Title

Social Connectivity to the American River Parkway

Authors

Curtis, Grayson
Lira, Nicolas

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Grayson Curtis

Nicolas Lira

Abstract

The current interest in “multibenefit projects” that balance ecology, flood control, and social use in urban rivers makes developing sound theory and methods for social assessments of urban rivers a pressing concern. “Social connectivity” is one theoretical approach to assessing the relationship between the social use and physical condition of rivers. In this study we apply a social connectivity analysis to the American River Parkway in Sacramento, California. We combined observations of channel form with in person counts of users and activities, interviews with users, and reviews of planning documents to conduct a post project assessment of some of the major goals and use assumptions that informed the planning of the Parkway. We found that channel form and access to the river largely drove use patterns, many uses were quotidian and conventional but the largest user groups were there for special occasions, and that users viewed the Parkway positively but had low awareness of flood control and modifications to the hydrology. The results may be relevant to planners or researchers studying urban rivers and their use as public spaces.

Introduction

Rivers flowing through major cities present special challenges for planners and natural resource managers. These rivers especially highlight the links between the social and ecological in their form and function. Historically urban rivers were highly modified for navigation, industry, or flood control and their ecology and hydrology greatly degraded. Increasingly there is a demand for the restoration of urban rivers with the goal of providing multiple benefits including flood control, ecological function and public use. This makes the challenge of river management all the more complex and requires methodological approaches that can bridge the gap between the physical and social sciences.

This study applies a social connectivity analysis of the American River Parkway (henceforth "Parkway") a contiguous 32 mile greenbelt on the banks of the Lower American River running through the City of Sacramento and its suburbs from Folsom Dam to the confluence of the American and Sacramento rivers. We assess which uses are prevalent in the Parkway and where in the stream profile they are taking place. We also assess the frequency and temporal patterns of users. Lastly we gauge perceptions and attitudes towards the Parkway through quantitative and open ended interview questions. Taken together these results are a partial post project analysis of some of the planning goals that inform Parkway management.

A variety of theoretical approaches have attempted to find a unified approach that recognizes the inextricable linkages between natural and social phenomena to inform natural resources management planning, and design. These include contemporary approaches such as the "Hydrosocial Cycle" (as opposed to solely *hydrological* cycle), "Urban Ecology", "Political Ecology" and the current concern with social equity and resilience.[1] [2] [3] Each of these perspectives generates unique questions requiring hybrid approaches that incorporate sociological and ethnographic methods alongside hydrology and ecology. [4] [5] These approaches are not necessarily new, the interplay between the natural and human is a core concept in Gilbert White's seminal dissertation *Human Adjustment to Floods* and the concept is deeply embedded

[1] Boelens, Rutgerd, Jaime Hoogesteger, Erik Swyngedouw, Jeroen Vos, and Philippus Wester. "Hydrosocial Territories: a Political Ecology Perspective." Water international 41, no. 1 (2016): 1–14.
[2] Tzaninis, Yannis, Tait Mandler, Maria Kaika, and Roger Keil. "Moving Urban Political Ecology Beyond the 'urbanization of Nature.'" Progress in human geography 45, no. 2 (2021): 229–252.,
[3] Forman, Richard T. T. "Urban Ecology Principles: Are Urban Ecology and Natural Area Ecology Really Different?" Landscape ecology 31, no. 8 (2016): 1653–1662.
[4] White, Richard. The Organic Machine. New York: Hill and Wang, 1995.
[5] Boelens, Rutgerd, Jaime Hoogesteger, Erik Swyngedouw, Jeroen Vos, and Philippus Wester. "Hydrosocial Territories: a Political Ecology Perspective." Water international 41, no. 1 (2016): 1–14.

in the discipline of landscape architecture and environmental planning typified by McHarg's *Design with Nature*. [6] [7]

