, and Katherine Verdery. "Introduction: Raising questions about property." *Property in question: Value transformation in the global economy*. Oxford: Berg, 2004, p. 5.

<sup>986</sup> Rose, Carol M. *Property and persuasion*. Westview Press, 1994, p 58.

<sup>987</sup> Here I am using a gendered “Man”, as Locke and Jefferson were clear in their beliefs that only a certain subset (white, male) of the human population was capable of free, rational, and moral thought and action and thus capable of owning property and participating in democratic self-governance

<sup>988</sup> Haraway, Donna Jeanne. *Modest- Witness@ Second- Millennium. FemaleMan- Meets- OncoMouse: Feminism and Technoscience*. Psychology Press, 1997, p. 72.

<sup>989</sup> See Locke, John. *The Second Treatise of Government and A Letter Concerning Toleration*. Dover: 2012 (1689), p iii. See e.g. Basasni, Marco. “Life, Liberty and...:Jefferson on Property Rights”. *Journal of Libertarian Studies, Volume 18, no. 1 (Winter 2004)*, pp. 31–87. See esp. ft nt 30, which claims that Jefferson was accused of having copied the Declaration from Locke’s Second treatise on government. In a letter to Madison, Jefferson noted, “Richard Henry Lee charged it as copied from Locke’s treatise on government.” See Thomas Jefferson to James Madison, August 30, 1823, *The Writings of Thomas Jefferson*, ed. Lipscomb and Bergh, vol. 15, p. 462; Stoner, James R. Jr. *Common Law and Liberal Theory: Coke, Hobbes, and the Origins of American Constitutionalism*. University Press of Kansas, 1992, p. 137.

Over a century of US land policy, from the Land Ordinance of 1785 to the Homestead Act of 1862 and the Dawes Act of 1887 issued from visions of Jeffersonian agrarian democracy. In addition to naming the “hoped-for” State of Jefferson after Thomas Jefferson, some ranchers in the Scott proudly trace their titles to Homestead Act claims<sup>990</sup>. For both Jefferson and Locke, only a certain subset (white, male) of the human population was considered capable of free, rational, moral thought and action and thus capable of owning property and participating in democratic self-governance. For both, the corollary of the property-protecting State becoming the responsible government of a free people was the property-owning subject becoming the respectable citizen of a democratic polity.

For Locke, the seeds of subjects, objects and governments all germinated in the original property relation set in motion by divine cosmological order. The “architecture of social order” was oriented around protecting free and rational human thought, action and property, as prescribed by natural law- the “order of nature as a seamless web of connection, harmony and interdependence among all created things”<sup>991</sup>. The divine laws of motion that created the cosmos gave to humans free, rational and moral capabilities and prescribed their manner of being in the world. As philosopher Kirstie McClure shows, the metaphor “architecture of order” allowed Locke to reconcile human freedom, physical necessity and divine creation through the original property relation, “allowing fulfillment of gods intentions to remain an ever present possibility...within a world of things and creatures”<sup>992</sup>. Due to their privileged rational and moral capabilities, humans were placed at the “acme of terrestrial beings” in the cosmos and the domain of things and creatures was given to the human species for their “use, convenience and comfortable preservation”. This “architecture of order” and its separation between the human subjects and non-human objects of property has remained strong in discourses of ownership permeating resource conflicts in the Scott.

### *Challenging the subject/object binary in property theory*

In the remainder of this section, I follow Katherine Verdery and Caroline Humphrey and ask “how property comes to be the label under which certain kinds of phenomena are arrayed” and specifically “how the persons or things of a property relation come to be understood as persons and things”<sup>993</sup>. What kinds of entities are admitted into subject or object positions in a property relation and what kind of a relation is posited between them in classic liberal democratic

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<sup>990</sup> Farming and ranching have been an important part of the Scott Valley economy since the mid 1800s. Hay cutting and cattle grazing began in 1851 (Wells, 1881, in Sommarstrom et al., 1990) primarily to support the local miners.

<sup>991</sup> McClure, Kirstie Morna. *Judging Rights: Lockean Politics and the Limits of Consent*. 1996, p.32.

<sup>992</sup> McClure 1996, p. 47

<sup>993</sup> Verdery, Katherine and Caroline Humphrey. “Introduction: Raising Questions about Property” in *Property in question: Value Transformation in the Global Economy*. Katherine Verdery and Caroline Humphrey eds. 2004, pgs 6-7.

property narratives? On the other hand, the standard social science perspective defines property as institutionalized relations of persons to things or as person-to-person relations mediated through things<sup>994</sup>. As Verdery and Humphrey show, such theories pose an unproblematic distinction between persons and things and assume that they are clearly bounded, have integrity and are easily recognized as separate kinds of entities.

In order to fully understand property relations in the Scott subsurface, I agree with them that “we must reassess the entire nexus of ‘persons-things-relation’ central to the most prevalent way of understanding property” (p 7). What happens to the property relation if we see things and persons not as clearly bounded and separate, but as participating in one another? I argue, along the lines of feminists and science studies scholars of materiality, that “things” consist of assemblages of biocultural relations on one hand and, on the other, individual human “subjects” can be seen as “ecologies of selves”, “composites”, or partible assemblages of the multiple social and natural relations in which they participate<sup>995</sup>. Therefore, the subject-object boundary assumed in contemporary property regimes must be reconfigured so as to decenter human agency and situate human land and water use within the relational watershed ecosystem that humans both participate in and depend upon.

The conception of property as a relation among people in regard to things was helpful in “denaturalizing” the Lockean property relation and breaking through the veil of the “seamless web of harmony” that justified and concealed hierarchical relations among people. However, grounding the realities of property merely in social relations ignores the important role that other-than-humans and material natures play in property relations. Legal geographer Nicholas Blomley argues that the “narrative approach” to property theory is helpful in allowing us to interrogate the subject positions and explore the histories of property, but that it deflects us from the geographies of property<sup>996</sup>. For Blomley, nature enters

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<sup>994</sup> For example, von Benda-Beckmann and Wiber (2006) propose an analytical framework for analyzing property relations as comprised of three major elements: 1. the social units (individuals, groups, lineages, corporations, states) that can hold property rights and obligation 2. the construction of valuables as property objects 3. different sets of rights and obligations social units can have with respect to such objects. See e.g. von Benda-Beckmann, Keebet and Franz von Benda-Beckmann, and Melanie Wiber (Eds). *Changing Properties of Property*. Berghahn Books: 2006.

<sup>995</sup> For “Assemblages”, see Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*. 2007. pp. 71, 88-91, 323-37, 503-5; “Ecologies of self”: see Kohn, Eduardo. *How forests think: Toward an anthropology beyond the human*. Univ of California Press, 2013.; “Composites”: see Strathern, Marilyn. 1988. *The gender of the gift: problems with women and problems with society in Melanesia*. Berkeley: University of California Press; 1991. *Partial connections*. Savage, Md: Rowman & Littlefield; 1992. *After nature: English kinship in the late twentieth century*. Cambridge: University Press; 1999. *Property, substance, and effect*. London: Athlone.

<sup>996</sup> Blomley, Nicholas. “Landscapes of property.” *Law and Society Review* (1998): 567-612; Blomley, Nicholas. “Flowers in the bathtub: boundary crossings at the public-private divide.” *Geoforum* 36.3 (2005): 281-296; Blomley, Nicholas. “Simplification is complicated: property, nature, and the rivers of law.” *Environment and planning. A* 40.8 (2008): 1825.

property in multiple ways, often playing the role of agent or actor. He gives the example of an accretion/avulsion case involving the movements of the Blackbird Bend in the Missouri river<sup>997</sup>. While the court sought to fix the river in one of the two legal categories, the river proved uncooperative:

“The river is mobile, illegible and obdurate. At Blackbird Bend, the river fought back....the river is, in that sense, a legal actor.”<sup>998</sup>

However, so as not to forget the lessons of the first wave of property criticism that denaturalized the property relation, it is important to note that nature does not enter property unproblematically, issuing forth from either science or law fully-formed. In Blomley’s example, several conflicting Missouri rivers were produced through property law, with either side attempting to demonstrate faster or slower movements of the river to prove their legal argument. In Blomley’s account, it is through these messy and contradictory practices that property becomes present in everyday life. Always born of the “mutual involvement of people and materials in an environment”, the practices of property entail the “entanglements of persons and things, such as clods of earth or keys and doors”<sup>999</sup>. Property effects are always particular accomplishments rather than naturally given relations between preformed subjects and objects. Though property practices may congeal into distinct regimes or patterns of relation, Blomley reminds us that the social-natural production of property is always partial, incomplete, and contradictory<sup>1000</sup>.

The next section attempts to outline the messy and contested processes through which the Scott subterranean enters property. Holes in California regulatory code, conflicting groundwater hydrologic models and regulatory policy disputes over Scott instream flows secrete the property regime of the Scott subsurface. Section 5 then explores the way beaver experiments have shifted groundwater debates and property relations, the “architecture of order” in the Scott watershed, opening up the range of those allowed to participate in Scott groundwater knowledge production and management. In the conclusion, I consider how beaver-based watershed collaboration is shifting the social, scientific and legal “architecture of order” underpinning Scott groundwater governance and opening up the subject/object binary at the heart of Scott property regimes.

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<sup>997</sup> Blomley 2008.

<sup>998</sup> Blomley 2008, p. 1838.

<sup>999</sup> Ibid, p 1839, citing Latour, Bruno. "The Berlin Key or How to do things with words." *Matter, Materiality and Modern Culture*. London: Routledge (2000): 10-21.

<sup>1000</sup> Blomley 2008, p 1840.



#### 4. The Great Hole in California Water Code and the Fluid Properties of the Scott Subterranean

At the time of this writing (5/2014) California and Texas are the only states in the US that do not regulate groundwater<sup>1001</sup>. Before the Sustainable Groundwater Management Act (AB-1739, SB-1168, and SB-1319) passed in Fall 2014, California Water Law partitioned surface water and groundwater into separate regulatory categories, with surface water withdrawals subjected to the State Water Board's discretionary permitting process and groundwater use effectively exempted from regulatory oversight. Private landowners could just pump groundwater, "as much as they want, whenever they want, with no one's permission"<sup>1002</sup>. The hydrologic-legal categories of California Water Code §1200, which lays out the scope of the State Water Board's jurisdiction, are inherited almost verbatim from §42 of the 1914 Water Commission Act:

"Whenever the terms stream, stream system, lake or other body of water occurs in this act, such term shall be interpreted to refer *only to surface water*, and to subterranean streams flowing through known and definite channels"

Legal scholar Joseph Sax demonstrated how groundwater was strategically exempted from the 1914 Act by the agricultural lobby, then determined to protect groundwater withdrawals on privately owned lands. Groundwater extraction and use on private lands was considered subject to the "absolute ownership rule" meaning that, as an incident of private property in land, the owner could use groundwater however they pleased, as long as the water was taken from underneath and applied onto their land<sup>1003</sup>. The "absolute ownership" rule resonates with Blackstone's famous characterization of property as that "sole and despotic dominion which one man claims and exercises over the external things of the world, in total exclusion of the right of any other individual of the universe"<sup>1004</sup>. That "subterranean streams flowing through known and definite channels" were subjected to State jurisdiction appears to have been a last minute compromise between the agricultural lobby protecting property rights and progressive State senators who advocated for State regulation of all water bodies<sup>1005</sup>.

The legal construct "subterranean stream" has no basis in hydrology, as it could apply either to every groundwater system or only to those such as limestone

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<sup>1001</sup> In December, 2014, California passed the Sustainable Groundwater Management Act (SGMA), which establishes a regulatory framework for groundwater management at the State level for the first time in California's history. See e.g. <http://groundwater.ca.gov>, last visited 6/14/15.

<sup>1002</sup> Sax, Joseph. We Don't Do Groundwater: A Morsel Of California Legal history. *U. Denv. Water L.Rev.* 6:269. 2002. Sax, Joseph. Review of the Laws establishing the SWRCB's Permitting Authority over Appropriations of Groundwater Classified as Subterranean Streams and the SWRCB's Implementation of Those Laws, Final Report (SWRCB No. 0-076-300-0), Jan. 19, 2002.

<sup>1003</sup> Sax 2002. ft nt 50.

<sup>1004</sup> Blackstone. *Commentaries on the Laws of England*. 2001 [1763], Vol. II, p. 3.

<sup>1005</sup> Sax 2002.

or Karst aquifers that to some extent flow in “known and definite channels”. According to Sax, California groundwater law is “fundamentally at odds with science’s understandings of water’s movement”<sup>1006</sup>. It is important to note that those who crafted the 1914 Water Commission Act were NOT ignorant of connections between subsurface and surface flows due to the infancy of hydrogeology<sup>1007</sup>. Groundwater-surface water connections were well documented in the hydrologic literature of the time and many other states had already begun including groundwater withdrawals in state permitting systems and water rights adjudications. Rather, the constellation of forces seeking to influence California water policy at the turn of the century strategically carved out a zone of legal exception around groundwater in direct violation of their understandings of watershed processes<sup>1008</sup>.

The compromise that created the conceptual monster “subterranean streams” in opposition to “percolating groundwater” has in turn spawned a confounding mess of legal doctrine regarding the State’s ability to intervene in groundwater use on private lands<sup>1009</sup>. The vacuum of State authority carved out of the Water Code has been filled mostly by local authorities, special groundwater districts created by Statute, and local non-governmental organizations such as groundwater advisory committees and watershed councils. This laissez faire approach to groundwater management has resulted in depleted aquifers, nitrate contamination, and land subsidence across the state as well as salt-water intrusion in many coastal basins<sup>1010</sup>. While recent drought conditions and rapid decline in Sierra and Klamath snowpack are putting renewed pressure on the State to regulate groundwater, agricultural interests are resisting State monitoring and management initiatives and advocating for local groundwater governance<sup>1011</sup>. In this political climate, the legal-hydrologic invention “subterranean stream” has provided the State Water Board and California Courts a strategic entry point into the zone of exception surrounding groundwater.

The water law and science around the Scott “subterranean stream” is

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<sup>1006</sup> Sax, 2002, p 273.

<sup>1007</sup> Water Commission Act of 1913, ch. 586 sec. 42, 1913 Cal. Stat. 1012, 1033.

<sup>1008</sup> As with Agamben’s States of Exception, this legal lacuna around groundwater pumping, “insofar as it is a suspension of the juridical order itself, defines law’s threshold or limit concept”. Agamben, Giorgio. State of Exception. University of Chicago: 2005, p. 4.

<sup>1009</sup> The case law in California around California groundwater withdrawals and the State’s ability to intervene in groundwater use on private lands has created a plethora of legal terms such as “underflow” and “percolating groundwater” that similarly bear little relationship to understandings of water’s movements through the subsurface.

<sup>1010</sup> See e.g. State of California The Resources. *Agency Department of Water Resources California Groundwater Bulletin*. 118 Update 2003 October 2003; State Water Resources Control Board, *California Communities That Rely on Contaminated Groundwater*, Draft Report to the Legislature, SWRCB: 2012; for an overview of CA groundwater issues see e.g. Lund, Jay and Thomas Harter. “California’s groundwater problems and prospects” California Water Blog, Posted on January 30, 2013.

<sup>1011</sup> <http://www.californiawaterfoundation.org/page.php?id=106>, last visited 6/1/15.

complex and contested. The Scott Groundwater Basin is one of only 19 watersheds in California whose groundwater basin has been at least partially adjudicated by the State Water Board<sup>1012</sup>. In 1980, after two years of proceedings, the Board set forth specific quantities, uses and priority rankings for all water rights in the Scott stream system<sup>1013</sup>. The Scott Decree also untypically covered “*all rights to ground water that is interconnected with the Scott River*”<sup>1014</sup>. However, rather than considering the entire Scott basin or even the entire Valley as hydrologically connected with the Scott Stream System, the Decree delineated a narrow “*Zone of Interconnection*” in paragraph 4:

“*Interconnected groundwater* means all groundwater so closely and freely connected with the surface flow of the Scott River that any extraction of such ground water causes a reduction in the surface flow in the Scott River prior to the end of a current irrigation season.”<sup>1015</sup>

The Board then defined the surface projection of this zone of interconnected groundwater by reference to another of its maps that was compiled in 1979<sup>1016</sup>. This map delineated a narrow strip about 500 feet on either side of the Scott mainstem in the reach from the Clarks Creek confluence to Meamber Bridge. The data for this map derived from a 1975 State Water Resources Control Board publication entitled “Report on the Hydrogeologic Conditions, Scott River Valley”, which discussed the alluvial materials of the valley, referencing info from driller’s logs such as descriptions of lithology and well capacities. From these descriptions, the author of the report made inferences as to where pumping from groundwater could reasonably be expected to impact the river within the same season. “The author did not make stream depletion calculations or otherwise quantify impacts to

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<sup>1012</sup> California Department of Water Resources. Bulletin 118 Update 2003. Ch 2, Table 5.

Adjudications in the Scott: Shackleford Creek Decree (No. 13775) in 1950, the French Creek Decree (No. 14478) in 1958, and the Scott River Decree (No. 30662) in 1980

<sup>1013</sup> Scott Stream System defined as “the watershed comprising the Scott River drainage area, except French Creek and Shackleford Creek and their tributaries”, which had been adjudicated in earlier decrees. See: Shackleford Creek Decree (No. 13775) in 1950, the French Creek Decree (No. 14478) in 1958, and the Scott River Decree (No. 30662) in 1980.

<sup>1014</sup> It also covered all rights to underflow defined as (p 4): “The term “natural flow” when applied to all streams in the Scott River stream system, except the reach of the Scott River described in the paragraph above, means such flow as will occur at any point in a stream either on the surface or beneath the surface as supporting underflow from the runoff of the watershed which it drains, from springs and seepage which naturally contribute to the stream, from waste and return flow from dams, conduits, and irrigated lands, and effluent abandoned from sewage treatment plants, (a11) as distinguished from water released directly from seasonal storage for rediversion and use, water pumped from ground water or interconnected ground water that is being conveyed in a surface stream for rediversion and use, or water imported from another watershed which is released directly to the natural channel for conveyance to the place of beneficial use”.

<sup>1015</sup> Scott River Decree (1980), Paragraph 4, p. 2, sec. 1 “rights decreed”.

<sup>1016</sup> California State Water Resources Control Board. “Scott River Stream System showing Diversions and Irrigated Lands, Siskiyou County”. SWRCB: 1979, 20 sheets.

support delineation of the ‘Zone of Interconnected groundwater’<sup>1017</sup>. Still, this *Zone of Interconnected Groundwater* became codified in law. All withdrawals within the zone were quantified, prioritized and subjected to their own specific schedule (Schedule “C”) to be overseen by the Scott “watermaster”. All groundwater withdrawals outside of the Zone were by default exempted from the adjudication and the watermaster’s jurisdiction. In addition, the Scott Decree also did not consider the cumulative impacts of pumping beyond one season.

Since 1979, the number of wells has increased steadily, with the majority of wells drilled outside the “interconnected zone”<sup>1018</sup>. Although it is disputed whether or not the total amount of irrigated acreage has increased since 1952, it is clear that the amount of groundwater water withdrawn has increased<sup>1019</sup>. One controversial study by Van Kirk and Naman (2008) recently demonstrated that the Scott has experienced a much greater reduction in baseflow since the 1970s than any other watershed in the Klamath<sup>1020</sup>. The authors show how irrigation withdrawals have increased about 55 million m<sup>3</sup> (115%) since the 1950s and that most ranchers have switched from surface diversions and flood-irrigation to well-withdrawals and sprinkler systems, which use water more consumptively and return less water to the stream. After accounting for climatic factors such as changes in precipitation and snowfall, their study shows that around 61% of the 10 million cubic meter decline (or ~6 Mm<sup>3</sup>) in Scott discharge from July 1-October 22 can be explained by “local factors”, namely increased well withdrawals.