While many of these approaches look at large scale relationships between nature and society, Kondolf and others have developed methods for "Social Connectivity " analysis that seeks to understand use and understanding of rivers at the site scale and within the stream profile. Connectivity is a core concept in ecology and hydrology and a key indicator of ecosystem health. In ecology and hydrology connectivity refers to the degree to which organisms or hydrologic processes are facilitated or impeded.[8] Loss of natural connectivity is a common feature of urban and other human dominated environments.[9] Dams sever longitudinal connectivity by altering flows of water and sediment downstream and inhibiting movement of organisms up and downstream levees and navigational works sever lateral connectivity, disconnecting the river from its floodplain and depriving organisms of critical habitat.[10] [11] [12] This loss of connectivity results in compromised hydrologic and ecosystem function; these alterations can lead to social ills such as increased risks from erosion, loss of critical species, and disruption of a host of other critical ecosystem processes.[13] Kondolf and others define "social connectivity" broadly, including a wide breadth of human uses at a variety of scales, ranging from large scale navigation, to smaller scale quotidian human use. Following the concept of hydrological connectivity, they divide social connectivity into three dimensions. These are: Longitudinal (movement of goods and people up and down the river), lateral (between settled areas on the floodplain and the channel) and vertical (the movement of people up and down the stream profile). They point out that the large-scale modifications to rivers that enable connectivity for navigation and transport, or provide flood control have resulted in a loss of other forms of social

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[6] White, Gilbert F. Human Adjustment to Floods: a Geographical Approach to the Flood Problem in the United States. Chicago, IL, 1945.
[7] McHarg, Ian L. Design with Nature / Ian L. McHarg, 1969.
[8] Holyoak, Marcel. "Ecological Indicators: Connectance and Connectivity." In Encyclopedia of Ecology, 567–574. Second Edition. The Netherlands: Elsevier B.V, 2019.
[9] Forman, Richard T. T. Towns, Ecology, and the Land. 1st ed. C: Cambridge University Press, 2019. 48
[10] Trush, William J., Scott M. McBain, and Luna B. Leopold. "Attributes of an Alluvial River and Their Relation to Water Policy and Management." Proceedings of the National Academy of Sciences - PNAS 97, no. 22 (2000): 11858–11863.
[11] Williams, John G, Peter B Moyle, J. Angus Webb, and G. Mathias Kondolf. "Dams and Channel Morphology." In Environmental Flow Assessment, 1–1. United Kingdom: John Wiley & Sons, 2019.
[12] Kondolf, G M. "Hungry Water: Effects of Dams and Gravel Mining on River Channels." Environmental Management 21, no. 4 (1997): 533–551.
[13] Bravard, Jean-Paul, G. Mathias Kondolf, and Herve Piegay. "Environmental and Societal Effects of Channel Incision and Remedial Strategies." In Incised River Channels; Processes, Forms, Engineering and Management, 303–341. Chichester: John Wiley & Sons, 1999.

connectivity by severing access to rivers for quotidian uses along their banks and point to a recurring conflict between longitudinal connectivity and lateral connectivity in urban rivers.[14] They use the stream profile to conceptually plot human activities in accordance with the elevation above the river as a way of linking social uses with geomorphology or stream condition.

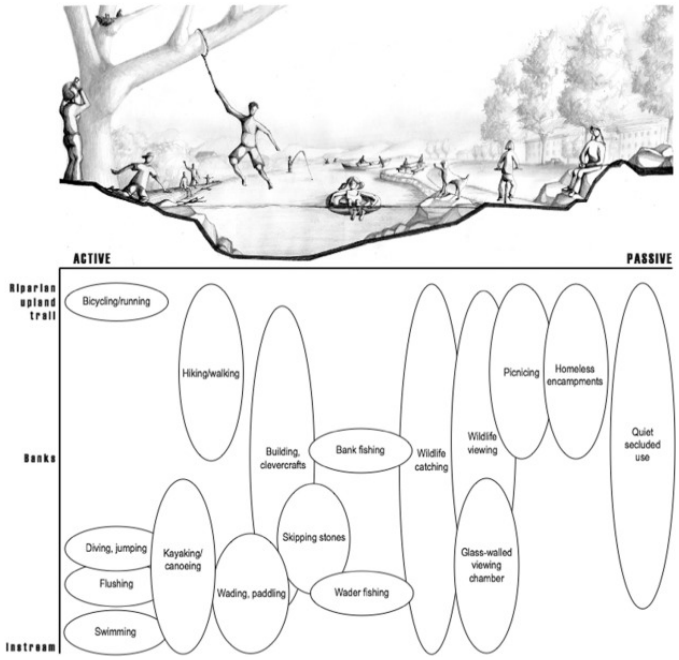


Figure. 1. Conceptual diagram of vertical social connectivity and type of use, Kondolf 2017

They identify the potential for enhancing social connectivity to urban rivers and argue that this requires thinking in all three dimensions, not just facilitating movement up and down the length of the river but also thinking about access from the banks to the channel and opportunities to swim, wade or otherwise immerse in the water. They argue that these concepts should inform designs of waterfront areas, and argue for the importance of enhancing connectivity both for recreational value, but also because public access and enjoyment help build awareness of river conditions and can generate a constituency around environmental improvements. [15]

Enhancing social connectivity is not a simple task, especially on highly urbanized rivers with extensive flood control or navigational works. In addition to technical challenges urban

[14] Kondolf, G. Mathias, and Pedro J. Pinto. “The Social Connectivity of Urban Rivers.” Geomorphology (Amsterdam, Netherlands) 277 (2017): 182–196.
[15] Kondolf, G. Mathias, and Pedro J. Pinto. “The Social Connectivity of Urban Rivers.” Geomorphology (Amsterdam, Netherlands) 277 (2017): 182–196.

river restoration presents a host of social, institutional, and cultural challenges. These include stakeholder conflicts, social inequities, and aesthetic preferences[16] As cities rethink their approaches and enhance ecological or hydrological function they can and should incorporate social connectivity into project goals. This however requires attention to existing social uses and perceptions of urban rivers.

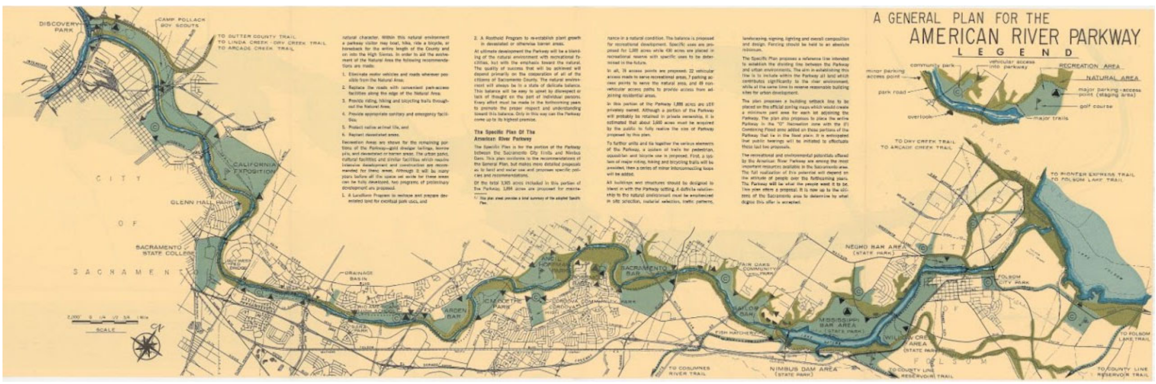


Figure. 2. American River Parkway Plan, 1968

The City of Sacramento provides an excellent test case for the study of social use of urban rivers and the complex management they require. Sacramento sits at the confluence of the American and Sacramento rivers. It has experienced recurrent major floods throughout its history, and the need for flood control has been a primary factor in the city's development and urban form. In precolonial times what is now Sacramento was inhabited by Nisenan Maidu peoples. Like other tribes that lived in the Sacramento floodplain they sited their village sites on higher ground to avoid floods. Sutter's fort, The first American settlement in the region was founded in proximity to a Nisenan village site on a high point away from the bank.[17] The gold rush area settlers ignored the prudent siting indigenous peoples followed and the city of Sacramento was founded at the confluence of the American and Sacramento river with the historic core on the river banks. At the same time gold mining released massive amounts of sediment into the American river basin, which caused the channel to aggrade and exacerbated flooding. This combination of forces would result in frequent flooding issues that threatened the