Though the stream dries up every summer, groundwater pumping outside of the “interconnected zone” occurs in the untouchable legal lacuna carved out of California regulatory code. Environmental groups, tribes and fisherfolk have recently put pressure on agencies and courts to include the whole groundwater basin as interconnected and subject it to Public Trust doctrine or list the Scott as flow impaired under the TMDL process. Landowners and local agencies claim they maintain jurisdiction over Scott groundwater science and management outside of the interconnected zone. While local agencies resist outside interference in their watershed and its groundwater resources, out-of-basin environmental groups and downstream Tribes and fisherfolk see the rhetoric of democracy and community-based governance in the Scott as covering up a kind of “pernicious localism” or regulatory capture of local institutions by local political and economic interests.

In 2010, the Siskiyou County Board of Supervisor passed a county ordinance establishing Groundwater Advisory Committees for the Scott and Shasta

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<sup>1017</sup> S.S. Papadopulos & Associates, Inc. Memorandum. August 27, 2012. “Stream Depletion Impacts Associated with Pumping from within or beyond the ‘Interconnected Groundwater’ Area as Defined in the 1980 Scott Valley Adjudication”, p 1.

<sup>1018</sup> Van Kirk, Robert W. and Seth W. Naman, 2008. Relative Effects of Climate and Water Use on Base-Flow Trends in the Lower Klamath Basin. *Journal of the American Water Resources Association (JAWRA)* 44(4):1035- 1052.

<sup>1019</sup> Van Kirk 2010

<sup>1020</sup> Van Kirk 2010, p 14.

groundwater basins. In 2011, the Scott Groundwater Advisory Committee was created and eleven Scott Valley landowners and residents were appointed by the County Supervisors to produce studies and represent groundwater users throughout the Scott. According to the Board's groundwater management plan: "Keeping local control is an enduring interest and critical principle"<sup>1021</sup>. Scott Valley was actually the first basin in the state to have a Groundwater Advisory Committee created<sup>1022</sup>. The GAC is technically an advisory committee with no real decision-making power, but with local influence and access to landowner well-data.

There are currently (5/2014) two groundwater models being developed for the Scott, one by Colorado consulting firm S.S. Papadopulos & Associates, Inc. for the Karuk Tribe and the other by a University of California Cooperative Extension specialist in cooperation with the local groundwater advisory committee. Efforts to extend the "interconnected zone" and thus State jurisdiction over the Scott subterranean hang in the balance of the two groundwater models. I will now briefly explore the two models and their implications for property relations and public authority over Scott groundwater.

After the temperature and sediment TMDLs were passed in 2005, the Regional Water Board and the UC Cooperative Extension farm advisor for Siskiyou, Steve Orloff contacted Thomas Harter, groundwater hydrologist extension specialist based at UC Davis and asked him if his research group would be available to prepare the Scott Valley Groundwater Study Plan and initiate data collection for a groundwater modeling effort. Harter agreed, partly because the Water Board offered to fund the study and mostly because there was interest among the community of landowners in their groundwater system. From Harter's perspective, it was a unique opportunity to work with a group of rural landowners who had been collecting and sharing well data and attempting to learn about their groundwater and manage it cooperatively. In his terms "the institutional infrastructure was unique"- there was a group of interested landowners and an active watershed council and the Resource Conservation District and Board of Supervisors were interested. At the time, Scott groundwater hydrology wasn't as politicized a topic. The Karuk Tribe wasn't heavily involved in the Scott, the 1602 permitting issue hadn't come up, and the ELF public trust case hadn't been brought. At the time, in his words, "the TMDL was the biggest thing on the plate".

Another factor, for Harter, from a hydrology perspective, was that community data taken monthly from forty-three wells was much better data than the data from the four wells that California Department of Water Resources was infrequently collecting. The Water Board chose to outsource and fund the development of the model to UCCE because it didn't have the "in-house expertise" and because UCCE was trusted by local landowners used to working with irrigation specialists. Also, the groundwater model would be perceived as more "objective"

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<sup>1021</sup>Scott Valley Groundwater Advisory Committee. Voluntary Groundwater Management & Enhancement Plan for Scott Valley. Advisory Committee. 2012.

<sup>1022</sup> State Board Resolution 10-291.

coming from a university hydrologist rather than a regulatory agency with stakes in the outcome.

Groundwater data is as sensitive a subject as groundwater management in the Scott. Only recently was well monitoring made mandatory for State water agencies, who now have to have four monitoring wells for every 100 square miles. While this might work for the Central Valley, according to Harter, “for places like the Scott, to really understand dynamics and the spatio-temporal distribution of water level dynamics, a network of 40 wells is much better; originally we had suggested 90”. Harter’s close relationship with trusted local agencies such as the Groundwater Advisory Committee and watershed council in turn enabled him to build trust with the landowners. A groundwater level-monitoring program is run by a private organization and the records are kept private. Landowners are not concerned about sharing their well data because they want to protect intellectual property rights, but because of the potential regulatory implications of making that data available to regulatory agencies. One local rancher and member of the advisory committee makes the rounds to each of the 43 private wells and drops a sounder into the well about once a month. For him, it is important that the farmers trust him and know him well:

“The ground water study is a double-edged sword. Some are afraid it could lead to regulation, but then again it makes people aware of their water use and is an opportunity to examine what’s going on with groundwater and get you out in front of the regulators. The key is that it’s *our* study. It’s incredibly important for the community to have their own information, their own science. If environmental groups want our data, I will blow it up with a 12-gauge. The community needs to trust you, to know that their data is safe. Outside intervention kills the science.”

The Resource Conservation District initially contacted Harter and asked him to be the “confidential repository” of their private well data because UCCE was already trusted and well respected by landowners. Keeping the data confidential and anonymous has been key to his relationship with Scott landowners. However, it seems to have put him in a somewhat conflicted position related to his role in a public service position as an extension specialist contracted by a public agency. In his words:

“Now I’m of course not about secrets...in that I’m working with public entities, but to the degree possible, I do keep the data private and anonymous...I will always being an advocate of having more of this data available publically, but I also see that you move forward by providing some anonymity to the people who are participating in these programs.”

Harter’s lab at Davis released their initial groundwater study plan in 2007

and their initial integrated hydrologic model and water budget in April, 2013<sup>1023</sup>. The report laid out initial findings, but was very careful to foreground uncertainties and highlight the numerous assumptions that had been made, stressing that “models cannot represent the complexity of the real system”<sup>1024</sup>. However, the study was misrepresented by the press, with environmentalists and ranchers both interpreting the results to suggest clear regulatory implications. For example, Ag Alert ran a press release titled “Study indicates no overdraft from Scott Valley wells” which claimed that Harter’s study “proves that the Scott Valley is not in an annual overdraft situation and that groundwater levels are not declining during years of normal precipitation and recharge”<sup>1025</sup>.

In search of an alternative model built by an outside party, the Karuk Tribe hired Colorado-based consulting firm SS Papadopulos & Associates, Inc. to develop a separate groundwater model for the Scott Valley. They released their findings in June of 2012, in a report titled “Groundwater Conditions in Scott Valley”<sup>1026</sup>. In a press release, the Karuk Tribe claimed that “the report shows that unregulated groundwater use is a key factor in the decline of one of the Klamath's most important salmon streams”<sup>1027</sup>. The model comparatively analyzed stream depletion impacts associated with pumping from within the “interconnected zone” with those from the area of alluvial fill within the Scott Valley that lies outside of the “interconnected zone”. The model outputs showed that “in both cases, stream depletion impacts are evident within the first season of pumping and increase thereafter”. They interpret the results to indicate that the “interconnected zone is too narrowly drawn to meet the objective of identifying areas wherein pumping would have the effect of reducing surface water flows within the same irrigation season”. They also show that stream depletion impacts accumulate over time and have higher impacts than are seen within the first year. When I asked Harter about the Karuk groundwater model, he seemed to think that the science was valid, but politically charged:

“ In terms of the science behind it, it’s a totally valid study. Though it’s not quite as sophisticated as the model we were putting together, but it’s an interesting exercise and well put together....but a difference is that it was done by someone who at least in the valley is perceived to be from the outside. The local landowners weren’t consulted, so they don’t trust it. They were quick to

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<sup>1023</sup> Foglia, Laura, Alison McNally, Courtney Hall, Lauren Ledesma, Ryan Hines and Thomas Harter. *Scott Valley Integrated Hydrologic Model: Data Collection, Analysis, and Water Budget, Final Report*. Dept of Land, Air and Water Resources. UC Davis. April 22, 2013. North Coast Regional Water Board, Contract #09-084-110 State Water Resources Control Board, Contract #11-189-110.

<sup>1024</sup> Foglia et al 2013, p. 11: “In the data analysis and during the model development, numerous assumptions have been made as is common in building a conceptual and numerical integrated hydrologic model. Models cannot represent the complexity of the real system, but are an effort to capture salient hydrologic features with sufficient accuracy to develop modeling results that are useful for a better understanding of the watershed dynamics and water balance.”

<sup>1025</sup> See e.g. Campbell, Kate. Study indicates no overdraft from Scott Valley wells. October 17, 2012.

<sup>1026</sup> SS Papadopulos & Associates, Inc. 2012.

<sup>1027</sup> Karuk Tribe press release, June 4, 2012.

understand that Karuk tribe wants to look into a court verdict that wants to reduce pumping by thirty percent.”

Even though the Tribe hopes to collaborate with the Harter lab, landowners and local, state, and federal agencies to put the Groundwater Model to good use, Harter cannot use their data due to the fact that his collaborators don't trust it. The Tribe thinks that the model can be used as tool to evaluate restoration ideas to determine what actions would best address the problem of impaired stream flows. However, according to Scott Valley POW:

“Though the Karuk Tribal Council claims to be in support of agriculture in Siskiyou County, don't be fooled. Their six-month groundwater study is another example of the Karuk Tribes' attempt to usurp property rights and resources in this area through lawsuits and one-sided environmental agreements.”<sup>1028</sup>

The latest chapter in the Saga of the Scott Valley subterranean stream is the case won in July 2014 by the Environmental Law Foundation against the State Water Board and Siskiyou County for their “pattern and practice ... of failing to manage groundwater resources interconnected with the Scott River in a manner consistent with the Public Trust Doctrine of California”<sup>1029</sup>. In this case, ELF successfully proved that the Scott River is, in fact and by law, a navigable waterway<sup>1030</sup>. They then proved that underlying groundwater resources constitute diverted “non-navigable tributaries” or that groundwater resources implicate the public trust doctrine because they are “sufficiently linked with the Scott River”<sup>1031</sup>. ELF alleged that the Board's “zone of interconnection” incorrectly excluded groundwater that is hydraulically interconnected with the Scott River's surface flows”<sup>1032</sup>. According to ELF's complaint, unregulated groundwater pumping both within and outside of the 500-Foot Strip is depleting stream flow and thus causing harm to the Scott River, which is a navigable waterway and thus a public-trust resource. Invoking the Public Trust Doctrine, the ELF and the Pacific Coast Federation of Fishermen's Associations successfully expanded the “zone of interconnection” and thus the State's jurisdiction over groundwater management along with it. Judge Sumner concluded his opinion with the statement, “if pumping groundwater impairs the public's right to use a navigable waterway for trust purposes, there is no sound reason in law or policy why the public trust doctrine

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<sup>1028</sup> P.O.W. “News in Jefferson Country on KSYC”, 6/4/12. <http://www.ksyc1039.com/live>.

<sup>1029</sup> Environmental Law Foundation, Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources v. State Water Resources Control Board, County of Siskiyou and DOES 1-100, inclusive, Petition for Writ of Mandamus and Complaint for Declaratory and Injunctive Relief.

<sup>1030</sup> “ELF seems confident, asserting that the Scott River is a navigable waterway in its complaint.. Moreover, Shasta aboriginal tribes and fur traders, who navigated the river before California's statehood, further underscore this point.<sup>82</sup> As such, there is little doubt that the court will find the Scott River navigable.” 81.

<sup>1031</sup> Browning, Jordan. Unearthing Subterranean Water Rights: The Environmental Law Foundation's Efforts to Extend California's Public Trust Doctrine. *UC Davis Law Journal* 2011, p 241.

<sup>1032</sup> Barnhart, Bryan. “Right Doctrine, Wrong Groundwater: The Environmental Law Foundation's Flawed Attempt To Extend Public-Trust Protection To Groundwater”. *Hastings College of Law*, June 26, 2013.



should not apply”<sup>1033</sup>.

In the midst of the modeling wars and the epistemic and regulatory gridlock around the Scott subterranean, another approach to studying and managing Scott groundwater began brewing underground in the Scott. By December, 2013, the watershed council and groundwater committee would be endorsing beavers as the key to restoring Scott flow regimes, Harter’s lab would be running a “Beaver scenario” through their model and the Siskiyou Board of Supervisors would be debating the pros and cons of beaver dams and their impacts on private property. But in order to fully make sense of the social and eco-hydrologic implications of this recent “beaver turn”, we have to journey back to the mid 19<sup>th</sup> Century, when Scott Valley was known as “Beaver Valley”.

## 5. Into Beaver Valley

Before the gold rush came the fur rush. Half a century before swarms of miners ripped apart the mountains and streams of California came the “fur brigades”, the ships and overland parties of trappers aggressively seeking fur to feed the European and Russian markets. Over the course the 17<sup>th</sup> century, as the English, French, Spanish and Dutch established colonies in North America, they consolidated control over a steady supply of North American beaver (*Castor Canadensis*) pelts to substitute for the dwindling supply of European beaver (*Castor Fiber*) that had nourished the global fur trade. Millions of beaver were trapped and their pelts shipped from the Great Lakes, Hudson’s Bay, New Amsterdam, French Canada and Louisiana, down the Mississippi and across the Atlantic, mainly to France and England, where they were combed, caroted with mercury nitrate, felted and sewn into the latest style of castor hat. The hats were then shipped all over the world, to Italy, Portugal, the Caribbean, Latin America, Russia, China and even back to the North American colonies. Beaver pelts thus played a key role in the bloody drama of North American colonization, territorialization, nation-building and global market-making in the 17<sup>th</sup> century<sup>1034</sup>.

The first non-indigenous fur trappers in California were the Spanish colonists who trapped beaver, otter, and seal along the coast beginning in the late 18<sup>th</sup> Century. They were soon followed by Russian, British, French and American, particularly Bostonian, ships. The opening of the west coast fur trade allowed New England merchant economies to recover from the economic collapse that ensued after the revolutionary war. The California fur rush was initially centered around marine-fur bearers, with otter pelts bringing in the highest prices. As the marine fur resources were depleted around 1820, attention began to shift to inland fur-bearers, with beaver bearing the brunt of the new focus. The British Hudson’s Bay company, based out of Ft. Vancouver, and Jacob Astor’s American Fur Company,

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<sup>1033</sup>Environmental Law Foundation. “Court Rules Groundwater Protected as Public Trust”. Press release, July 16, 2014.

<sup>1034</sup> Wolf, Eric. *Europe and the People without History*. Berkeley: University of California Press. 1982. See esp. Ch 6: “The Fur Trade”.

based in Astoria, began sending “fur brigades”, parties of 10-200 men, down the Siskiyou-Oregon trail into California in search of beaver pelts. Private American trapping companies, such as the company led by Jeddediah Smith began coming into California from the East over the Sierras in pursuit of fur.

Smith’s party, as well as one of the Hudson’s Bay fur brigades led by Peter Skene Ogden trapped their ways up into the Klamath basin in Northern California in the late 1820s. In 1836, a Scotsman named Tom McKay led a fur brigade into what we now know as the Scott Valley. The brigade stayed nearly a month, trapping beaver on both forks of the Scott and eventually taking away 1,800 pelts<sup>1035</sup>. One of the trappers, Stephen Meek remarked that the valley was “the best place for beaver I ever saw”. Significantly, the valley bottom was described by the early trappers as “all one swamp, caused by the beaver dams”<sup>1036</sup>.

In honor of its abundant fur resources, the trappers named the place “Beaver Valley” and the creek that ran through it “Beaver Creek”. In his later life, Stephen Meek returned to Beaver Valley and attempted to mine and trap independently for a number of years, but was unsuccessful due to the lack of beavers left in the valley. In 1845, even the mighty Hudson’s Bay company was abandoning its trapping operations in California due to the scarcity of beaver and the new export duty on beaver skins. Beaver Valley was soon renamed Scott Valley and Beaver Creek became the Scott River after John W. Scott discovered gold on its banks in July, 1850. In addition to a new name, a new resource base and a new political economy centered on mining and ranching, the transition from Beaver Valley to Scott Valley was also accompanied by a massive ecological and hydrologic shift.

### *The hydrologic and ecological impacts of Beaver removal*

The removal of beaver and beaver dams from Beaver Valley completely flipped the hydrologic regime from a swampy marsh and meadow mosaic to a network of incised channels, many of which dried up by the end of the summer. According to Cal DFW (2009)

“...the net effect of beaver removal along the Scott River was probably a reduction in diversity and stability as low gradient channels locally incised, snowmelt flood peaks increased, flood-related sediment transport increased and slow-velocity habitats preferred by Coho salmon were lost. Summer baseflows were also probably reduced as a result of the loss of beaver dams and their associated storage capacity and in-stream flow retention.”

Barely a couple of decades after it came to Beaver Valley, the West Coast fur rush had stripped the watershed almost entirely of its ecosystem engineers. The

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<sup>1035</sup> Wells, Harry. *History of Siskiyou County*. 1881. p 80.

<sup>1036</sup> Wells 1881, p 44.

first wave of manifest destiny had so completely flipped the hydrologic regime that its former identity as a swampy marshland known as Beaver Valley would already have been unfathomable to the hoards of miners that arrived in the 1850s. Even as fur brigades snagged millions of pelts and wiped out beaver colonies across the US, there were instances of resistance by both beaver and their human allies.

In the Scott Valley, a colony of beaver managed to survive the onslaught of the fur brigades by hiding out in Marlahan slough<sup>1037</sup>. They managed to elude fur hunters for almost a century until the last beaver family was finally trapped out in 1929. Almost immediately after, ranchers and State fish and game wardens began noticing the changes in hydrology and ecology. According to State biologist Tappe in 1942:

“There is clear evidence that beavers render a valuable service to stockmen by building dams and holding water in small streams that might otherwise become dry in summer. In such cases, the conservation of water by the beavers makes it unnecessary for stockmen to remove their livestock from a locality because of insufficient water.”<sup>1038</sup>

In 1934, the US Forest Service and the California Division of Fish and Game (Cal DFG) actually began transplanting beaver to strategic locations in California. In 1936, the US Forest service trapped 1 male and 3 female *Shastensis* beavers in Modoc County and gave them to the Division of Fish and Game who then released them into Marlahan Slough in the Scott Valley. Soon after the transplantation, even the ranchers noticed the favorable changes in hydrology. According to William Davidson, the Siskiyou county road supervisor living at Fort Jones:

“Beaver dams built across streams raise the water table in the adjacent land. In many places, this rise in the water table is sufficient to enable grasses and other forage plants growing in meadows adjacent to beaver ponds to remain green throughout the summer”<sup>1039</sup>

During the height of the Dust Bowl, some Cal DFG biologists even devised a scheme to translocate beaver into beaverless watersheds by airplane. One beaver, nicknamed “Geronimo”, was dropped more than 100 times by parachute in a special cage designed to open on impact<sup>1040</sup>. Once they perfected the design, the biologists dropped Geronimo and a female beaver into a stream where they set up shop, as did thousands of other beaver aeronauts. The science investigating beaver’s hydro-ecological effects emerged piecemeal, and beaver themselves slowly began spreading into their former territories.