[16] Kondolf and Yang , "Planning River Restoration Projects: Social and Cultural Dimensions" 2008
[17] Castaneda, Christopher J, and Lee M. A Simpson. River City and Valley Life: An Environmental History of the Sacramento Region. 1st ed. Pittsburgh: University of Pittsburgh Press, 2013.

city's long term viability. As one resident remarked after the destructive 1862 floods "We all admit that this is no place for a city."[18]

The 1862 spurred the city to straighten and move the channel, regrade much of the city to elevate structures above floods, and construct flood control structures.[19] Further floods in 1907 and 1909 led to the creation of the Sacramento Flood Control System, an extensive network of levees, bypasses, and diversions on the Sacramento River and its tributaries that was designed to protect the city of Sacramento and the surrounding area. As part of this project the city and state envisioned a belt of parkland along the lower american river. Although plans for parkland were in the works since the early 20th century it took until 1968 for the city to formally develop plans for the "American River Parkway" (henceforth "Parkway" running from the confluence to Folsom dam.

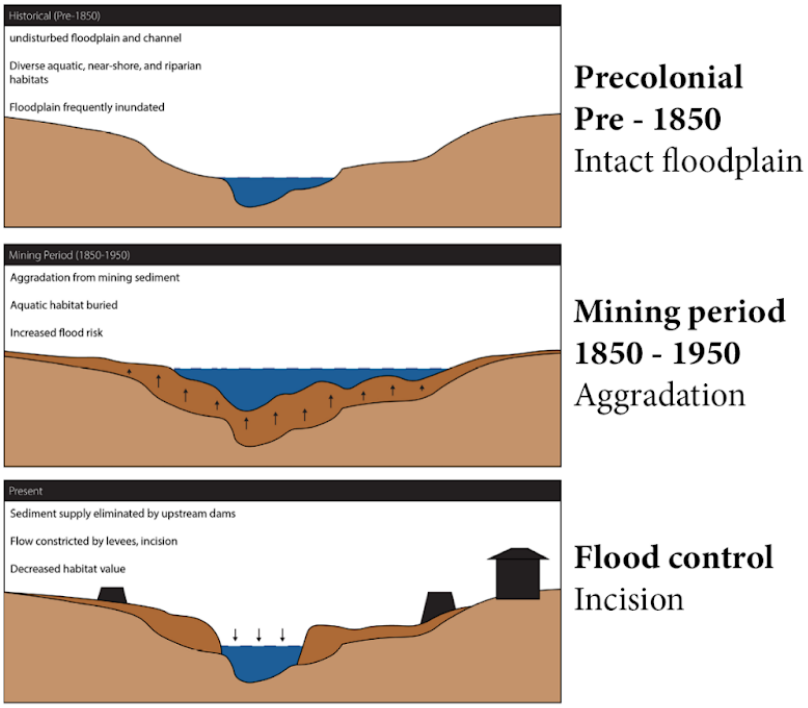


Figure 3. Historical evolution of Lower American River, based on Lower American River Corridor Management Plan 2002, Lower American River Task Force

The dam and other flood control measures cut off the sediment supply from the Lower American River causing incision back into the mining sediment and resulting in the current

[18] Castaneda, Christopher J, and Lee M. A Simpson. River City and Valley Life: An Environmental History of the Sacramento Region. 1st ed. Pittsburgh: University of Pittsburgh Press, 2013. pp . 62
[19] Castaneda, Christopher J, and Lee M. A Simpson. River City and Valley Life: An Environmental History of the Sacramento Region. 1st ed. Pittsburgh: University of Pittsburgh Press, 2013. 62

stream condition (see figure 3). Accordingly, the reach of the American between Folsom Dam and the Confluence currently has very incised steep banks, with visible remnants of gravel mining deposits. A levee up either bank up and two flood control dams control flows and disrupt ecological connectivity especially for anadromous fish.

Today the Parkway serves as a corridor of greenspace through the City of Sacramento and into the eastern suburbs. The Parkway houses many of the region's recreational facilities as well as much of the remaining wildlife habitat. It falls under a variety of jurisdictions and multiple local state and federal agencies are involved in its management. These include the cities of Sacramento, Rancho Cordova, and Folsom; Sacramento County; the California Department of Fish and Wildlife; the Sacramento Area Flood Control Agency and the US Bureau of Reclamation. The entire Parkway is within the American River Flood control system and is held as public land.

The earliest version of the American River Parkway was included in a 1915 plan for the city of Sacramento imagining a green belt on the banks of the river through the city.[20] The American and Sacramento Rivers were studied in Frederick Law Olmsted Jr's. study for the California State Parks system. Increased flood protection from the newly completed Folsom Dam spurred the first planning efforts and Sacramento County began to acquire land along the river in 1959 with the first full plans produced in 1962 and approved in 1968.[21]

The goals of the Parkway management have evolved over time but have always recognized the need for coordinated management and a balance between habitat, flood management, and recreation goals. The Current 2008 American River Parkway plan seeks to,

> "Balance the goals of controlling flooding; preserving and enhancing native vegetation, native fish species, the naturalistic open space and environmental quality within the urban environment; maintaining and improving water flow and quality; providing adequate habitat connectivity and travel corridors to support migratory and resident wildlife; providing recreational opportunities; and ensuring public safety."[22]

Early plans also studied the uses of the Parkway and can be used as a baseline to compare current and historic use.

Despite its successes the Parkway has also experienced major challenges. These include: rapidly dwindling salmon populations, persistent issues with erosion and channel incision,

[20] American River Parkway Plan, City and County of Sacramento 1973
[21] American River Parkway Plan 1973
[22] American River Parkway Plan, City and County of Sacramento 1968

instability and inadequacy of existing levees, and pronounced social challenges with large homeless encampments. Current major projects seek to address each of these challenges. Considering the diversity, complexity, and interrelation between each of these issues the Lower American River is a clear case to apply a multibenefit approach that considers social connectivity along with ecological and hydrologic processes. Conducting a post project assessment of the Parkway allows us to compare project goals to actual observed uses and attitudes toward the Parkway which could inform future planning and design efforts.

Methods

This study uses a combination of field observations and surveys to assess the uses and perception of the Parkway. We collected data at 5 sites over 2 days in Fall of 2023. We documented each site with photos, video, drawings, and notes. We also conducted a count of the number of users and type of activity, and conducted interviews with users. These methods were adapted from prior papers from Kondolf, Podolak, and Yang that have been used for social connectivity assessments of rivers around the world.

We selected sites in order to capture a diversity of river forms, infrastructure types, and types of use (see figure 4 below). We also chose sights to cover the entire length of the Parkway from the confluence with the sacramento to Folsom lake. All sites were within the American River Flood Control system and Special Flood Hazard Area and/or fully within the Regulatory floodway. Each site was publicly accessible by pedestrian trails and was within parkland.

At each site we collected data between the top of bank, or top of levee, out to the middle of the channel on either the right or left bank. We approached each of the sites on foot via the main public access trail and began with general observations and documentation in field notes, photos and video. Our counting procedure was to select a point with a good field of view and stand for 10 minutes, noting the numbers of people, the activities they were engaged in, and their location in the stream profile. In some cases it was necessary to approximate the numbers of people due to large crowds.

The sampling procedure for interviews was to walk along the main public access trail and conduct interviews with the first three people who were willing to stop for an interview. We limited the number of interviews in the interests of time and capped it at 3 per site to give equal weight to each. The questions are divided into four sections, the first section of questions are about the frequency and times of day or year respondents visit. The next set seeks to gauge users' perceptions of the recreation opportunities, natural resources, and safety of the Parkway. In each we asked respondents to provide a numerical rank of the topic in question, followed by a free response prompt. We recorded responses in hand written notes on paper forms which we then transcribed and coded in a spreadsheet.