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<sup>1037</sup> Tappe, Donald T. The Status of Beavers in California. *State of California Dept. of Natural Resources Division of Fish and Game Bulletin No 3. 1942.*

<sup>1038</sup> Tappe 1942, p 30.

<sup>1039</sup> *Ibid.*

<sup>1040</sup> See e.g. Elmo Heter. Transplanting Beavers by Airplane and Parachute. *The Journal of Wildlife Management*, Vol. 14, No. 2.

The regulatory policy around beaver in the first half of the 20th century demonstrates a pull and tug between protecting and re-introducing beaver populations and mitigating what were perceived as their negative effects on property. In 1911, as the California beaver population faced extinction, the State legislature passed a law providing for the complete protection of beaver, forbidding trapping and killing outright<sup>1041</sup>. A rapid increase in the beaver population provoked fears of flooding among ranchers, particularly in the SF Bay delta. In 1917, the law was amended allowing the trapping of beaver if the landowner could prove they were damaging property. In 1927, beaver were again placed on the list of fur-bearing mammals, and the wholesale trapping of beavers followed, leading again to their near extinction by the end of that decade. In 1933, as DFG was experimenting with beaver reintroductions, beavers were again placed on the protected list and could only be trapped under permit where satisfactory evidence of property damage or destruction, actual or threatened, was presented. When their population exploded again, the Commission added to existing beaver laws a provision establishing “beaver control areas” in places where landowners could demonstrate that beavers were damaging or threatening to damage or destroy lands, crops, levees or other irrigation structures.

Currently, beaver are listed in California as both fur-bearing mammals and nuisance species, meaning that trapping and killing is allowed for recreational and commercial purposes at certain times of year. In addition, if a landowner can demonstrate that beaver are damaging their property, a DFW trapper will come to their property and trap, remove and kill the “nuisance” beaver. In the Scott, where the beaver population is still fairly low, only a handful of beavers are killed each year. However, in the Sacramento-San Joaquin delta, hundreds of beavers are killed each year<sup>1042</sup>.

## 6. The Return to Beaver Valley

In the first decade of the 21<sup>st</sup> century, as the in-stream flow debates and modeling wars were beginning to heat up, a “beaver believer” movement was percolating underneath the regulatory turmoil. Fisheries scientists and watershed advocates such as NMFS’s Michael Pollock and Occidental Arts and Ecology Center’s Broch Dolman began publishing scientific articles and presenting research on the geohydrologic and ecological benefits of beaver dams. Informal networks of scientists and advocates began to form across the west coast and assembling in conferences such as “the State of the Beaver” and the “Salmonid Restoration Federation”. These conferences were instrumental in bringing together the knowledge and experience of agency scientists, academics, tribal natural resource managers, restoration consultants, and grassroots salmon activists. Field trips at

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<sup>1041</sup> See Tappe 1942 for an account of early Beaver trapping regulations.

<sup>1042</sup> See e.g. California Dept. of Fish and Wildlife. *Animals Taken by Component/Method Type and Fate by Wildlife Services in California*, Fiscal Year 2009.

these conferences brought groups of salmon scientists and advocates face to face with beaver dams and their pools chock-full of salmon and steelhead. Presentations tend to emphasize case studies of restoration interventions rather than basic science or modeling. On the whole, discourse centers around preserving rural livelihoods while recovering salmon populations, rather than litigious or regulatory strategies.

The Beaver Believer movement came to the Scott both through connections of watershed council directors to these networks and conferences as well as through individuals' chance encounters with beavers. Directly downstream from the Scott in Seiad Valley, an encounter with a beaver family sparked interest among watershed councils across the Klamath and eventually spread to the Scott. In early 2010, the Mid-Klamath watershed council and the Karuk Tribe DNR were collaborating on a stream restoration project. They were putting brush bundles into Seiad Creek to enhance habitat for Coho. When they returned to monitor the results of their restoration efforts, they discovered that the brush bundles had all gone missing. Biologists staked-out their sites and discovered that a beaver family had been stealing their brush bundles, eating them and adding them to their own dam upstream on Seiad Creek. That same spring, the Tribe and The Council had planned a similar "engineered log jam" project downriver near the mouth of Boise Creek. However, before they could bring out the dozers, beaver moved in and constructed a five-foot tall dam at the exact location of the proposed log-jam. The watershed council and the tribe's fisheries biologists observed *thousands* of juvenile salmon utilizing the ponds. According to Will Harling of the mid-Klamath watershed council:

"the Beaver were doing everything we had been trying to do. Except the beaver were doing it better, faster, and at no cost to us."

Where before, biologists had considered beaver dams a barrier to fish passage, after coming face-to-face with beaver and seeing beaver ponds chock-full of young steelhead and Coho salmon, they realized that beaver, long absent from CA coastal watersheds-could fundamentally shift the hydrology of dehydrated California streams. Members of the Mid-Klamath and Scott River Watershed Councils attended SRF and SoB conferences and were exposed to Michael Pollock's research. Beaver seemed to be a tool that could help restore the natural stream channel and Coho habitat, was accessible to everyone, had little regulatory red tape and was incredibly cheap. The equipment and labor cost for engineered log-jams or off-channel pond construction can run into hundreds of thousands of dollars per project. When asked about how and why beaver caught on in the Scott, a number of interviewees had different reasons:

"Necessity is the mother of invention, and it got to that point."- GAC member

"When we first moved here, a guy was ripping apart the beaver dam on the creek near our property. So I called the trapper and told him "no beavers die

on my property"! I like wildlife, I didn't want to see it killed. Later I found thousands of young Coho behind his beaver dam, and I started thinking about how they make perfect habitat. I'm on the groundwater advisory committee, so I brought it up with them."- GAC member

"In the past ten years when doing spawning surveys, we noticed that, where we saw beaver dams, we saw Coho, with groundwater recharge being the big reason. But no-one really realized the connection before Pollock."- WS council member

In 2011, the Groundwater Advisory Committee invited Pollock to give a presentation in the Scott, and he obliged. In September, 2011 the California Department of Fish and Game held a "Scott Valley Beaver Technical Management Workgroup" in their Yreka Office. The purpose of the meeting was: "Understanding the role and relationship of beaver, Coho and water quality as it relates to the different agencies and their policies". NMFS's Michael Pollock kicked off the meeting and presentations from DFW and Klamath National Forest wildlife biologists, California Department of Water Resources, the Scott River Watershed Council and the Federal Trapper followed. According to an interviewee, there was virtually *unanimous* interest and support among the groundwater advisory committee and landowners. According to another:

"The meeting w Pollock was a home run. There were over 50 people there, Karuk, Yurok, Quartz Valley (Quartz Valley Indian Reservation), regional and state board members, NOAA, USGS. Everyone on board, saying let's get this going."

One interviewee described the Pollock presentation as a "wow" moment and a turning point in Scott landowner interest in beaver. Everyone decided that the Scott watershed council should be the lead on the project and that it would need to be a community-based approach, in cooperation with the Siskiyou Resource Conservation District and with buy-in from the Scott Water Trust and using funding from Pacificorp mitigation dollars. In May of 2013, representatives from the Groundwater Advisory Committee and the Scott River Watershed Council presented to the Siskiyou County Board of Supervisors to explain how beavers could be a beneficial tool in their efforts to improve groundwater levels and surface flows in the Scott <sup>1043</sup>. Members of the Watershed Council and Groundwater Advisory committee enumerated the potential benefits of beaver dams and referenced the growing body of scientific research on beaver ecology to the Board. The Chairman of the Watershed Council even brought it back to Beaver Valley:

"Scott Valley owes their wonderful soil and everything else to beaver. It was Beaver Valley before it was the Scott Valley"<sup>1044</sup>

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<sup>1043</sup> Siskiyou B.o.D. minutes May 7<sup>th</sup>, Vol 72 ~10~; May 7<sup>th</sup>, 2013.

<sup>1044</sup> Bowman, John. "Beaver Valley". *Siskiyou Daily News*, May 10, 2013.

At the meeting, the representatives of the watershed council and groundwater advisory committee proposed a test project to study the possible benefits of beaver on fish habitat and groundwater. The study centers around encouraging beavers that are already in the stream system. However, the beavers in the Scott are mostly “bank beavers”-meaning they build their dens in the channel banks. The goal is to encourage them to build dams across the stream by pounding in posts to support their structures, as recommended by Pollock’s research<sup>1045</sup>. They would then set up instruments around dams and ponds and evaluate the possibility that having beaver in the landscape could benefit fish and groundwater with minimal damage to property. Supervisor Armstrong, the Agricultural Commissioner/Sealer and the USDA Trapper voiced concerns about the potential negative impacts of beaver on property. Concerns mentioned were bank erosion, flooding, beaver forage of crops and the beaver population “getting out of hand”. A concern was also voiced around the impact of beaver dams on the Scott’s navigability and potential public trust issues emerging if passage was blocked by beaver dams. In a letter to the Siskiyou Daily News, Supervisor Armstrong said:

“Not enough information is known about the specific benefits and risks, or the potential impacts on landowners or irrigators for the board to give a blanket endorsement for the notion of 'encouraging' beavers to build dams in the Scott.”<sup>1046</sup>

## 7. Beaver models, Beaver futures

Though the Board took no action on the issue at the May 10, 2013 meeting, there has since been a flurry of beaver-related activity around the watershed. Numerous landowners are now working with local, State and Federal agencies to help beaver build across streams and monitor the impacts of their dams on groundwater recharge, instream flows and Coho habitat. The Watershed Council and the Groundwater Advisory Committee have been working with landowners to educate them about the potential benefits of having beaver in their streams and to mitigate the negative impacts to their properties. They are using a number of methods to keep beaver off of fields, away from trees and out of irrigation ditches and culverts using diversion screening. To minimize flood damage, the watershed council advocates using pond-levelers or “*beaver deceivers*”- devices that leak water from behind beaver ponds to keep them at certain levels without beaver noticing<sup>1047</sup>. According to one beaver advocate, the Scott watershed council and groundwater advisory council are “helping landowners live with beavers”.

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<sup>1045</sup> Pollock, M. M., J. M. Wheaton, N. Bouwes, C. Volk, N. Weber, and C. E. Jordan. 2012. *Working with beaver to restore salmon habitat in the Bridge Creek intensively monitored watershed: Design rationale and hypotheses*. NOAA Technical Memorandum, NMFS–NWFSC–120; Pollock, M. M., G. R. Pess, T. J. Beechie, and D. R. Montgomery. 2004. *The importance of beaver ponds to coho salmon production in the Stillaguamish River basin, Washington, USA*. North American Journal of Fisheries Management 24:749–760.

<sup>1046</sup> See Bowman, 2013; Siskiyou B.o.D. minutes 5/7/2013.

<sup>1047</sup> See <http://www.beaverdeceivers.com/index.html>, last visited 6/20/15.

Beaver advocates in the Scott are also attempting to alleviate beaver-human conflict by encouraging landowners to contact the groundwater advisory committee or the watershed council before they call the trapper. The watershed council and the groundwater advisory committee have a “beaver team” that will come to a landowner’s property and explore ways of mitigating risk and damage through installing flow-regulators and putting wire around trees. Only if these devices don’t mitigate human-beaver conflict is the trapper called in. As one advocate put it,

“almost all landowners are ok, as long as steps are taken to mitigate against property damage. You need to make sure there is a comfort level before encouraging beaver, make sure people know they can remove them if they are not beneficial.”

Landowners are exchanging information and techniques through the SRWC and GAC. There is interest among landowners, along with the Siskiyou Resource Conservation District, the Regional Water Board, and NOAA fisheries in investigating how and where to encourage beaver in the Scott stream system to maximize fish habitat benefits and minimize damage to property. Following Michael Pollock’s advice, some scientists and landowners are interested in ponding in posts in strategic locations or encouraging beaver to build off of rock jetties. It is unclear, however, whether or not ponding posts is illegal without a Sec. 1602 stream-bed alteration permit and landowner approval within a five mile radius. As brought up in the Board of Supervisors session, concerns have also been voiced around whether or not encouraging beaver dams through post-ponding violates navigability requirements under public trust protections. While the debates around the legality of post-ponding plays out in State-wide debates, the watershed council and groundwater advisory council are reporting significant results:

“Around 2010, beaver made a big comeback. There were 7 to 10 dams near the mouth of French Creek. The concept back in 2005 was to get a backhoe in there and tear the dam out. The management effort now is pretty much let them do their thing. There's beaver dams here that rival anything you see online.”

Last fall (9/2013), property owners up and down the Scott who had worked with the groundwater advisory committee to keep beaver on their land noticed differences in flow levels in the late summer:

“This fall, where there were beaver dams, the stream didn’t dry up. There was better riparian veg. too, which is better for wildlife.”

In addition to the widespread political support among landowners and the anecdotal evidence accumulating, the local, State, Federal and Tribal agency representatives and scientists are interested in building a solid scientific case for



the ability of beaver dams to enhance groundwater recharge, provide late season flows and support Coho habitat. For water and wildlife managers as well as groundwater hydrologists there is a lot of uncertainty as to where and how exactly beaver dams can be beneficial. In their December 2013 meeting, the groundwater advisory committee requested that one of the three scenarios that Dr. Harter run through his groundwater model be a “beaver scenario”. When I asked Dr. Harter if they will run a “Beaver scenario”, he replied:

“Oh, we are. We have offered to the groundwater committee to run what they consider to be the most important management scenarios, and they’ve identified the beaver scenario as an important scenario to them. And we will do it because of that...and because I think it is a potential viable option.”

The watershed council and groundwater advisory committee hope that Harter’s beaver scenario will help them better understand connections between localized impacts and watershed-scale dynamics. The model will also try to understand the temperature and energy-balance dynamics between flow depth, riparian canopy cover, shading and stream temperature conditions. There are also many cascading terrestrial and aquatic ecological food-web interactions between pond and riparian dynamics and insects, water-borne pathogens, avian and wildlife behavior that need to be modeled and better understood. The Council, the GAC and the local, state, federal and tribal agencies are also exploring ways of calibrating the model through field-based experiments. The watershed council and GAC have recently (Summer 2014) partnered with Michael Pollock and are in the process of designing an adaptive field experiment in the Scott<sup>1048</sup>. Their “Post-Assisted Woody Structures” (PAWS) project used pounded-posts to help beavers set up dams at sites in the Scott, where their impacts on ground water level, water temperature, fish habitat, and sediment retention will be tested. The idea is to pound in posts, right below where the Scott dries up in the summer to make the experiment and the effects of the experiment as visible as possible. As demonstrated in the following quote from a local agency representative, getting Pollock involved is seen as key to proving success of the beaver effort in the Scott:

“We need to demonstrate that it works from an outside perspective, so having Michael is key. No one (here) is worried about him being from NOAA Scientist, his science is well respected”.

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<sup>1048</sup> See e.g. Scott River Watershed Council “Post-Assisted Woody Structures” (PAWS) project. “Post Assisted Woody Structures have been placed in three sites in Scott Valley. The PAWS project was implemented by the Scott River Watershed Council in response to the community’s’ desire to improve Scott River conditions for wildlife, fish and human needs. The project, under the direction of Dr. Michael Pollock, NOAA Fish Scientist, is a pilot project designed to study the structures’ impact in California...Some of the parameters being studied are: ground water level, water temperature, fish habitat improvements, and sediment retention...Landowner involvement, as well as Regulatory Agency partnerships, is the basis of the success of this, and other restoration projects in Scott Valley.” See: <http://www.scottriverwatershedcouncil.com/#!projects/c1vzv> l.v. 5/1/15.

As expressed in these quotes from Scott residents, the key to beaver's eventual success in winning over the Scott community and outside regulators is proving Beaver's hydrologic and aquatic ecological benefits through independent, government-validated science. The outcomes of experiments that seek to determine how, where and why beaver dams contribute to groundwater recharge and support Coho habitat will ultimately determine whether or not beaver will be allowed to take up habitat across the main-stem of the Scott. When I asked Dr. Harter about his opinion on Beaver's restoration potential, he was cautiously optimistic:

"I am ...cautious about it.....I am not so sure....I'm enthused by studies that have shown that in fact it changes flows. But I'm somewhat cautious about whether or not we can really achieve this in the Scott with these beaver dams. I think they are an interesting tool that could be a very productive part of a suite of management practices that try to address this issue. You know, we don't look at any of these entirely in isolation. I think ultimately it has to be a portfolio of management practices that as a whole will accomplish the goal of protecting fish and stream habitat."

When I asked a Karuk representative who has been active in Scott groundwater debates about the beaver solution, he was optimistic about the potential political implications of beaver collaboration, but less so about the potential for restoring watersheds:

"On the political side, it's great to see people collaborating. But in terms of getting water back in the stream for fish, we'll see. It could be just a drop in the bucket. We need to explore all our options."

Will the "beaver scenario" modeling runs and high-stakes field experiments in the Scott yield results that demonstrate beaver success? On one hand, I agree with many of my interlocutors that beaver collaborations should not be seen as a silver-bullet that will magically restore the Scott, leading us skipping hand in paw with our furry kinfolk back to the happy meadows of Beaver Valley. The beaver approach needs to be situated within a larger suite or "portfolio" of approaches to watershed restoration. Beaver experiments will have to take place alongside difficult discussions on sensitive subjects like groundwater regulation, pumping curtailments and Cal DFW §401 nuisance trapping and §1601 stream-bed alteration permits. As one downriver environmentalist put it to me, "once the beavers recharge the aquifer, who's to say they (Scott ranchers) won't pump the groundwater right back out?"<sup>1049</sup> The pressures on courts and regulatory agencies to extend the zone of interconnection are also not going to vanish behind a beaver dam. While I agree that beaver collaborations must be approached critically and not in isolation from the range of institutions, laws and regulatory policies that govern water and land use in the Scott, I argue in the concluding section of this

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<sup>1049</sup> Pers com. An. 5/14.

chapter that the beaver collaborations in the Scott open up a new angle for approaching watershed democracy.

## **8. Conclusion: Multispecies watershed entanglements**

In this concluding section, I attempt to interpret what these multispecies watershed collaborations with beaver signal about new forms of knowledge production and changing property relations in the Scott. In the attempts of landowners and government agencies to partner with beaver to restore the Scott watershed, I see evidence of new ways of generating, certifying and communicating knowledge about watershed processes as well as new ways of governing watersheds through property regimes that are more open to the claims of non-human watershed inhabitants. In recent beaver experiments, landowners, local, State, Federal and Tribal agencies are collaborating in new ways, attending the same conferences, workshops and field trips, sharing data and exchanging restoration and management techniques. They are collaboratively designing modeling scenarios and field experiments and sharing funding resources. Also a widespread consensus is emerging among fisheries biologists, water and wildlife agency scientists and County Supervisors, that “beavers do it better than we do” in terms of recharging groundwater and restoring streams, riparian areas and Coho habitat. Beavers are repositioned in these networks and knowledge communities as active participants in knowledge generation and watershed restoration. Beaver collaborations are opening up space for the elaboration of common worlds across species lines.

In this chapter, I have demonstrated the centrality of property regimes to the biocultural choreography of hydrologic flow regimes and the organization of watershed relations between human and non-human watershed inhabitants in the Scott. State and Federal agencies’ ability to manage public resources such as groundwater bodies, navigable streams and endangered species bumped up against the zone of non-interference carved out around private property rights in land and water in the Scott. The ambiguity around the definition of the “zone of interconnection” between groundwater and surface water in the Scott adjudication of 1980 created an exemption for groundwater pumping outside of the narrow strip along the Scott main-stem, forcing State agencies and environmental groups to prove hydrologic interconnectivity in order to expand the boundaries of the “public” resource and, along with it, the State’s jurisdiction and ability to intervene in management of land and water on “private” lands. The definition of the “zone of interconnection” between ground water pumping and surface water flows then became an arena in which the reach of the public via State and Federal agencies in private lands is being negotiated through groundwater hydrology and modeling wars. In the midst of these heated modeling wars, collaborations between landowners, watershed councils, the groundwater advisory committee and beaver have emerged as an alternative way of producing knowledge and organizing relations between watershed inhabitants in the Scott.

Beavers are seeding new alliances between Scott landowners and State, Federal and local agencies and facilitating new up-stream/down-stream and in-basin/out-of-basin relations between ranchers, fishers and environmental groups. Beaver-based approaches to watershed restoration are convening new kinds of “publics”, or sites of mutual witnessing, knowledge-making and collective deliberation. Debates around beaver also seem to be maintaining spaces of non-interference and privacy, especially with regards to the right of landowners to trap beaver and take down their dams if beaver are damaging land or property.

New scientific understandings of beavers’ role in supporting Coho habitat and recharging groundwater aquifers require new ethical, political and legal frameworks for managing the interactions between humans, ground and surface water, Coho, beaver and other non-human watershed inhabitants. Legal scholar Joseph Singer writes in “Entitlement: The Paradoxes of Property” that “owners have obligations as well as rights”<sup>1050</sup>. Singer is referring mostly to obligations among humans when he says “property owners have moral obligations to non-owners as well as obligations to other owners”<sup>1051</sup>. However, his discussion of the tensions between the liberties and obligations of ownership is helpful for framing issues that come up in the Scott regarding the obligations private landowners have to non-human watershed inhabitants like beaver or Coho. On paper, §401 of the State Fish and Game Code still entitles owners to be able to apply to the department for a permit to “take beaver damaging or destroying, or immediately threatening to damage or destroy, land or property”<sup>1052</sup>. In this regard, State beaver and water code privatize the moral obligations of property, to use Singer’s term, making it up to the individual landowner to decide whether to partner with beaver, where and to what extent. Under this reading of property and civic duty, “morality and obligation become private matters that cannot be mandated by government regulation without infringing on liberty”<sup>1053</sup>. In some cases, this right translates to an almost Blackstonian absolute entitlement of owners to remove and kill beaver if their activities are considered at all detrimental to the property rights of the landowner.

However, in other cases, many private landowners are excited at the possibility of working with beaver on their property. As one interviewee put it, “I pretty much just let them do their thing on my property. As long as they’re not interfering with diversions and headgates, let ‘em rip!” One landowner has a personal relationship with the beaver near his property, who he calls Frenchie, named after the creek, French Creek, which runs along his property:

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<sup>1050</sup> Singer, Joseph. *Entitlement: The Paradoxes of Property*. Yale University Press: 2000, p 16.

<sup>1051</sup> *Ibid.* p18

<sup>1052</sup> California Fish and Game Code; §4181. “Kill Elk, Bear, Beaver, Wild Pig, or Gray Squirrels Damaging Property; Permit Required.”

<sup>1053</sup> Singer 2000, p 16.

“Frenchie, the beaver, is still around, I’ve seen drag marks. I put some willow branches down for him, Frenchie loved them. You can spot his dams by the bark-stripped branches”

Beyond individual landowner-beaver family relations, beaver collaborations are also taking place across public/private spaces, in collaborations among landowners, extension specialists and local, State and Federal agencies. Portions of this social-ecological experiment are being conducted in “broad daylight”, such as along the Scott mainstem near Fort Jones or in a public hearing at a Board of Supervisors meeting. Certain moments of knowledge-generation, such as well-sounding, model calibration, court-cases and decisions to put in flow-levelers or call in the trappers, however are kept private. Local agencies like the GAC and the watershed council play an intermediary role between local landowners and State regulatory agencies, attempting to help landowners “live with beaver”. They are trying especially hard to mitigate human-beaver conflict and wrap trees or install pond-levelers before the USDA trapper is called in. In worst-case scenarios, beavers’ interests lose out to humans, as evidenced in this quote from a beaver advocate:

“You have to make sure people know they can remove (beaver) if they are not beneficial. You have to let them know they can trap and remove them when they pose a problem to ease their concern. You might need to remove dams if they are causing a problem or blocking fish passage.”

In this example, we see how beaver collaborations involve humans and beaver at the level of “concretized property relations”, not between pre-formed subjects and inert objects, but between relational subjects or ecological selves, co-habiting and reciprocally co-producing each others’ watershed ecosystems, attempting to understand one another’s behavior and interpret the eco-hydrologic and material-semiotic implications of each others’ moves<sup>1054</sup>. Ranchers such as the one quoted below try to understand beavers’ actions and respond to them:

“I plant willow and cottonwood poles. When you have a low water year you can dig deeper. I could ‘ave swore I caged all those trees but he came and chewed the two trees down. “

This landowner's response to the hungry beaver was to plant still more willows and cage some of them better. In response to questions about beaver-related increases in flood-risk, this property owner didn’t seem worried at all, as he has an accommodating flood plane and a side channel that will take flood-waters and a spring-fed pool that he wants to deepen anyway.

Property owners enter into beaver-watershed collaborations with particular goals. They want to encourage beavers to set-up dams in particular places along their streams and property and deter them from damming in others or from

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<sup>1054</sup> On “concretized property relations, see Von Benda Beckman et al. 2004, Ch 1.

chewing down their favorite trees, but they have to remain flexible. Dealing with beaver as active, adaptive agents means attempting to persuade them to act along certain lines that will be the least harmful and most beneficial to individual humans and their collectives assembled in representative institutions.

In this sense, Carol Rose's notion of "property as persuasion", an institutional, affective or narrative strategy for changing minds and shaping individual and collective behavior, is appropriate for describing the way beaver collaborations reshape property relations in the Scott<sup>1055</sup>. Rose employs the metaphor of a landowner putting up a used bed-spring to communicate a property boundary as an example of how property is both a practice and a form of communication and persuasion<sup>1056</sup>. Similarly, a landowner setting up a gate in front of their irrigation ditch or a cage around their favorite trees is a form of inter-species communication, designed to persuade beaver to enter into particular relations with humans and their more-than-human surroundings so as to maintain a particular social, ecological and hydrologic order. Beaver communicate their own claims to property through chewing down willow trees, inhabiting banks and blocking irrigation ditches in attempts to maintain a particular hydrologic and ecological order.

Strategically partnering with beaver and granting them "easements" on one's property is seen as a strategy for both protecting private rights to land and water from outside regulation and supporting ecological and hydrologic conditions that in turn support public resources. Setting up a pond-leveler or beaver deceiver, for example, is a way of managing inter-species relations to both protect individual human properties in land and water from flooding and maintain the "propriety" of particular hydrologic flow regimes and aquatic habitat conditions that support public resources such as Salmon and navigable streams. In this sense, the beaver deceiver device itself temporarily works out the tensions between private property in land and water and public property in flowing streams, groundwater and endangered species, securing to each that which is "proper" in relation to the needs of the surrounding watershed ecosystem and keeping "good order" in the transpecies watershed republic<sup>1057</sup>.

All of these portrayals of beaver agency, from dangerous crop-destroyer to watershed savior have very different implications for how to get along "properly" with beaver. For some, beaver are seen as valuable and worthy of moral consideration and legal protection only to the extent that they stay out of irrigation ditches, don't flood property, don't eat crops, support Coho and keep regulators out of the Scott. To some agency scientists and fisheries biologists, only the results of

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<sup>1055</sup> Rose, Carol. *Property and Persuasion: Essays on the History, Theory and Rhetoric of Ownership*. 1994, p. 6.

<sup>1056</sup> Rose 1994, pgs 274-276. Thanks to Professor Louise Fortmann for introducing me to Carol Rose's work through her Property seminar and for encouraging me to think about Scott groundwater and property issues through Rose's "bedspring" metaphor of property relations.

<sup>1057</sup> c.f. Rose 1994, p 51, 58.

the “beaver scenario” modeling runs or the field experiments can define the “proper” place for beaver in the watershed community by determining definitively whether their dams are beneficial for humans, Coho, and watershed ecosystems. To others, beaver are worthy of moral consideration and legal rights apart from their utility to humans or even Coho, as active agents, engineers, persons, or fellow watershed inhabitants. To some, like Marilyn of the watershed council, “Scott Valley owes their wonderful soil and everything else to beaver”. In this portrayal of beaver-human relations, the productivity of the Scott’s agricultural economic base and the stability of human livelihoods and political institutions are ultimately dependent upon the cumulative effects of centuries of beaver dam-building activity. This depiction of beaver agency “decenters” the human subject at the heart of liberal democratic property theory.

As landowners, watershed councils and even State, Federal and Tribal agencies position beaver as fellow ecosystem engineers, it shifts the “architecture of order” that property regimes support from a subject-object relation in which individual humans stand-above and command nature to a more ecological and relational “architecture of order” in which humans are positioned in interdependent relations to beaver, salmon and the webs of ecological relations and hydrologic conditions that must be in place to support them. In the Scott, at least on paper, the main pillars of property relations are still in place in water rights and land titles and the “bundles of rights” they entail<sup>1058</sup>. However, as the result of various forms of *persuasion*- scientific, economic and ethical arguments from various sources such as watershed councils, the groundwater advisory committee and Federal agency scientists like Pollock- some landowners have voluntarily ceded territory to beaver. In this sense, beaver collaborations have shifted, though ever so slightly, the sets of norms, narratives and practices that determine who is allowed to be where and doing what, whose claims to land and water matter and, ultimately, what forms of watershed relations and conditions are considered “proper” and by whom. Could allowing beavers to build dams along river-banks and across streams or granting them access to willows be conceived of as a voluntary easement on property, or as something entirely different, as a relational and ecological version of property?

The current “beaver turn” in the Scott is presenting a new way of organizing property relations ecologically and relationally, apart from the public and private binary. On one hand, the “beaver turn” has re-positioned individuals, along with their properties and livelihoods as co-produced and maintained through webs of ecological and hydrologic relations. On the other the “beaver turn” has shifted the perspective of many landowners to come to see that one of the duties of owners of “private property” is make room for beaver and in turn support the webs of ecological relations, flow regimes and water quality conditions that support “public” resources such as navigable streams, ground-water bodies and late-season

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<sup>1058</sup> for extensive discussions of the metaphor of property as “bundles of rights” see Singer 2001, Rose 1994 and Von Benda Beckmann 2006.

flows. This perspective opens up new ways of seeing what geographer Sarah Whatmore (97) terms “relational and ecological selves” as opposed to individualist understandings of ethical agency and political community<sup>1059</sup>. Eduardo Kohn (2013) similarly invokes the concept of an “ecology of selves” as a way of understanding selves as emerging and dissolving in complex webs of material-semiotic relations with forest ecosystems and their more-than-human inhabitants<sup>1060</sup>.

In this case, beavers force us to acknowledge, to quote Haraway, that “to be a human is always to be in a relationship with a host of others” including fellow non-human watershed inhabitants such as Beaver. Haraway draws on the biological metaphor of *symbiogenesis* to describe the process by which organisms “form consortia in a baroque medley of inter and intra-actions”, resulting in an interspecies “yoking together all the way down”<sup>1061</sup>. Symbiogenesis reminds us that “nothing makes itself in the biological world”<sup>1062</sup>. Such a perspective would see the relationships between human, Coho, beaver and watersheds as “interspecies epigenesis”- “cascades of inter and intra-action between critters, all eating one another and developing indigestion”.

Extending the boundaries of the demos in watershed democracy to include beavers as fellow watershed citizens opens up a perspective of the Scott watershed as itself a vibrant, flourishing ecology of selves entangled in symbiotic process of world-making, a “complex patterning of ones and manys in entangled association”<sup>1063</sup>. Through this perspective, to become a watershed citizen is to enter into companion-species relationships with the multitudes of other watershed inhabitants such as beaver, Coho and elk (Ch 5) in the sense of “coming into being with a crowd of others”<sup>1064</sup>. The term “companion” derives from Latin *cum panis*, which means “with bread” and invokes messmates at table<sup>1065</sup>. A companion-species view of beaver-human relations does not see landowners as sovereign subjects who stand above their inert property as owners or knowers, but rather sees human knowledge and agency as itself indebted to those other humans and non-humans who co-inhabit their lands and watersheds. A companion-species

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<sup>1059</sup> Whatmore, Sarah. "Dissecting the autonomous self: hybrid cartographies for a relational ethics." *Environment and planning D* 15 (1997): 37-54.

<sup>1060</sup> Kohn, Eduardo. *How forests think: Toward an anthropology beyond the human*. Univ of California Press, 2013.

<sup>1061</sup> “Symbiogenesis is defined biologically as the appearance of a new phenotype, trait, tissue, organelle, organ or organism formed through a symbiotic relationship”. Parisi Abstract Sex: Philosophy, Bio-technology and the Mutations of Desire. 2004. Lusciana Parisi, uses the biological concept of “Symbiogenesis” to “read the organism as a temporal and fragile effect of evolutionary and developmental contingencies, characterized in terms of affinities rather than identities”.

<sup>1062</sup> Haraway, Donna. *When Species Meet*. University of Minnesota Press: 2008. citing Scott Gilbert’s critique of autopoiesis as self-making, self-referential processes maintaining flows of matter, energy and information.

<sup>1063</sup> Haraway 2008. p 31.

<sup>1064</sup> see Haraway 2008 Ch 1.

<sup>1065</sup> Haraway 2008, p. 17.



approach to property relations displaces the fixed and bounded contours of the individual at the heart of the ethical community by arguing that political agency and community emerge from networks of relation that extend the body politic beyond the human.

A companion-species approach to hydrosocial experimentation as world-making presents a different way of producing knowledge about watershed processes through an embodied and emplaced practice of engagement guided by an ethics of responsibility and care. Beaver collectives have shifted the epistemologies, ontologies and property relations of the Scott watershed from a representationalist, interest-group approach inclined towards modeling wars to a more performative, collaborative and adaptive multi-species approach to knowledge generation that materially engages the watershed and its non-human inhabitants. Theory and experiment are viewed through this perspective as dynamic practices of material engagement and world-making. Making watershed knowledge in this mode, to borrow Karen Barad's words, "knowing does not come from standing at a distance and representing but rather from a direct material engagement with the world"<sup>1066</sup>.

In the "beaver turn", I spot a new way of making knowledge across species lines and a new epistemology and ontology of the Scott watershed. In the case of the Scott subterranean, I argue that new scientific understandings of beavers' role in maintaining a healthy watershed are changing the way private landowners manage their land and water. In addition to shifting property relations, the "beaver turn" has the potential to shift up-stream down-stream and in-basin out-of-basin relationships by providing an alternative and slightly less politicized arena of collaboration landowners and local resource management agencies and the various publics and State, Federal, Tribal and non-government agencies with stakes in Scott watershed governance. While the debates about the ecological and social benefits of beaver play out in the scientific literature and in regulatory hearings, landowners are experimenting with beaver collaborations on their lands and streams and reporting material differences such as increased riparian vegetation and late-season flows.

Whether or not beaver collaborations are successful at maintaining the "proper" social-ecological order will be determined over the next few years through scientific studies, political deliberation and regulatory processes in multiple local, State and Federal forums and potentially even through cases brought in County and Federal courts. In one of the most legally and politically contested Basins in California facing both cumulative legacy impacts and contemporary water and land-use conflicts, the fact that beaver have already opened up new lines of communication between watershed communities and inspired new approaches to making watershed knowledge and restoring

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<sup>1066</sup> Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. 2007. Duke University Press, p 49.

watersheds is a promising sign. In Dr. Harter's words: "If the beavers and the beaver dams can be part of the solution, it would be a terrific outcome".

## CONCLUSION

### *Scales of sovereignty after watershed democracy*

The ideal of watershed democracy attempts to orient the rule of the people around the patterns that water follows as it flows downhill. The Klamath experiments in collaborative watershed governance over the past three decades have attempted to find better ways of scientifically and politically representing both people and nature. However, the processes of representing both communities and watersheds turn out to be complex and contested in the Klamath. The boundaries and dynamics of both the demos and the watersheds they live and work in turn out to be slippery and intractable. How to draw boundaries around drainages, how to divide watersheds into their tributary Sub-basins and even more so how to determine the impact of upstream and upslope resource uses on flow regimes, water quality and habitat conditions became controversial subjects in Klamath watershed governance forums. Defining the composition and contours of the “demos” relevant to any particular watershed also proved difficult. Different articulations of collaborative watershed governance were at odds regarding whether “the public” includes the many government agencies and their constituents, those who have title to land or possess water or fishing rights, all potentially affected parties or even national and global publics with interests vested in the Klamath. Uncertainty around how to identify publics and weigh their knowledges, values and interests against one another generated significant controversy in Klamath experiments in watershed democracy.

I argued in this dissertation that questions of how to represent the nature of watersheds are always intimately linked with the questions of how to best represent society through fair democratic processes. How to produce credible knowledge about Klamath watershed ecosystems brought up questions about appropriate forms of political, economic and social life as well as questions about proper relations between people and nature. What democracy means for the diverse communities of the Klamath and how it is put into practice in relation to natural resource management has been worked out over the past three decades through collective knowledge making and deliberation at the watershed scale.

I followed numerous Public, Tribal and non-government institutions engage the watershed as they negotiated sovereignty, jurisdiction and territory and claimed authority to act on behalf of Klamath watershed communities. I demonstrated through accounts of collaborative watershed management forums such as the Klamath Fisheries Task Force, the Salmon River Watershed Analysis and the FERC “cultural riverscape” analysis how the relative jurisdictions and sovereignties of Tribal, State and Federal agencies are articulated and contested through negotiations around watershed science and policy. Power relations between Federal, State tribal and non-government agencies were reshuffled as democratic environmental governance was aligned with Klamath watersheds.

Watershed governance institutions rerouted flows of epistemic and political authority among the many institutions, citizens, publics and landowners attempting to influence the management of Klamath resources. Collaborative watershed governance reconfigured the boundaries and terms of citizenship, the conditions of membership in the political community and the scope of the rights and obligations that this citizenship entails. In Klamath experiments in watershed democracy, the basic terms of political life such as property, territory, sovereignty and the public good were actively negotiated, as were the actual flows of material resources and the patterns of access to, ownership in and distribution of these resources.