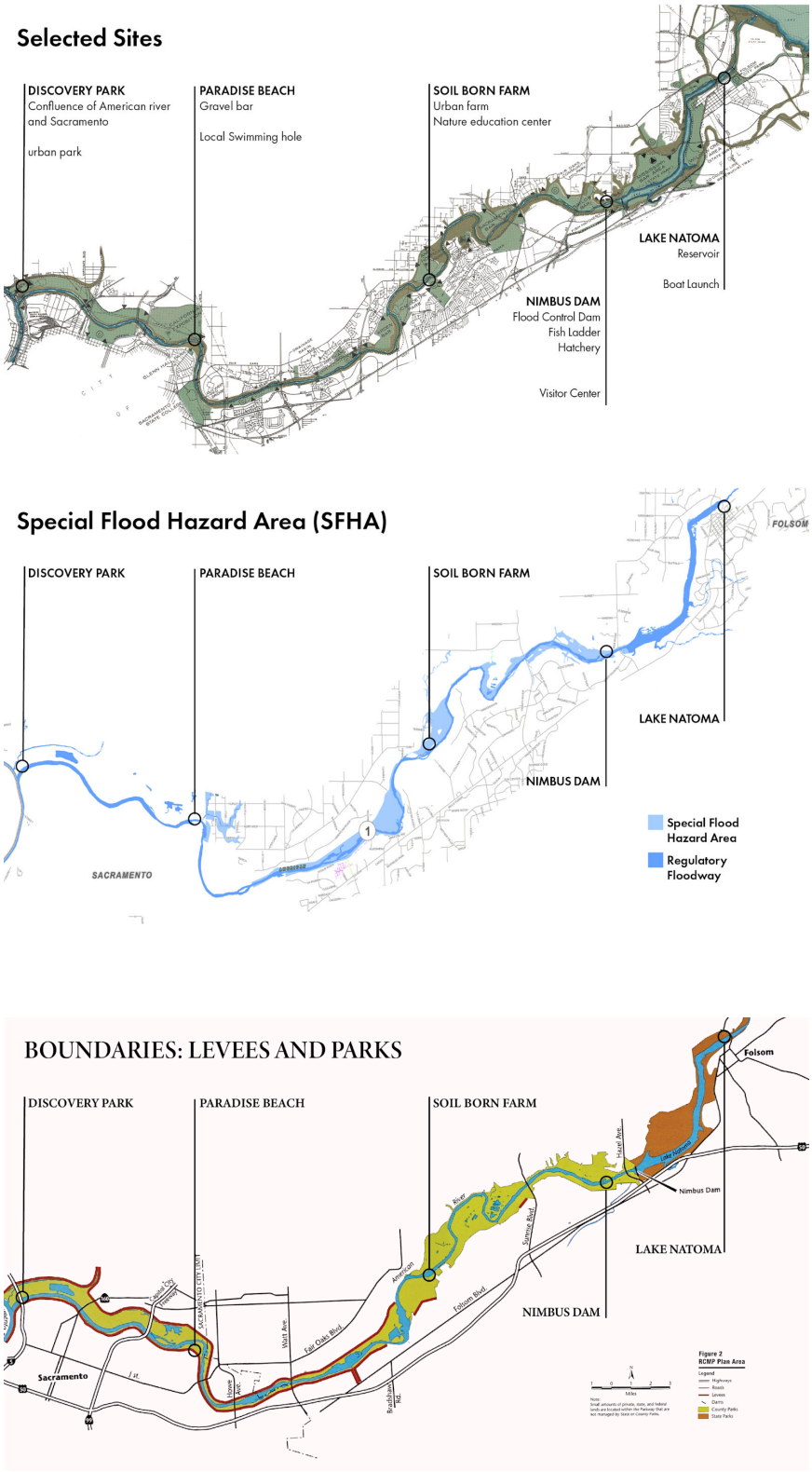


Figure 4. Selected sites and special flood hazard area and parks system (see appendix)

Questionnaire

When do you visit?