In particular, I have focused on the role watershed science plays in guiding resource management policy and defining relationships among human institutions and between humans and nature. I demonstrated how the proper role of science in guiding democratic environmental governance was negotiated through collective scientific and social experiments at the watershed scale in the Klamath. Neither the intellectual or institutional history of the watershed follows a neat linear progression in the Klamath, with more accurate representations of watershed processes forcing an evolution of institutions towards more resilient, bioregionally oriented institutions over time. Instead, I demonstrate the messy, non-linear process by which the watershed entered into Klamath environmental science and resource management policy.

For the first part of its history (1851-1986), the watershed provided a template for negotiating treaties, drawing county boundaries and dividing up mineral, timber and water resources. A paradigm shift brought the watershed into the center of environmental debates beginning in the late 1970s as new scientific understandings of watershed processes combined with political mobilization from indigenous, hippie back-to-lander, environmental activist communities and local schools to portray the watershed as a unit of ecological restoration, conflict resolution, democratic deliberation and community building. Beginning in the late-1980s, the watershed became a primary arena through which issues of sovereignty, representation and cultural difference were worked out in the Klamath. The watershed then became the preferred unit of implementing democratic environmental governance, beginning with the Klamath Fisheries Task Force in 1986 and continuing through the USFS Pacific Northwest Forest Plan, the North Coast Regional Water Quality Control Board TMDL processes for the Klamath, Scott and Salmon rivers, the FERC dam relicensing process, endangered species protection and habitat restoration such as NMFS's Southern Oregon-Northern California Coast Coho restoration strategy, the secretarial determination process for dam removal and restoration strategies of environmental NGOs such as watershed councils and River Keepers.

Different deployments of the watershed as a unit of environmental governance articulate very different relationships between State agencies, scientists, publics and material watershed ecosystems. Each articulation of

watershed science and management with discourses and practices of democracy structures a range of inclusions and exclusions that determine who is allowed to influence knowledge production, decision-making and policy-making. Knowledge and policy-making processes operated very differently under the “third-wave” of watershed democracy than under earlier paradigms. As opposed to expert-driven and hierarchical models of epistemic and political authority typical of early-to-mid 20th century resource management in the Klamath, collaborative watershed governance offered local citizens and Karuk Tribal representatives real opportunities to participate in knowledge production, planning and decision-making for ecosystem restoration and resource management.

Collaborative watershed management institutions such as the Task Force brought farmers, ranchers, fisherfolk, timber companies, environmentalists and Tribal members together for the first time to share knowledge and make collective decisions about the management of natural resources. Many restoration projects such as road decommissionings, fish passage and creek-mouth openings, off-channel habitat and riparian corridor restoration were sponsored and implemented over the last 20 years, making a substantial material difference in revitalizing the watershed ecosystems, local economies and communities of the Klamath. The dynamics of inclusion/exclusion in Klamath watershed governance were both socially and ecologically constitutive- in determining whose knowledge and values mattered in designing environmental policy, watershed institutions embed particular sets of values and politics in the material conditions and dynamics of watershed ecosystems. The material outcomes of restoration and management initiatives in turn shape patterns of resource access and the distribution of resource benefits and burdens among Klamath communities.

Epistemologies and ontologies of the watershed did not always harmonize through collaborative watershed management forums. In many instances, tensions between ways of understanding and relating to nature were made apparent through collective engagement of the watershed. Although watersheds were supposed to provide “neutral” grounds for assembling diverse knowledges, watershed forums have actually struggled to render different types of indigenous, traditional, local, and scientific knowledge commensurable and have instead provoked debates about appropriate ways of producing knowledge about nature. The science behind the impact of human land and water use practices on Klamath watershed-ecosystem processes became an important site of contestation, negotiation and collaboration in Klamath environmental governance.

I have argued for the importance of considering how indigenous knowledge is defined and positioned in relation to dominant forms of knowledge production in collaborative environmental governance forums because it has consequences for whose knowledge of nature counts in natural resources management. Representations of nature embed power dynamics that authorize certain ways of seeing the world and living in it while delegitimizing others. It is therefore important to see how boundaries between knowledge systems are constructed and

set to work by actors attempting to gain legitimacy for their distinct ways of knowing the world. I argue that both recognizing difference among epistemic cultures and building bridges between them is important for democratic knowledge-making and environmental governance.

Karuk scientists and representatives both leveraged and critiqued the watershed as a way of conceptualizing watershed-ecological processes and as a way of approaching ecological restoration and cultural revitalization in their ancestral territory. Watershed science and watershed-based governance forums were sometimes leveraged by Karuk tribal members and representatives to substantiate Karuk sovereignty, self-determination and resource rights, and at times rejected for not being able to convey distinct Karuk epistemologies, ontologies and cosmologies. On one hand, watershed governance forums such as the Klamath Fisheries Task Force, the Tribal Module under the Salmon Watershed Analysis, the government-to-government consultation through the TMDL development process and the cultural riverscape analysis for the FERC dam-relicensing process all provided the Karuk Department of Natural Resources with important opportunities to share knowledge, voice tribal perspectives and influence resource management in and around their ancestral territories.

The Karuk Department of Natural Resources received significant amounts of support and funding for watershed restoration projects. Projects such as the Steinacher road-decommissioning project worked to “decolonize” Karuk watersheds on a number of levels- through materially reshaping drainage contours to protect Salmon habitat from erosion and siltation, building legitimacy for tribal environmental programs, training and employing Tribal members and supporting a local “restoration economy”. However, Karuk critiques of the watershed-based approach to ecological restoration and resource management were numerous. Through knowledge conflicts over epistemologies and ontologies of watershed processes, the ability of the watershed to stand-in for nature and society was challenged. The watershed’s ability to represent nature was challenged for its inability to register biophysical and ecological dynamics that did not obey drainage boundaries. The watershed was not even able to comprehensively represent the flows of water through Klamath ecosystems and communities, as important biophysical and social factors that influence flow dynamics are also not well captured at the watershed scale. The watershed’s representativeness as a unit of collaborative resource governance was also critiqued for its ability to represent the knowledges and values of Klamath watershed inhabitants.

In particular, I argue that certain indigenous perspectives on natural resource management were systematically ignored at the watershed scale. Karuk scientists and representatives presented scalar and spatial critiques of the watershed as a unit of knowledge production, ecosystem restoration and environmental governance. On an epistemological level, watersheds were critiqued for not registering the spatialities and dynamics of fire behavior, wildlife habitat or soil-vegetation associations. From a cultural perspective, watersheds as

represented through western science were portrayed as mechanical, passive and inert instead of composed of active adaptive agents connected to the human community through relations of interdependence and practices of world-making. Watersheds were also seen as imposed from without, “dropped down” by experts, rather than composed from within the local community. On a political level, collaborative watershed management forums were critiqued for considering peripheral certain issues the Karuk community considered central to watershed restoration such as eco-cultural revitalization, youth empowerment, protection of sacred sites and healing intergenerational trauma. Watershed science and policy often excluded spiritual and cultural dimensions of Karuk worldviews as irrelevant to science and policy-making.

For many Karuk scientists, their culture of knowledge production prevents sensitive knowledge from being abstracted from place and put onto paper or into publically-available maps. Knowledge is communicated between particular people, in particular times and places, with detailed instructions for its use and application. Therefore, many tribal members do not feel comfortable sharing knowledge in public forums, research publications or on maps. When Karuk knowledge and traditional resource management techniques were taken seriously by resource management agencies, in some instances they were taken out of context, as in the Orleans Community Fuels Reduction episode. My Karuk colleagues mentioned on many occasions the critical importance of consulting with people rather than with pieces of paper. My community partners also mentioned frustration over instances in which tribal knowledge is cited or applied by Federal or State agencies and environmental groups, but no benefits such as intellectual property, jobs or access to resources are returned to tribal members.

I demonstrated connections between the cultural politics of scale, what the Karuk Tribe describes as “knowledge sovereignty”, or sovereignty over representations of Karuk knowledge and culture in natural resource management arenas, and what Karuk people call “eco-cultural revitalization”, or restoration of the watershed and ecosystem processes that support Karuk cultural and political self-determination. Ways of making knowledge about nature shape and are shaped by scalar formations, which in turn become the arenas through which the communities of the Klamath struggle for political, economic and ecological self-determination. Tribes in the Klamath claim sovereignty and peruse self-determination and rights to natural and cultural resources in multiple scales, both in multiple political spaces of engagement- e.g. Federal, State, regional and local scales, courts, international arenas and media outlets- as well as at multiple ecological or bioregional scales- e.g. watersheds, firesheds, foodsheds, habitats, road networks, forest patches and stands, landscapes and airsheds. Indigenous perspectives on place and polity in the Klamath are in-line with the post-Westphalian perspective on space in seeing individuals and collectives as constituted through relations of interdependency, yet Klamath Tribes also insist on recognition of their distinct sovereign political, legal and territorial status to protect their ability to resist domination and perpetuate their culture.

The watershed framework was critiqued by Karuk scientists and representatives for not capturing the complex spatialities of fire behavior, wildlife movement, soil-vegetation interactions or the habitat conditions of cultural resources such as basketry materials or regalia species and the management practices needed to steward them. Fire is seen by tribal members and the local environmental community as the most important tool for managing cultural and natural resources as well as for restoring watersheds. However, the spatiality of fire, including ignition patterns, spread dynamics and ecological effects are not well captured by a scalar perspective oriented around watersheds. Beginning around 2005, due to the inability of watershed-based governance to represent and manage fire, collaborative efforts in the mid-Klamath and Salmon Basins began to shift towards a regional governance network centered around firesheds.

After around two decades of experiments in collaborative watershed governance (~1986-2006), the movement of fire across began suggesting alternative sites and shapes for the formation of democratic resource management institutions in the Klamath. Community mobilization around fire issues is creating a new regional space of collective action, the “Western Klamath Mountains”, as well as new institutional configurations that are temporarily stabilizing around “firesheds”, defined according to the way that fire can be managed rather than according to flows of water through drainage networks. Though firesheds are designed to pull out a different dimension of Klamath eco-cultural landscapes, they also are designed to target priority “upslope” fuels treatments and accomplish some of the most important dimensions of watershed management. In addition to the ecological benefits, Karuk scientists and representatives also gain more epistemic and political authority by shifting frames of governance from watersheds to firesheds. Karuk cultural knowledge and legal authority related to the cultural use of fire to manage Klamath landscapes is being increasingly sought after by fire managers and restoration ecologists.

I also explored “foodsheds” as an alternative scalar approach to ecological democracy in the Klamath. A “foodshed” is a template for conceptualizing the spatiality of local food resources and the ways they are managed, accessed, procured, processed and distributed. Foodsheds visualize patterns of “food flows” and historic, contemporary and future desired conditions of access to food resources in the Klamath. Through foodsheds, cultural and political self-determination is tied to the ability to manage and access food and fiber resources on National Forest and private lands in particular ways as well as to the ability to define the contours of local agro-ecosystems and determine how they are represented and managed. Foodsheds attempt to reverse the resource management paradigm in national forests by shifting the focus away from recreation and timber production and towards a view of forest ecosystems as sources of food, fiber and cultural resources that can be managed for the benefit of multiple species and human uses. Foodsheds are also a way of operationalizing



food sovereignty by visualizing the spatiality and temporality of food resources and food flows in order to increase local control over the food system.

For example, Elk foodsheds are an attempt to chart a new way of thinking about scale in community-based environmental governance by elaborating multiple socio-spatial formations without fixing them in the landscape or closing them off for discussion. Rather than pre-given watershed boundaries providing the backdrop for democratic environmental governance, the elk foodshed reveals a scalar template that is nested, mobile, seasonal, adaptive and defined according to place-based community values. Elk foodsheds guide fire across the landscape according to their seasonal movements and the community-specified cultural and ecological values they touch along the way. In tying together diverse wildlife species' habitats and the spatial contours of foodsheds, firesheds and watersheds, elk foodsheds weave different scalar perspectives together according to community values and the social-ecological specifics of place.

Watersheds, fireshed and foodsheds each provide a template for patterning democratic political life and guiding experiments in multi-species world-making in the Klamath. Each way of seeing attempts to bring science and resource governance into more intimate contact with people and place. In comparing these three scales of collaborative environmental governance, I do not argue that one is the ultimate unit under which the others should be subsumed and through which ecological democracy should proceed. My goal was not to determine which "shed" better represents the nature or human communities of the Klamath, but to focus on how each "shed" brings about particular spaces of governance and makes possible certain modes of democratic politics, material practices and ways of life. Bringing these three scales of governance together diffractively means not forcing them into terms of commensurability or collapsing important differences between them. Rather, my intention in bringing these three scales of governance into contact with each other was to allow differences, generative tensions and affinities to emerge from multiple views of the landscape.

Conflicts in epistemologies and ontologies of the watershed point to the fact that there are "multiple ways of worlding", or many ways of elucidating a common world and many processes through which collectives can and do order nature and social life. I argue that new norms, concepts and practices of democracy emerge from this clash of epistemologies and ontologies of nature and debates over the proper scale for democratic environmental governance. Acknowledging multiple ways of worlding entails working with multiple epistemologies and ontologies across multiple social and ecological scales and forging connections between them. Indigenous epistemologies, ontologies and political processes therefore offer ecological democracy a model of universality as openness rather than sameness, a "*pluriversal*" mode of democracy that connects a plurality of partial perspectives through the unfolding of multiple interacting worlds at multiple scales. It is not neutral, disinterested correspondence with objective reality that enables harmony among partial perspectives or makes collective action possible, but rather

collectively designed processes for bringing multiple partial perspectives together through collectively defined socio-spatial formations. The WKRP scoping process and the elk foodshed demonstrate how multi-scalar perspectives and deliberative approaches to questions of scale in resource management open up new possibilities for ecological democracy.

One of my most important findings is that that, as opposed to watershed-centric approaches to environmental governance, multi-scalar perspectives can better accommodate multiple ways of seeing and living in nature while avoiding homogenizing diverse situated perspectives into a single way of seeing Klamath eco-cultural landscapes. I am not arguing that collaborative resource governance initiatives should abandon the watershed as a unit of knowledge generation and social organization, for the watershed concept is a useful management unit for connecting up-stream and down-stream water-use and for linking upslope land use with in-stream hydrologic, geomorphologic and aquatic ecological processes. The watershed also has a long history and a deep resonance in both American intellectual history and Klamath environmentalist culture. However, the communities of the Klamath need to decide what types of knowledge should be produced and what kinds of decisions should be made at the watershed scale and which ones should be made at other scales such as fireheds, foodsheds, airsheds or landscapes. These decisions cannot be decided only through laboratory experiments or scenario modeling, but rather must be made through adaptive and inclusive democratic processes in dialogue with multiple ways of producing and communicating knowledge about watershed ecosystems and their human and non-human inhabitants. More research is needed on the risks and benefits of potential processes through which Klamath communities could structure socio-spatial and scalar formations in order to guide knowledge-making and collective action for natural resource management in ways that are appropriate for those particular landscapes and communities.

To better depict the way water flows through Klamath watersheds and more responsibly represent the multiple scales through which watershed inhabitants understand and value nature, I suggest the need for multi-scalar and polycentric governance institutions, the boundaries and nesting patterns which are themselves designed through democratic processes. I argue for "*democratizing scale*" - meaning opening up questions related to the appropriate spatial and temporal contours of collaborative environmental governance to deliberative inquiry. Multi-scalar perspectives and democratic approaches to the question of scale open up new possibilities for ecological democracy beyond the watershed<sup>1067</sup>. Efforts to

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<sup>1067</sup> See e.g. Sneddon, Chris, et al. "Contested waters: Conflict, scale, and sustainability in aquatic socioecological systems." *Society & Natural Resources* 15.8 (2002): 663-675; Norman, Emma, Karen Bakker, and Christina Cook. "Introduction to the themed section: Water governance and the politics of scale." *Water Alternatives* 5.1 (2012): 52-61; Lebel, Louis, et al. "A multi-level perspective on conserving with communities: Experiences from upper tributary watersheds in montane mainland Southeast Asia." *International Journal of the Commons* 2.1 (2007): 127-154; Lebel, Louis, Po Garden, and Masao Imamura. "The politics of scale, position, and place in the governance of water resources

democratize environmental governance in the Klamath require an accompanying democratization of scale to accommodate the myriad ways people make knowledge and live in Klamath watershed-ecosystems. Throughout this dissertation, I have demonstrated that scalar frameworks produced through democratic processes can provide more inclusive grounds than the watershed for democratic environmental governance and multispecies world-making.

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in the Mekong region." *Ecology and Society* 10.2 (2005): 18; Swallow, Brent M., Dennis P. Garrity, and Meine Van Noordwijk. "The effects of scales, flows and filters on property rights and collective action in watershed management." *Water Policy* 3.6 (2002): 457-474; Merrey, Doug, and Simon Cook. "Fostering institutional creativity at multiple levels: Towards facilitated institutional bricolage". *Water Alternatives* 5(1):1-19, 2012; Budds, Jessica, and Leonith Hinojosa-Valencia. "Restructuring and rescaling water governance in mining contexts: the co-production of waterscapes in Peru." *Water Alternatives* 5.1 (2012): 119-137.

## **Bibliography**

- Adams, Jane, Steven Kraft, J. B. Ruhl, Christopher Lant, Tim Loftus and Leslie Duram. "Watershed Planning: Pseudo-democracy and its Alternatives- The Case of the Cache River Watershed, Illinois". *Agriculture and Human Values*. Fall 2005, Volume 22, Issue 3, pp 327-338.
- Afiff, Suraya and Celia Lowe. "Claiming Indigenous Community: Political Discourse and Natural Resource Rights in Indonesia". *Alternatives* 32 (2007).
- Agee, James. "Issues and Impacts of Redwood National Park Expansion". *Environmental Management*, Vol.4, No.5, pp.407-423, 1980.
- Agrawal, Arun. "Dismantling the Divide Between Indigenous and Scientific Knowledge". *Development and Change*, 1995.
- Anderson, Kat. *Tending the Wild: Native American knowledge and the management of California's natural resources*. Univ of California Press: 2005.
- Anderson, Warwick. "From subjugated knowledge to conjugated subjects: science and globalisation, or postcolonial studies of science?" *Postcolonial Studies* 12.4 (2009): 389-400.
- Anderson, Warwick. "Introduction: postcolonial technoscience." *Social Studies of Science* (2002): 643-658.
- Andréassian, Vazken. "Waters and forests: from historical controversy to scientific debate". *Journal of Hydrology* 291 (2004) 1-27.
- Ansell, Chris and Alison Gash. "Collaborative Governance in Theory and Practice". *Journal of Public Administration Research and Theory*. (2007) 18:543:-571.
- Baker, Mark and Jonathan Kusel. *Community Forestry in the United States: Learning from the Past, Crafting the Future*. Island Press: 2013.
- Bakker, Karen. "Archipelagos and networks: urbanization and water privatization in the South." *The Geographical Journal* 169.4 (2003): 328-341.
- Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke University Press: 2010.
- Barad, Karen. "On touching- The inhuman that therefore I am." *Differences* 23.3 (2012): 206-223.
- Barbour, Wayne and Christine Schlesinger. "Who's the boss? Post-colonialism, ecological research and conservation management on Australian Indigenous lands". *Ecological Management and Restoration*: 2012.

- Barham, E. "Ecological Boundaries as Community Boundaries: The Politics of Watersheds". *Society & Natural Resources* (2001).
- Barnett, Clive, and Murray Low (eds). *Spaces of democracy: geographical perspectives on citizenship, participation and representation*. Sage: 2004.
- Bates, Carlos G. 1921."First results in the streamflow experiment, Wagon Wheel Gap, Colorado." *Journal of Forestry* 19.4 (1921): 402-408.
- Bates, Carlos G., and Alfred Judson Henry. "Second Phase of Streamflow Experiment at Wagon Wheel Gap, Colo." *Monthly weather review* 56.3 (1928): 79-80.
- Bateson, Gregory. *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology*. University Of Chicago Press; 1972.
- Beecher-Monas, Erica. "Heuristics of Intellectual Due Process: A Primer for Triers of Science". *NYU Law Review* (2000).
- Beecher-Monas, Erica. *Evaluating Scientific Evidence: An Interdisciplinary Framework for Intellectual Due Process*. Cambridge: 2006.
- Berg, Peter (ed). *Reinhabiting A Separate Country: A Bioregional Anthology of Northern California*. San Francisco: Planet Drum: 1978.
- Berg, Peter. "Learning to Partner with a Life-Place". *Ecuador Dispatch #1*, June 12, 2004.
- Berg, Peter. "Bioregion and Human Location". *All Area #2*, Spring 1983.
- Berkes, F. and D. Jolly 2001. "Adapting to climate change: Social-ecological resilience in a Canadian western Arctic community". *Conservation Ecology* 5 (2): 18.
- Berkes, F. 1990. "Native subsistence fisheries: A synthesis of harvest studies in Canada". *Arctic* 43: 35-42.
- Berkes, F. and D. Jolly 2001. "Adapting to climate change: Social-ecological resilience in a Canadian western Arctic community". *Conservation Ecology* 5 (2): 18.
- Berkes, Fikret, et al. "Minireviews: exploring the basic ecological unit: ecosystem-like concepts in traditional societies." *Ecosystems* 1.5 (1998): 409-415.
- Best, David. 1991 "History of timber harvest in the Redwood Creek Basin, Northwestern, California". In Nolan, Kenneth Michael, H. M. Kelsey, and D. C. Marron. *Geomorphic processes and aquatic habitat in the Redwood Creek Basin, Northwestern California*. US Government Printing Office: 1991.
- Biggs, David. "Reclamation Nations: The US Bureau of Reclamation's Role in Water Management and Nation Building in the Mekong Valley, 1945-1975." *Comparative Technology Transfer and Society* 4.3 (2006): 225-246.

- Biolsi, T. "Imagined geographies: Sovereignty, indigenous space, and American Indian struggle". *American Ethnologist*, 32: 239–259: 2005.
- Biswas, Asit K. *History of hydrology*. Amsterdam: 1970.
- Blaikie, Piers M., and Joshua SS Muldavin. "Upstream, downstream, China, India: the politics of environment in the Himalayan region." *Annals of the Association of American Geographers* 94.3 (2004): 520-548.
- Blaikie, Piers, and Harold Brookfield. *Land degradation and society*. Methuen: 1987.
- Blaser, Mario. "Ontology and indigeneity: on the political ontology of heterogeneous assemblages". *Cultural Geographies* (2014) 21: 49.
- Bledso, Anthony Jennings. *Indian Wars of the Northwest: A California Sketch*. 1885.
- Blomley, Nicholas. "Flowers in the bathtub: boundary crossings at the public–private divide." *Geoforum* 36.3.
- Blomley, Nicholas. "Landscapes of property." *Law and Society Review* (1998): 567-612.
- Blomley, Nicholas. "Simplification is complicated: property, nature, and the rivers of law." *Environment and planning. A* 40.8 (2008): 1825.
- Boelens, Rutgerd. "Cultural politics and the hydrosocial cycle: Water, power and identity in the Andean highlands." *Geoforum* 57 (2014): 234-247.
- Bohman, James. "The Coming of Age of Deliberative Democracy". *The Journal of Political Philosophy*: Vol 6, No 4, 1998.
- Born, Branden and Mark Purcell. "Avoiding the local trap scale and food systems in planning research." *Journal of Planning Education and Research* 26.2 (2006): 195-207.
- Borowski, I., J. Le Bourhis, C. Pahl-Wostl, and B. Barraqué. 2008. "Spatial misfit in participatory river basin management: effects on social learning. a comparative analysis of German and French case studies". *Ecology and Society* 13(1): 7.
- Bowers, Amy, and Kristen Carpenter. "Lyng v. Northwest Indian Cemetery Protective Association: Challenging the Narrative of Conquest." *Indian Law Stories*: 2011.
- Bowker, G., & Star, S. L. *Sorting Things Out: Classification and Its Consequences*. MIT Press: 1999.
- Boyle, J.C. *50 years on the Klamath*. Klocker: 1976.
- Braun and Whatmore (Eds) *Political Matter: Technoscience, Democracy and Public Life*. University of Minnesota Press: 2010.

- Brenner, Neil. "The limits to scale? Methodological reflections on scalar structuration." *Progress in human geography* 25.4 (2001): 591-614.
- Brooks, Kenneth N., Peter F. Ffolliott, Hans Gregersen and Leonard DeBano. *Hydrology and the Management of Watersheds*. 3rd Edition. Iowa State Press: 2003.
- Brown, J. Christopher and Mark Purcell. "There's nothing inherent about scale: political ecology, the local trap, and the politics of development in the Brazilian Amazon." *Geoforum* 36.5 (2005): 607-624.
- Browning, Jordan. "Unearthing Subterranean Water Rights: The Environmental Law Foundation's Efforts to Extend California's Public Trust Doctrine". *UC Davis Law Journal* (2011).
- Buache, Phillipe. *Essay in physical geography proposing general perspectives on the structure of the globe, which is made up of mountain ranges crossing the oceans and lands, with some particular considerations regarding the different sea basins and the internal configuration of the sea*. French Royal Academy: 1752.
- Buckley, Thomas. "Kroeber's Theory of Culture Areas and the Ethnology of Northwestern California". *Anthropological Quarterly*, Vol. 61, No. 4, Culture Theory and Cultural Criticism in Boasian Anthropology (Oct., 1988), pp. 15-26.
- Budds, J. and Hinojosa, L. "Restructuring and rescaling water governance in mining contexts: The co-production of waterscapes in Peru". *Water Alternatives* 5(1): 119-137. 2012.
- Budds, Jessica. "Whose scarcity? The hydrosocial cycle and the changing waterscape of La Ligua river basin, Chile." *Contentious geographies: Environment, meaning, scale* (2008): 59-68.
- Buisseret, David. *Monarchs, Ministers and Maps: the Emergence of Cartography as a Tool of Government in Early Modern Europe*. University of Chicago:1992.
- Butler, Judith. *Bodies that matter: On the discursive limits of sex*. Taylor & Francis: 2011 (1993).
- Calder, Ian. *Blue Revolution: Integrated Land and Water Resource Management*. Earthscan: 2005.
- California Department of Fish and Game. *State Wildlife Action Plan*. 2014.
- Carroll, Patrick. "Water and Technoscientific State Formation in California". *Social Studies of Science*. 42-4 (2012), 489-516.
- Castree, Noel. "Differential geographies: place, indigenous rights and 'local' resources." *Political Geography* 23.2 (2004): 133-167.
- Cetina, Karin Knorr. *Epistemic cultures: How the sciences make knowledge*. Harvard: 2009.

- Chartkoff, Joseph L. and Kerry K. Chartkoff. 1975. "Late Period Settlement of the Middle Klamath River of Northwest California". *American Antiquity*, vol. 40, no. 2 172-179
- Chen, Mel. *Animacies: Biopolitics, racial mattering, and queer affect*. Duke: 2012.
- Chou, Tsu-Lung. "ANT Analysis on the River Management of Urban Taiwan: A Case Study of Keelung River in Taipei Basin." *Advances in Applied Sociology* 2.03 (2012): 203.
- Clar, Raymond. *California Government and Forestry*. 1959.
- Clarke, Adele E. "Controversy and the development of reproductive sciences." *Social Problems* 37.1 (1990): 18-37.
- Coats, Robert N., and Taylor O. Miller. "Cumulative silvicultural impacts on watersheds: a hydrologic and regulatory dilemma." *Environmental Management* 5.2 (1981): 147-160.
- Coggins, George C. 1999. "Regulating federal natural resources: a summary case against devolved collaboration". *Ecology Law Quarterly* 25 (4):602-610.
- Cohen, Alice, and Seanna Davidson. "The watershed approach: Challenges, antecedents, and the transition from technical tool to governance unit." *Water alternatives* 4.1 (2011): 1-14.
- Coombe, Rosemary. *The Cultural Life of Intellectual Property: Authorship, Appropriation, and the Law*. Duke: 1998.
- Cosens, Barbara. "The Measure of Indian Water Rights: The Arizona Homeland Standard, Gila River Adjudication". *Natural Resources Journal* (2002).
- Cosgrove, Denis E. *Social formation and symbolic landscape*. 2nd ed. Madison: University of Wisconsin Press, 1998 (1984).
- Coy, Owen C. *The Genesis of California Counties*. CA: 1923.
- Crawford, Jeffrey N., et al. "Late Holocene fire and vegetation reconstruction from the western Klamath Mountains, California, USA: A multi-disciplinary approach for examining potential human land-use impacts." *The Holocene* (2015).
- Cronon, William. "A place for stories: Nature, history, and narrative." *The Journal of American History* (1992): 1347-1376.
- Cronon, William. *Changes in the land: Indians, colonists, and the ecology of New England*. Macmillan: 2011.
- Dahl, Robert Alan, and Edward R. Tufte. *Size and democracy*. Stanford University Press: 1973.
- Daston, L., and P. Galison. *Objectivity*. Zone: 2007.



- Davies, Gilbert W. and Frank, Florice. *Stories of the Klamath National Forest: 1905-1955*. History Inc.: 1992.
- Debarbieux, Bernard. 2008. "The Mountains between corporal experience and pure rationality: the contradictory theories of Philippe Buache and Alexander von Humboldt" in Cosgrove, Denis E., and Veronica Della Dora. *High places: cultural geographies of mountains and ice*. Vol. 15. IB Tauris, 2008, pgs. 87-104.
- Deborah Bird Rose, Thom van Dooren, Matthew Chrulew, Stuart Cooke, Matthew Kearnes and Emily O’Gorman. "Thinking Through the Environment, Unsettling the Humanities". *Environmental Humanities* 1 (2012) 1-5.
- Delaney, David, and Helga Leitner. "The political construction of scale." *Political geography* 16.2 (1997): 93-97.
- DellaSala, D. A., S. B. Reid, T. J. Frest, J. R. Strittholt, and D. M. Olson, 1999. "A global perspective on the biodiversity of the Klamath-Siskiyou ecoregion". *Natural Areas Journal*, Vol. 19, No. 4, pp. 300-319.
- Deloria, Philip. *Playing Indian*. Yale University Press: 1999.
- Deloria, Vine and David Wilkins. *Tribes, Treaties and Constitutional Tribulations*. University of University of Texas Press: 2000.
- Deloria, Vine, and Clifford M. Lytle. *The nations within: The past and future of American Indian sovereignty*. University of Texas Press: 1984.
- Derrida, Jacques. 2003. "And Say the Animal Responded?" In *Zoontologies: The Question of the Animal*. Wolfe, Cary ed. Univ of Minnesota Press: 2003.
- Derthick, Martha. *Dilemmas of scale in America's federal democracy*. Cambridge University Press: 1999.
- Dewey, John. *The Public and its Problems*. 1927.
- Diver, Sibyl Wentz. *Negotiating knowledges, shifting access: Natural resource governance with Indigenous communities and state agencies in the Pacific Northwest*. PhD Dissertation. University of California, Berkeley: 2014
- Dodds, Gordon B. "The stream-flow controversy: A conservation turning point." *The Journal of American History* 56.1 (1969): 59-69.
- Doremus, Holly, and A. Dan Tarlock. "Fish, farms, and the clash of cultures in the Klamath basin." *Ecology LQ* 30 (2003): 279.
- Doremus, Holly, and A. Dan Tarlock. *Water War in the Klamath Basin*. Island Press: 2008.
- Doremus, Holly. "Purposes, Effects, and Future of the Endangered Species Act's Best Available Science Mandate, The." *Envtl. L.* 34 (2004): 397.

- Douglas, Mary. *How institutions think*. Syracuse University Press, 1986.
- Ekbladh, David. "'Mr. TVA': grass-roots development, David Lilienthal, and the rise and fall of the Tennessee Valley Authority as a symbol for US Overseas Development, 1933–1973." *Diplomatic History* 26.3 (2002): 335-374.
- Ezrahi, Yaron. *Imagined Democracies: Necessary Political Fictions*. Cambridge University Press: 2012.
- Ezrahi, Yaron. *The Descent of Icarus*. Harvard: 1990.
- Fals-Borda, Orlando. "The Application of Participatory Action-Research in Latin America". *International Sociology*, Vol 2. No 4. Pp.329-347. Dec 1987.
- Fals-Borda, Orlando. "The North-South convergence: A 30-year first-person assessment of PAR". *Action Research*. Volume 4(3): 351–358. 2006.
- Fals-Borda, Orlando. "Participatory action research." *Development: Seeds of change* 2 (1984): 18-20.
- Fals-Borda, O. & Rahman, M. (Eds.), *Action and knowledge: Breaking the monopoly with participatory action-research*. Apex Press: 1991.
- Field, Les. *Abalone Tales: Collaborative Explorations of Sovereignty and Identity in Native California*. Duke University Press: 2008.
- Fischer, Frank. *Citizens, Experts and the Environment: the Politics of Local Knowledge*. Duke University Press: 2000.
- Fleck, Ludwig. *The genesis of a scientific fact*. (Trans. F. Bradley). 1979 (1935).
- Foglia, Laura, Alison McNally, Courtney Hall, Lauren Ledesma, Ryan Hines, and Thomas Harter. *Scott Valley Integrated Hydrologic Model: Data Collection, Analysis, and Water Budget Final Report*. 2013.
- Folke, Carl, et al. "Adaptive governance of social-ecological systems." *Annu. Rev. Environ. Resour.* 30 (2005): 441-473.
- Folke, Carl. 2006. "Resilience: The emergence of a perspective for social–ecological systems analyses". *Global Environmental Change* 16 (2006) 253–267.
- Folke, Carl. "Social–ecological systems and adaptive governance of the commons." *Ecological research* 22.1 (2007): 14-15.
- Forsyth, Tim and Andrew Walker. *Forest Guardians, Forest Destroyers: The Politics of Environmental Knowledge in Northern Thailand*. University of Washington: 2008.
- Forsyth, Timothy. "Science, myth and knowledge: testing Himalayan environmental degradation in Thailand." *Geoforum* 27.3 (1996): 375-392.

- Fortmann, Louise. "Talking claims: discursive strategies in contesting property." *World Development* 23.6 (1995): 1053-1063.
- Foucault, Michel, et al. *Security, Territory, Population: Lectures at the Collège de France 1977-1978*. Vol. 4. Macmillan: 2009.
- Francois, Charles. "Systemics and Cybernetics in a Historical Perspective". *Systems Research and Behavioral Science Syst Res.* 16, 203-219 (1999).
- Fraser, Nancy. "Rethinking the Public Sphere: A Contribution to the Critique of Actually Existing Democracy". *Social Text* (1990).
- Fraser, Nancy. *Scales of Justice: Reimagining political space in a globalizing world*. Columbia University Press: 2009.
- Freire, P. *Pedagogy of the oppressed* (Trans M. B. Ramos). Continuum: 1970.
- Funtowitz, S.O. and J.R. Ravetz. "Science for the post-normal age". *Futures*, 1993.
- Gallo, Kirsten, et al. *Northwest Forest Plan- the first 10 years (1994-2003): preliminary assessment of the condition of watersheds*. USDA Forest Service: 2005.
- Getzler, Joshua. *A History of Water Rights at Common Law*. Oxford University Press: 2004.
- Gibbs, George. *George Gibb's Journal of Redick McKee's expedition through northwestern California in 1851*. Archaeological Research Facility, Dept. of Anthropology, University of California, 1972.
- Gibbs, George. *Two nineteenth century ethnographic documents on the Wiyot and Yurok of northwestern California and the Comanches of New Mexico and Texas*. Archaeological Research Facility, Dept. of Anthropology, University of California: 1973.
- Gieryn, Thomas F. 1983. "Boundary-work and the demarcation of science from non-science: Strains and interests in professional ideologies of scientists". *American sociological review* (1983): 781-795.
- Gifford, EW, "Karak, Katimiin". *University of California Publications in Anthropological Records*. 1952, ol XIII 1949-1952.
- Goodman, EJ. "Indian tribal sovereignty and water resources: Watersheds, ecosystems and tribal co-management". *J. Land Resources & Env'tl. L.*, 2000.
- Gosnell, Hannah, and Erin Clover Kelly. "Peace on the river? Social-ecological restoration and large dam removal in the Klamath basin, USA." *Water Alternatives* 3.2 (2010): 361-383
- Griffin, C.B. "Watershed Councils: An Emerging Form of Public Participation in Natural Resource Management." *Journal of the American Water Resources Association*, June 1999.

- Grinde, Donald and Bruce Johansen. *Exemplars of Liberty: Native America and the Evolution of Democracy*. UCLA: 1991.
- Grosfoguel, Ramón. "Decolonizing Post-Colonial Studies and Paradigms of Political-Economy: Transmodernity, Decolonial Thinking, and Global Coloniality". *Transmodernity*. 2011.
- Gunderson, Lance H. "Ecological resilience--in theory and application." *Annual review of ecology and systematics* (2000): 425-439.
- Gunderson, L.H. and C.S. Holling (eds.). *Panarchy: Understanding Transformations in Human and Natural Systems*. Island Press: 2007.
- Guston, David. *Between Politics and Science: Assuring the Integrity and Productivity of Research*. Cambridge University Press: 2007.
- Guthman, Julie. "Representing Crisis: The Theory of Himalayan Environmental Degradation and the Project of Development in Post-Rana Nepal." *Development and Change* 28.1 (1997): 45-69.
- Guzman, Adriana. *Salmon is Everything: The Emergence and Development of Eco-Drama in the Context of the Klamath Salmon Crisis and an Examination of its role as a Pedagogical Tool*. Master's Thesis, Humboldt State University, December 2012.
- Hall, Budd. "From margins to center? The development and purpose of participatory research". *The American Sociologist*. Winter 1992, Volume 23, Issue 4, pp 15-28, 1982.
- Hall, Budd. "In From the Cold? Reflections on Participatory Research From 1970-2005". *Convergence*. 2005.
- Haraway, Donna Jeanne. *When Species Meet*. University of Minnesota Press: 2008.
- Haraway, Donna Jeanne. *Modest-Witness@ Second-Millennium. FemaleMan-Meets-OncoMouse: Feminism and Technoscience*. Psychology Press: 1997.
- Haraway, Donna Jeanne. "A game of cat's cradle: science studies, feminist theory, cultural studies." *Configurations* 2.1 (1994): 59-71.
- Haraway, Donna. "Situated knowledges: The science question in feminism and the privilege of partial perspective." *Feminist studies* (1988): 575-599.
- Harding, Sandra. *Sciences from below: Feminisms, postcolonialities, and modernities*. Duke University Press: 2008.
- Harding, Sandra. "Strong objectivity and socially situated knowledge" in Harding, Sandra G. (ed) *Whose science? Whose knowledge?: Thinking from women's lives*. Cornell University Press: 1991.

- Harling, Will and Tripp, Bill. *Western Klamath Restoration Partnership : A Plan for Restoring Fire Adapted Landscapes*. MKWC and KDNR: 2014.
- Harris, Leila M., and Samer Alatout. "Negotiating hydro-scales, forging states: Comparison of the upper Tigris/Euphrates and Jordan River basins." *Political Geography* 29.3 (2010): 148-156.
- Hayden, Cori. *When nature goes public: The making and unmaking of bioprospecting in Mexico*. Princeton University Press: 2003.
- Heizer, Robert Fleming. *The eighteen unratified treaties of 1851-1852 between the California Indians and the United States government*. Archaeological Research Facility, Dept. of Anthropology, University of California: 1972.
- Heizer, Robert. "Introduction" to *George Gibbs Journal of Redick McKee's Expedition through Northwestern California in 1851*. University of California, Berkeley Archaeological Research Facility: 1972.
- Hester, Randy. *Design for Ecological Democracy*. MIT press: 2006.
- Heynen, Nik, et al., eds. *Neoliberal environments: false promises and unnatural consequences*. Routledge, 2007.
- Heynen, Nik, and Paul Robbins. "The neoliberalization of nature: Governance, privatization, enclosure and valuation." *Capitalism Nature Socialism* 16.1 (2005): 5-8.
- Hilgartner, Stephen. *Science on stage: Expert advice as public drama*. Stanford University Press: 2000.
- Hillman, Leaf & John F. Salter. "Environmental Management: American Indian Knowledge & The Problem of Sustainability". *Forests, Trees and People Newsletter*, Food and Agriculture Organization: 1997.
- Holling, CS (ed). 1978. *Adaptive environmental assessment and management*. (Editor) London: John Wiley & Sons.
- Holmes and Jampijinpa. "Law for country: the structure of Warlpiri ecological knowledge and its application to natural resource management and ecosystem stewardship". *Ecology and Society* 18.3: 19 (2013).
- Hoopes, Chad L. Redick McKee and the Humboldt Bay Region, 1851-1852; *California Historical Society Quarterly*, Vol. 49, No. 3 (Sep., 1970), pp. 195-219.
- Horowitz, Morton. *The Transformation of American Law (1870-1960): The Crisis of Legal Orthodoxy*. Oxford: 1992.
- Howitt, Richard, and Sandra Suchet-Pearson. "Rethinking the building blocks: ontological pluralism and the idea of 'management'." *Geografiska Annaler: Series B, Human Geography* 88.3 (2006): 323-335.

- Howitt, Richard. "Scale." *A companion to political geography* (2003): 132-157.
- Howitt, Richard. "Scale as relation: musical metaphors of geographical scale." *Area* 30.1 (1998): 49-58.
- Humphrey, Caroline, and Katherine Verdery. "Introduction: Raising questions about property" in Humphrey and Verdery (eds) *Property in question: Value transformation in the global economy*. Oxford: 2004.
- Hundley, Norris. *The great thirst: Californians and water, 1770s-1990s*. University of California Press, 1992.
- Huntsinger, Lynn and Sarah McCaffrey. "A Forest for the Trees: Forest Management and the Yurok Environment". *American Indian Culture and Research Journal*, Volume 19, No. 4, pp. 155-192 (1995).
- Iris Marion Young. "Hybrid Democracy: Iroquois Federalism and the Postcolonial Project" in *Global Challenges: War, Self-Determination and Responsibility for Justice*. Polity Press: 2007.
- Ives, Jack D. "The theory of Himalayan environmental degradation: its validity and application challenged by recent research." *Mountain Research and Development* (1987): 189-199.
- Kosek, Jake. "Introduction: The Cultural Politics of Race and Nature: Terrains of Power and Practice" in Moore, Kosek and Pandian (eds) *Race, Nature and the Politics of Difference*. Duke University Press: 2003.
- Jasanoff, Sheila. *Designs on Nature: Science and Democracy in Europe and the United States*. Princeton University Press: 2007.
- Jasanoff, Sheila. *States of Knowledge: the Co-production of Science and the Social Order*. Routledge: 2004.
- Jasanoff, Sheila. *The Fifth Branch: Science Advisers as Policy Makers*. Harvard: 1998.
- Jasanoff, Sheila. *Science at the Bar: Law, Science and Technology in America*. Harvard: 1997.
- Jonas A E G. "The scale politics of spatiality" *Environment and Planning D: Society and Space* 12(3) 257 – 264. 1994.
- Jones, Katherine T. "Scale as epistemology." *Political geography* 17.1 (1998).
- Jordan, J.M. *Machine-Age Ideology: Social Engineering and American Liberalism, 1911-1939*. UNC Press: 1994.
- Kaiser R, Nikiforova E. "The performativity of scale: the social construction of scale effects in Narva, Estonia" *Environment and Planning D: Society and Space* 26(3) 537 – 562 (2008).

- Karuk Tribe Department of Natural Resources. *Eco-Cultural Resource Management Plan*. Karuk Tribe: 2011.
- Karuk Tribe Department of Natural Resources. *Karuk Ecosystem Restoration Program*. Final Report FY 2001, 2002, 2003.
- Karuk Tribe Dept. of Natural Resources. *East Ishi Pishi Road Decommissioning Project*. 2005.
- Karuk Tribe of California, Dept. of Natural Resources. *Final report: Karuk tribal harvest monitoring project*. Orleans, CA: 1991.
- Karuk-UC Berkeley Collaborative. *Practicing Pikyav: A Guiding Policy for Collaborative Projects and Research Initiatives with the Karuk Tribe*. Draft: 2013.
- Kemmis, Daniel, and Matthew McKinney. "Collaboration and the ecology of democracy." *Sustainable Dev. L. & Pol'y* 12 (2011): 46.
- Kenney, Douglas. "Historical and Sociopolitical Context of the Western Watersheds Movement". *Journal of the American Water Resources Association*. June 1999.
- Kerr, John. Watershed Management: Lessons from Common Property Theory. *International Journal of the Commons*. Vol 1, no 1 October 2007, pp. 89-109.
- King, T. F. *First salmon: the Klamath cultural riverscape and the Klamath River hydroelectric project*. Klamath River Intertribal Fish and Water Commission, Hoopa, California (2004).
- Klamath National Forest. *Elk Management Strategy*. USFS: 2007.
- Kochhar-Lindgren, Kanta, and Thaneer Thaneer. "Dramatizing Water: Performance, Anthropology, and the Transnational." Special Issue on *Performance Studies* (2013): 22.
- Kohn, Eduardo. *How forests think: Toward an anthropology beyond the human*. Univ of California Press: 2013.
- Kortelainen, Jarmo. "The river as an actor-network: the Finnish forest industry utilization of lake and river systems." *Geoforum* 30.3 (1999): 235-247.
- Kroeber, Alfred Louis. *Handbook of the Indians of California*. Vol. 78. Courier Corporation, 1925.
- Kroeber, Theodora. Introduction to Kroeber, Alfred Louis, and Edward Winslow Gifford. *Karok myths*. Univ of California Press: 1980.
- Kuokkanen, Rauna Johanna. *Reshaping the university: Responsibility, Indigenous epistememes, and the logic of the gift*. UBC Press: 2007.

- Lake, Frank K. "Trails, fires, and tribulations: Tribal resource management and research issues in northern California." *Occasion* 5 (2013): 1-22.
- Lake, Frank. *Traditional Ecological Knowledge to Develop and Maintain Fire Regimes in Northwestern California, Klamath-Siskiyou Bioregion: Management and Restoration of Culturally Significant Habitats*. PhD diss., Oregon State University: 2007.
- Langston, Nancy. *Forest dreams, forest nightmares: the paradox of old growth in the Inland West*. University of Washington Press: 1995.
- Lansing, J. Stephen. "Complex adaptive systems." *Annual review of anthropology* (2003): 183-204.
- Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers through Society*. Harvard University Press: 1988.
- Latour, Bruno. *We Have Never Been Modern*. Harvard University Press: 1993.
- Latour, Bruno. *The Pasteurization of France*. Harvard University Press: 1988.
- Latour, Bruno. "Why has critique run out of steam? From matters of fact to matters of concern." *Critical inquiry* 30.2 (2004): 225-248.
- Latour, Bruno. *Politics of Nature: How to Bring the Sciences into Democracy*. Harvard University Press: 2004.
- Law, John. "Notes on the theory of the actor-network: Ordering, strategy, and heterogeneity." *Systems practice* 5.4 (1992): 379-393.
- Leach, Melissa, and Robin Mearns. *The Lie of the Land: challenging received wisdom on the African environment*. James Currey Ltd: 1996.
- Leach, William D. and Neil Pelkey. "Making Watershed Partnerships Work: A Review of the Empirical Literature". *Journal of Water Resources Planning and Management*. Nov/Dec 2001.
- Leach, William. Collaborative Public Management and Democracy: Evidence from Western Watershed Partnerships. *Public Administration Review*, December 2006.
- Leach, William. *Is Devolution Democratic? Assessing Collaborative Environmental Management*. Center for Collaborative Policy, August 2004.
- Lebel, Louis et al. "The Politics of Scale, Position, and Place in the Governance of Water Resources in the Mekong Region". *Ecology and Society* 10(2):18 (2005).
- Lebel, Louis, et al. "A multi-level perspective on conserving with communities: Experiences from upper tributary watersheds in montane mainland Southeast Asia." *International Journal of the Commons* 2.1 (2007): 127-154.



- Leopold, Luna. M Gordon Wolman and John Miller. *Fluvial Processes in Geomorphology*. Dover: 1992 (1962).
- Lewis, Henry T. *Patterns of Indian burning in California: ecology and ethnohistory*. No. 1. Ballena Press: 1973.
- Lilienthal, David E. *TVA: Democracy on the March*. Harper and Brothers Publishers: 1944.
- Lilienthal, David Eli. *Management: a Humanist Art*. Columbia University Press: 1967.
- Linton, J. and Budds, J. "The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water". *Geoforum* 57 (2014): 170-180.
- Linton, Jamie. "Modern water and its discontents: a history of hydrosocial renewal." *Wiley Interdisciplinary Reviews: Water* 1.1 (2014): 111-120.
- Linton, Jamie. *What is water? The history of a modern abstraction*. UBC Press: 2010.
- Littlefield, Douglas. "Water Rights During the California Goldrush: Conflicts over Economic Points of View". *Western Historical Quarterly*, 18, Jan 1987.
- Loeffler, Jack and Celestia Leffler. *Thinking Like a Watershed: Voices from the West*. University of New Mexico Press: 2012.
- Lotspeich, Frederick B. "Watersheds as the Basic Ecosystem". *Journal of the American Water Resources Association* 16.4 (1980): 581-586.
- Lowe, Celia. *Wild Profusion: Biodiversity Conservation in an Indonesian Archipelago*. Princeton University Press: 2006.
- Lubell, Mark et al. "Watershed Partnerships and the Emergence of Collective Action Institutions". *American Journal of Political Science*, Vol. 46, No. 1, January 2002.
- Lubell, Mark and William Leach. "Watershed Partnerships: Evaluating a Collaborative Form of Public Participation". *National Research Council's Panel on Public Participation in Environmental Assessment and Decision Making*, February 3-4, 2005.
- MacKenzie, Donald A., Fabian Muniesa, and Lucia Siu. *Do economists make markets?: on the performativity of economics*. Princeton University Press: 2007.
- MacPherson, C.B. 1977. *The Life and Times of Liberal Democracy*. Oxford: 1977.
- Mann, Geoff. *Our Daily Bread: Wages, workers, and the political economy of the American West*. Univ of North Carolina Press: 2007.
- Marsh, George Perkins. *Man and Nature; or Physical geography as modified by human action*. University of Washington: 1965 (1864).
- Marston, Sallie A. "The social construction of scale." *Progress in human geography* 24.2 (2000): 219-242.

- McCarthy, James. "Scale, sovereignty, and strategy in environmental governance." *Antipode* 37.4 (2005): 731-753.
- McClure, Kirstie Morna. *Judging Rights: Lockean Politics and the Limits of Consent*. 1996.
- McCool, Daniel. *Iron Triangles, Federal Water Development, and Indian Water*. University of Arizona Press: 1994.
- McCool, Daniel. *Native Waters: Contemporary Indian Water Settlements and the Second Treaty Era*. University of Arizona Press: 2006.
- McGee, W. J. "Water as a Resource." *Annals of the American Academy of Political and Social Science* 33.3 (1909): 37-50.
- McGuire, Kevin and Gene E. Likens. "Historical Roots of Forest Hydrology and Biogeochemistry" in Delphis F. Levia, Darryl Carlyle-Moses, Tadashi Tanaka (eds) *Forest Hydrology and Biogeochemistry*. 2011.
- McKee, John. *Minutes Kept by John McKee on the Expedition From Sonoma through Northern California*. August 1851, Sen. Ex. Docs., 33 Cong., Spec. Sess., Doc. 4, pp. 134-180 (688).
- McNeil, Maureen. "Introduction: postcolonial technoscience." *Science as Culture* 14.2 (2005).
- Merrey, Doug, and Simon Cook. "Fostering institutional creativity at multiple levels: Towards facilitated institutional bricolage". *Water Alternatives* 5(1):1-19, 2012.
- Merton, Robert K. "Note on Science and Democracy, A." *J. Legal & Pol. Soc.* 1 (1942): 115.
- Mid-Klamath Watershed Council. *Mid-Klamath Sub-basin Restoration Plan*. 2002.
- Mignolo, Walter. "Epistemic Disobedience and the Decolonial Option: A Manifesto". *Transmodernity*: 2011.
- Mignolo, Walter. "The Zapatista's Theoretical Revolution: Its Historical, Ethical and Political Consequences." *Review* (Fernand Braudel Center), Vol. 25, No. 3 *Utopian Thinking*, (2002).
- Mitchell, Don. *The lie of the land: Migrant workers and the California landscape*. University of Minnesota Press: 1996.
- Mitchell, Timothy. *Rule of Experts: Egypt, Techno-Politics, Modernity*. University of California Press: 2002.
- Mitchell, WJ Thomas. *Landscape and power*. University of Chicago Press: 2002.
- Mol, Annemarie, and John Law. "Regions, networks and fluids: anaemia and social topology." *Social studies of science* 24.4 (1994): 641-671.

- Molle, François. "River-basin planning and management: The social life of a concept." *Geoforum* 40.3 (2009): 484-494.
- Molle, Francois. Planning and managing water resources at the river-basin level: emergence and evolution of a concept. Vol. 16. *IWMI*, 2006.
- Mollinga, Peter P., Ruth S. Meinzen-Dick, and Douglas J. Merrey. "Politics, plurality and problemsheds: A strategic approach for reform of agricultural water resources management." *Development Policy Review* 25.6 (2007): 699-719.
- Montgomery, David R., Gordon Grant and Kathleen Sullivan. " Watershed Analysis as a Framework for Implementing Ecosystem Management". *Water Resources Bulletin*, June 1995, Vol. 31, No. 3.
- Moore, Adam. "Rethinking scale as a geographical category: from analysis to practice." *Progress in human geography* 32.2 (2008): 203-225.
- Moore, Donald. *Suffering for Territory: Race, Place, and Power in Zimbabwe*. Duke University Press: 2005.
- Most, Stephen. *River of Renewal: Myth and history in the Klamath Basin*. Oregon Historical Society Press: 2004.
- Mostert, E., C. Pahl-Wostl, Y. Rees, B. Searle, D. Tàbara, and J. Tippett. "Social learning in European river-basin management: barriers and fostering mechanisms from 10 river basins". *Ecology and Society* 12(1): 19 (2007).
- Nadasdy, Paul. "We Don't Harvest Animals; We Kill Them:" Agricultural Metaphors and the Politics of Wildlife Management in the Yukon. in *Knowing Nature: Conversations at the Intersection between Political Ecology and Science Studies*.. University of Chicago Press: 2011.
- Nadasdy, Paul. *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal-State Relations in the Southwest Yukon*. Vancouver: University of British Columbia Press: 2003.
- Neumann, Roderick P. "Political ecology: theorizing scale." *Progress in Human Geography* 33.3 (2009): 398.
- Norgaard, Kari. "The Politics of Fire and the Social Impacts of Fire Exclusion on the Klamath" *Humboldt Journal of Social Relations*. 36 (2014): 77-101.
- Noorgard, Kari. *Karuk Traditional Ecological Knowledge and the Need for Knowledge Sovereignty: Social, Cultural and Economic Impacts of Denied Access to Traditional Management*. Karuk Tribe: 2014.
- Noorgard, Kari. *The Effects of Altered Diet on the Health of the Karuk People*. Karuk Tribe: 2005.

- Norman, Emma, Karen Bakker, and Christina Cook. "Introduction to the themed section: Water governance and the politics of scale." *Water Alternatives* 5.1 (2012): 52-61.
- Norman, Emma. "Cultural politics and transboundary resource governance in the Salish Sea." *Water Alternatives* 5.1 (2012): 138-160.
- Norton, Jack. *Genocide in Northwestern California*. Indian Historian Press: 1979.
- Olson, David, Dominick A. DellaSala, Reed F. Noss, James R. Strittholt, Jamie Kass, Marni E. Koopman and Thomas F. Allnutt. "Climate Change Refugia for Biodiversity in the Klamath-Siskiyou Ecoregion" *Natural Areas Journal*, 32(1):65-74.
- Olsson, Per, Carl Folke, and Fikret Berkes. "Adaptive Comanagement for Building Resilience in Social-Ecological Systems". *Environmental Management* Vol. 34, No. 1, pp. 75-90.
- Olwig, Kenneth. *Landscape, nature, and the body politic: from Britain's renaissance to America's new world*. Univ. of Wisconsin Press: 2002.
- Ong, Aihwa. *Flexible Citizenship: The Cultural Logics of Transnationality*. Duke University Press: 1999.
- Opotow, Susan, and Leah Weiss. "New ways of thinking about environmentalism: Denial and the process of moral exclusion in environmental conflict." *Journal of Social Issues* 56.3 (2000): 475-490.
- Ostrom, Eleanor. *Governing the Commons*. Cambridge University Press: 1990.
- Pahl-Wostl, C., E. Mostert, and D. Tàbara. 2008. "The growing importance of social learning in water resources management and sustainability science". *Ecology and Society* 13(1): 24.
- Pahl-Wostl, C. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19: 354-365 (2009).
- Parisi, Luciana. *Abstract Sex: Philosophy, Bio-technology and the Mutations of Desire*. Continuum: 2004.
- Pickering, Andrew. *The cybernetic brain: Sketches of another future*. University of Chicago Press: 2010.
- Pinchot, Gifford. *A Primer of Forestry*. Doubleday: 1905.
- Pinchot, Gifford. *The fight for conservation*. Doubleday: 1910.
- Pisani, Donald. Water Planning in the Progressive Era: The Inland Waterways Commission Reconsidered. *Journal of Policy History* 18.4 (2006) pp.389-418.

- Pisani, Donald J. *Water, Land, and Law in the West: The Limits of Public Policy, 1850-1920*. Univ. Press of Kansas: 1996.
- Pisani, Donald J. "Squatter Law in California, 1850-1858." *The Western Historical Quarterly* (1994): 277-310.
- Pisani, Donald J. "Enterprise and equity: A critique of Western water law in the nineteenth century." *The Western Historical Quarterly* (1987): 15-37.
- Pisani, Donald J. *From the Family Farm to Agribusiness: The Irrigation Crusade in California and the West, 1850-1931*. Univ of California Press: 1984.
- Poff, N. LeRoy, et al. "The natural flow regime." *BioScience* (1997): 769-784.
- Polanyi, Michael. "The Republic of Science: Its Political and Economic Theory". *Minerva* 1:54-74 (1962).
- Pollock, M. M., G. R. Pess, T. J. Beechie, and D. R. Montgomery. "The importance of beaver ponds to coho salmon production in the Stillaguamish River basin, Washington, USA". *North American Journal of Fisheries Management* 24:749-760 (2004).
- Porter, Theodore M. *Trust in numbers: The pursuit of objectivity in science and public life*. Princeton University Press: 1996.
- Powell, John Wesley. *Truth and Error: Or the Science of Intellection*. 1898.
- Powell, John Wesley. "Institutions for the arid lands." *The Century* 40 (1890): 111-116.
- Powell, John Wesley, et al. *Report on the Lands of the Arid Region of the United States: With a More Detailed Account of the Lands of Utah*. With Maps. Vol. 1-3. Government Print Office, 1878.
- Protevi, John, ed. *Political physics: Deleuze, Derrida and the body politic*. Vol. 1. Bloomsbury Publishing: 2001.
- Purcell, Mark, and J. Christopher Brown. "Against the local trap: scale and the study of environment and development." *Progress in Development Studies* 5.4 (2005): 279-297.
- Ranco, Darren J. "The Ecological Indian and the Politics of Representation: Critiquing the Ecological Indian in the Age of Ecocide" in *Native Americans and the Environment: Perspectives on the Ecological Indian*, edited by Michael E. Harkin and David Rich Lewis. University of Nebraska Press: 2007.
- Raphael, Ray. *Little White Father: Redick McKee on the California Frontier*. Humboldt County Historical Society: 1993.

- Ray Arthur J. *History of Anthropology, Volume 11: Central Sites, Peripheral Visions: Cultural and Institutional Crossings in the History of Anthropology*. University of Wisconsin Press: 2006.
- Reed, Ron and Kari Marie Norgaard. "Salmon Feeds Our People" pp 7-16 in Walker Painemilla, K., Rylands, A B., Woofter, A., & Hughes, C. eds. *Indigenous People and Conservation: From Rights to Resource Management*. Conservation International: 2010.
- Reid, L. M. *Research in Cumulative Watershed Effects*. US Forest Service General Technical Report PSW GTR-141: 1993, 118 pp.
- Rhode, Robert, Leaf Hillman, Susan Smith and Bill Tripp. *Water Temperature Monitoring of the Klamath River Mainstem*. Karuk Department of Natural Resources: 1994.
- Riedlinger, D. and F. Berkes 2001. Contributions of traditional knowledge to understanding climate change in the Canadian Arctic. *Polar Record* 37: 315-328.
- Robbins, Paul. *Political ecology: A critical introduction*. Vol. 16. John Wiley & Sons: 2011.
- Robertson, Taylor Donald. *A Watershed Analysis of the Bluff and Aikens Creek Watersheds*. Six Rivers National Forest. [Arcata, Calif.]: 1967.
- Romm, Jeff and Mark Baker. *Emerging Institutional Linkages between Land and Water: Opportunities for State Involvement in Watershed Management Institutions*. UC Berkeley Department of Forestry, August 1990.
- Rose, Carol M. *Property and persuasion*. Westview Press: 1994.
- Rowley, Max and Wooden, Margaret. "California City: Bluff Creek and Vicinity". *The Humboldt Historian*. Vol. 49, No. 2. Summer 2001.
- Ruhl, J. B. "Thinking of environmental law as a complex adaptive system: how to clean up the environment by making a mess of environmental law." *Houston Law Review* 34.4 (1997).
- Ruhl, J. B., and Robert L. Fischman. "Adaptive management in the courts." *Minn. L. Rev.* 95 (2010): 424.
- Sabatier, Paul, Will Foct, Mark Lubell, Zev Trachten berg, Arnold Vedliz and Marty Matlock. *Swimming Upstream: Collaborative Approaches to Watershed Management*. MIT Press: 2006.
- Salmon River Restoration Council. *Salmon River Community Watershed Restoration Plan*. 2000.
- Salter, John. *White Paper on Behalf of the Karuk Tribe of California*. A context Statement Concerning the Effect of the Klamath Hydroelectric Project on Traditional Resource Uses and Cultural Patterns of the Karuk People within the Klamath River Corridor. Karuk Tribe Department of Natural Resources: 2003.

- Sanders, Jason. "Wolves, Lone and Pack: Ojibwe Treaty Rights and the Wisconsin Wolf Hunt". *Wisconsin Law Review* (2013).
- Sawyer, John. "Why are the Klamath Mountains and Adjacent North Coast Floristically diverse?" *Fremontia*. P 3, Vol 35:3, Summer 2007.
- Sax, Joseph. *Review of the Laws establishing the SWRCB's Permitting Authority over Appropriations of Groundwater Classified as Subterranean Streams and the SWRCB's Implementation of Those Laws, Final Report* (SWRCB No. 0-076-300-0), Jan. 19, 2002.
- Sax, Joseph. "We Don't Do Groundwater: A Morsel Of California Legal history". *U. Denv. Water L.Rev.* 6:269. 2002.
- Sayre, Nathan F. "Ecological and geographical scale: parallels and potential for integration." *Progress in human geography* 29.3 (2005): 276-290.
- Schenck, Sara M. and Edward Winslow Gifford. *Karok Ethnobotany*. University of California Anthropological Records: 1952.
- Schlager, Edella, and William Andrew Blomquist. *Embracing watershed politics*. University of Colorado 2004: 2008.
- Schmidt, Jeremy J. "Historicising the hydrosocial cycle." *Water Alternatives* 7.1 (2014): 220-234.
- Schmidt, Jeremy J., and Dan Shrubsole. "Modern water ethics: Implications for shared governance." *Environmental Values* 22.3 (2013): 359-379.
- Schneider, David C. The Rise of the Concept of Scale in Ecology. *BioScience* 51.7 (2001): 545-553.
- Scluter, Maja et al. "Mechanisms of Resilience in Common-pool Resource Management Systems". *Ecology and Society*, 2007.
- Scoones, Ian. 1999. "New ecology and the social sciences: what prospects for a fruitful engagement?" *Annu. Rev. Anthropol.* 28:479-507.
- Scott, James C. "High modernist social engineering: the case of the Tennessee Valley Authority" in *Experiencing the state* (2006), pgs 3-52.
- Segerstråle, Ullica. "Politics by Scientific Means and Science by Political Means: Trojan Horses in the Sociobiology Debate". *Science Studies* 13.1 (2000): 3-18.
- Selznick, Philip. *TVA and the Grass Roots; A Study in the Sociology of Formal Organization*: 1949.

- Sendzimir, J., Flachner, Z., Pahl-Wostl, C., Knieper, C. "Stalled regime transition in the upper Tisza river basin: The dynamics of linked action situations". *Environmental Science & Policy*, 13: 604-619, 2010.
- Shapin, Steven and Simon Schaffer. *The Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*. Princeton University Press: 1986.
- Silvern, Steven E. "Scales of justice: law, American Indian treaty rights and the political construction of scale." *Political Geography* 18.6 (1999): 639-668.
- Simpson, Audra. "Settlement's Secret." *Cultural Anthropology* 26, no. 2 (2011): 205-217
- Singer, Joseph. *Entitlement: The Paradoxes of Property*. Yale University Press: 2000.
- Singer, Joseph William. "Sovereignty and Property." *Nw. UL Rev.* 86 (1991): 1.
- Singer, Joseph William. "Property and Coercion in Federal Indian Law: The Conflict Between Critical and Complacent Pragmatism", *63 S. Cal. L. Rev.* 1821, 1832 (1990).
- Sismondo, Sergio. *An introduction to science and technology studies*. John Wiley & Sons: 2011.
- Sivaramakrishnan, Kalyanakrishnan. *Modern forests: Statemaking and environmental change in colonial eastern India*. Stanford University Press, 1999.
- Smith, Dana. Doctrinal Anachronism? Revisiting the Practicably Irrigable Acreage Standard in light of International Law for he Rights of Indigenous Peoples. *22 Ariz. J. Int'l & Comp. Law* 691 (2005).
- Smith, Linda Tuhiwai. *Decolonizing methodologies: Research and indigenous peoples*. Zed Books: 1999.
- Smith, Neil. "Contours of a spatialized politics: homeless vehicles and the production of geographical scale." *Social text* (1992): 55-81.
- Sneddon, Chris, and Coleen Fox. "Rethinking transboundary waters: A critical hydropolitics of the Mekong basin." *Political Geography* 25.2 (2006): 181-202.
- Sneddon, Chris, et al. "Contested waters: Conflict, scale, and sustainability in aquatic socioecological systems." *Society & Natural Resources* 15.8 (2002): 663-675.
- Sneddon, Chris. "Reconfiguring scale and power: the Khong-Chi-Mun project in northeast Thailand." *Environment and Planning A* 35.12 (2003): 2229-2250.
- Sneddon, Chris. "Water conflicts and river basins: the contradictions of comanagement and scale in Northeast Thailand." *Society & Natural Resources* 15.8 (2002): 725-741.
- Snyder, Gary. *A Place in Space: Ethics, Aesthetics and Watersheds*. City Lights: 1995.



- Sposito, Garrison. *Scale dependence and Scale Invariance in Hydrology*. Cambridge University Press: 2008.
- Star, Susan Leig and James Griesemer. "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39". *Social Studies of Science*, Vol 19, Issue 3, Aug 1989, 387-420.
- Stegner, Wallace. *Beyond the hundredth meridian: John Wesley Powell and the second opening of the West*. Penguin: 1992.
- Stengers, Isabelle. *Cosmopolitics*. Vol. 1. University of Minnesota Press: 2010.
- Strathern, Marilyn. "Cutting the network." *Journal of the Royal Anthropological Institute* (1996): 517-535.
- Strathern, Marilyn. *Property, substance, and effect*. Athlone: 1999.
- Stumpf, Gary. 1998. "Gold Mining in Siskiyou County 1850-1900". *Siskiyou County Historical Society*, Occasional Paper No.2.
- Sundberg, Juanita. 2014. "Decolonizing posthumanist geographies." *Cultural geographies* 21.1 (2014): 33-47.
- Swallow, Brent M., Dennis P. Garrity, and Meine Van Noordwijk. "The effects of scales, flows and filters on property rights and collective action in watershed management." *Water Policy* 3.6 (2002): 457-474.
- Swezey, Sean L., and Robert F. Heizer. "Ritual management of salmonid fish resources in California." *Journal of California Anthropology*, The 4.1 (1977).
- Swyngedou, E. *Social power and the urbanization of water: flows of power*. Oxford University Press: 2004.
- Swyngedouw, E. "The political economy and political ecology of the hydro-social cycle". *Journal of Contemporary Water Research & Education* 142(1): 56-60.
- Swyngedouw, Erik. "Interrogating post-democratization: Reclaiming egalitarian political spaces." *Political Geography* 30.7 (2011): 370-380.
- Swyngedouw, Erik. "Scaled geographies: Nature, place, and the politics of scale." *Scale and geographic inquiry: Nature, society, and method* (2004): 129-153.
- Swyngedouw, Erik. "Power, nature, and the city. The conquest of water and the political ecology of urbanization in Guayaquil, Ecuador: 1880-1990." *Environment and planning A* 29 (1997): 311-332.
- TallBear, Kim. "Genomic articulations of indigeneity." *Social Studies of Science* (2013).
- Tang, Chenxi. *The Geographic Imagination of Modernity: Geography, Literature, and Philosophy in German Romanticism*. Stanford University Press: 2008.

- Tappe, Donald T. *The Status of Beavers in California*. State of California Dept. of Natural Resources Division of Fish and Game Bulletin No 3. 1942.
- Tarlock, Dan. "The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law", 27 *Loy. L.A. L. Rev.* 1121, 1994.
- Taylor, Alan H., and Carl N. Skinner. "Spatial patterns and controls on historical fire regimes and forest structure in the Klamath Mountains." *Ecological Applications* 13.3 (2003): 704-719.
- Teclaff, Ludwik A. "Evolution of the river basin concept in national and international water law." *Nat. Resources J.* 36 (1996): 359.
- Teclaff, Ludwik A. *The River Basin in History and Law*. Springer: 2012 (1967).
- Thomas, Craig W. "Public Management as interagency cooperation: testing epistemic community theory at the domestic level." *Journal of Public Administration Research and Theory* 7.2 (1997): 221-246.
- Thompson, M., Warburton, M. and Hatley, T. *Uncertainty on a Himalayan Scale: An Institutional Theory of Environmental Perception and a Strategic Framework for the Sustainable Development of the Himalayas*. London: 1986.
- Toweill, Dale E., and Jack Ward Thomas, eds. *North American elk: ecology and management*. Smithsonian Institution Press: 2002.
- Tripp, Bill. "Understanding the Indian Connection to Land and Place". *Evergreen Magazine*. Spring, 2014.
- Tsing, Anna Lowenhaupt. *Friction: An ethnography of global connection*. Princeton University Press: 2005.
- Tsosie, Rebecca. "Indigenous Peoples and Epistemic Injustice: Science, Ethics and Human Rights." *University of Washington Law Review*, 2012.
- Tsosie, Rebecca. "Challenges to Sacred Site Protection." *Denv. UL Rev.* 83 (2005): 963.
- Turnbull, David. "Maps Narratives and Trails: Performativity, Hodology and Distributed Knowledges in Complex Adaptive Systems – an Approach to Emergent Mapping". *Geographical Research*, June 2007. 45(2):140–149 2007.
- Turnbull, David. *Masons, tricksters and cartographers: Comparative studies in the sociology of scientific and indigenous knowledge*. Taylor & Francis: 2000.
- United States Department of Agriculture Natural Resources Conservation Service. *Work Plan for Adaptive Management, Klamath River Basin*. USDA: 2004.
- United States Forest Service. *Pacific Northwest Forest Plan Update*, 2003.

- Van Kirk, Robert W. and Seth W. Naman, 2008. "Relative Effects of Climate and Water Use on Base-Flow Trends in the Lower Klamath Basin". *Journal of the American Water Resources Association (JAWRA)* 44(4):1035- 1052.
- Vance-Borland, K., R. Noss, J.R. Strittholt, P.A. Frost, C. Carroll, and R. Nawa. 1995. "A biodiversity conservation plan for the Klamath/Siskiyou region". *Wild Earth* 5 (4):52-59.
- Verran, Helen. "A postcolonial moment in science studies alternative firing regimes of environmental scientists and aboriginal landowners." *Social Studies of Science* 32.5-6 (2002): 729-762.
- von Benda-Beckmann, Keebet and Franz von Benda-Beckmann, and Melanie Wiber (Eds). *Changing Properties of Property*. Berghahn Books: 2006.
- Von der Porten, S., Loë, R. de, 2013. "Water governance and Indigenous governance: towards a synthesis". *Indig. Policy J.* 23.
- von Foerster, H., Mead, M., & Teuber, H. L. (Eds.). *Cybernetics: Circular causal and feedback mechanisms in biological and social systems*. Josiah Macy, Jr. Foundation: 1951.
- Wang, Jessica. "Science and the Problem of the Public in Cold War America, 1945-1960". *Osiris* (2002).
- Warner, Jeroen. Philippus Wester and Alex Bolding. "Going with the flow: river basins as the natural units for water management?" *Water Policy Supplement* 2008. 121-138.
- Watson-Verran, H., & Turnbull, D. (1995). "Science and other indigenous knowledge systems". In S. Jasanoff, G. Markle, J. Petersen, & T. Pinch (Eds.), *Handbook of science and technology studies*, revised edition. (pp. 115-140). Thousand Oaks, CA: SAGE Publications.
- Watson, Annette, and Orville H. Huntington. "They're here—I can feel them: the epistemic spaces of Indigenous and Western Knowledges." *Social & Cultural Geography* 9.3 (2008): 257-281.
- Weiner, Norbert. *Cybernetics: Or Control and Communication in the Animal and the Machine*. MIT Press: 1948.
- Weir, Jess. *Murray River country: an ecological dialogue with traditional owners*. Aboriginal Studies Press, Canberra: 2009.
- Wells, Harry. *History of Siskiyou County*. 1881.
- West, Paige. "Translation, Value, and Space: Theorizing an Ethnographic and Engaged Environmental Anthropology". *American Anthropologist*, 2005.
- Whatmore, Sarah. "Dissecting the autonomous self: hybrid cartographies for a relational ethics." *Environment and planning D* 15 (1997): 37-54.

- White, Richard. *The organic machine: The remaking of the Columbia River*. Macmillan: 2011.
- White, Richard. "Environmental history, ecology, and meaning." *The Journal of American History* (1990): 1111-1116.
- Whitt, Laurelyn. *Science, colonialism, and indigenous peoples: The cultural politics of law and knowledge*. Cambridge University Press: 2009.
- Williams Jr., Robert. *The American Indian in Western Legal Thought: The Discourses of Conquest*. Oxford: 1990.
- Williams, Robert A. *Like a Loaded Weapon: The Rehnquist Court, Indian Rights, and the Legal History of Racism in America*. University of Minnesota Press: 2005.
- Williams, Rosalind. *Notes on the Underground. An Essay on Technology, Society, and the Imagination*. MIT Press: 2008.
- Wilson, Nicole. "Indigenous water governance: Insights from the hydrosocial relations of the Koyukon Athabascan village of Ruby, Alaska". *Geoforum* 57 (2014) 1–11.
- Winner, Langdon. "Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology." *Science, Technology, and Human Values* (1993): 362-378.
- Wittfogel, Karl August. *Oriental despotism: A comparative study of total power*. Vol. 3. Vintage Books: (1957) 1981.
- Wolf, Eric. *Europe and the People without History*. University of California Press: 1982.
- Woolley, John T., Michael McGinnis and Julie Kellner. "The California Watershed Movement: Science and the Politics of Place". *Natural Resources Journal*. Winter 2002.
- Worster, Donald. "Watershed democracy: Recovering the lost vision of John Wesley Powell." *J. Land Resources & Env'tl. L.* 23 (2003).
- Worster, Donald. *A river running west: the life of John Wesley Powell*. Oxford University Press: 2002.
- Worster, Donald. *Rivers of Empire: Waters, Aridity and the Growth of the American West*. Oxford University Press: 1985.
- Zent, Stanford. "A Genealogy of Scientific Representations of Indigenous Knowledge" in Serena Heckler (ed) *Landscape, Process and Power: Re-evaluating Traditional Ecological Knowledge*. Berghahan: 2012.
- Ziemer, Robert Leslie M. Reid and Robert R Furniss. "Watershed Analysis in the Federal Arena". *Watershed Management Council Newsletter* 6(2): 6-11. Fall 1994.

Ziemer, R. R., J. Lewis, R. M. Rice, and T. E. Lisle. Modeling the cumulative watershed effects of forest management strategies. *Journal of Environmental Quality* 20(1): 36-42 (1991).

Zimmerer, Karl S. "Rescaling irrigation in Latin America: the cultural images and political ecology of water resources." *Cultural Geographies* 7.2 (2000): 150-175.

Zon, Raphael. *Forests and water in the light of scientific investigation*. USFS: 1927.