How often do you visit?

Most days / weekly / monthly / once a year or less

How long have you been coming here?

First time / one year or less / 2-5 years / 10 years / 10 years or more

What season do you visit?

summer / spring / fall / winter

What day of the week or times of the year do you visit?

Activity

On a scale of one to five how much is there to do here? (1 is very little, 5 is a lot)

1 2 3 4 5

What activities bring you here?

Nature

On a scale of one to five how natural is the area? (1 is not natural, 5 is very natural)

1 2 3 4 5

Why do you feel the area is natural or unnatural?

Safety

On a scale of one to five how hazardous or dangerous is the area? (1 is not at all hazardous, 5 is very hazardous)

1 2 3 4 5

Why do you feel the area is hazardous or safe?

Fig 5. Survey Form

Results & Discussion

We generated four types of results; counts of numbers of users by use, observations of use in relationship to the stream profile, survey results of temporal use patterns, and survey results of user perceptions. Due to small sample sizes and some inherent issues with our sampling methods these results should be understood as a partial and qualitative picture of user behavior in the Parkway. A more in depth analysis conducted over a longer time frame and including more participants would be necessary to achieve a fuller picture of uses and attitudes.

The results of our count of users by activity revealed some interesting patterns. Many of the uses we counted were conventional and quotidian uses you might expect in an urban park setting (e.g. running, walking, biking). The two largest types of uses however were for special occasions. We encountered approximately 200 people at the Nimbus Dam Fish Hatchery visitor center observing the Fall Chinook and Steelhead run. Most of these users indicated that their first visit or that they came infrequently and specifically to view the Salmon. By far the largest group of users we encountered at Discovery Park near the confluence of the American and Sacramento. We visited in the morning as a large crowd was gathering to enter “AFTERSHOCK” an annual hardrock and heavy metal festival held in Discovery Park. The users we interviewed here mostly indicated that this was either their first time visiting the Parkway, or that they only visited for the event. We counted hundreds of people lined up to enter the event and many more already inside. The event had a reported attendance of 160,000 over the entire weekend. These two events completely dwarfed the other uses in raw numbers and highlighted the importance of capturing occasional large events when considering social use. It also highlights an inherent difficulty in these kinds of studies. If we had visited on different weekends we would have missed AFTERSHOCK and the Salmon run and our assessment of the use would be totally different. For future studies more reconnaissance or more in depth ethnographic methods might help with capturing some of these special occasions that seem to be as important as the quotidian uses.

The uses differed significantly from the user data gathered in 1967. The 1967 did not state their methods but reported their findings as a percentage of users for each activity. We can surmise that they likely sampled various locations at different times of year and normalized their data by the total number of users observed. In order to compare the 1967 data with out own we also converted our observations into percentages. The 1967 plans recorded large percentages of users fishing and swimming. Our counts recorded no one fishing, and a smaller proportion of

swimmers. Our observations were likely highly influenced by the days we conducted field work. We observed very few swimmers on our October 7th field day despite temperatures in the 90s. However since both field days took place in Fall the public may have been less prone to go swimming. The time of day and time of year likely influenced our lack of observations of fishing. Both days we began field work on site mid morning and left by evening, missing peak fishing hours. One of our field days also aligned with the fall chinook run so the entire river was closed to fishing. Regardless, both fishing and swimming may have declined in popularity due to changes in preferences since the 1967 study. Motorcycling and picnicking appeared in the 1967 figures but not in our observations. The biggest difference were the two large events. The music festival and salmon viewing were by far the largest uses we observed but similar uses were not even included in the 1967 numbers. This data highlights the importance of updating plans to reflect actual use patterns to better reflect the values of the public, and thinking beyond the conventional activities we associate with greenspaces.

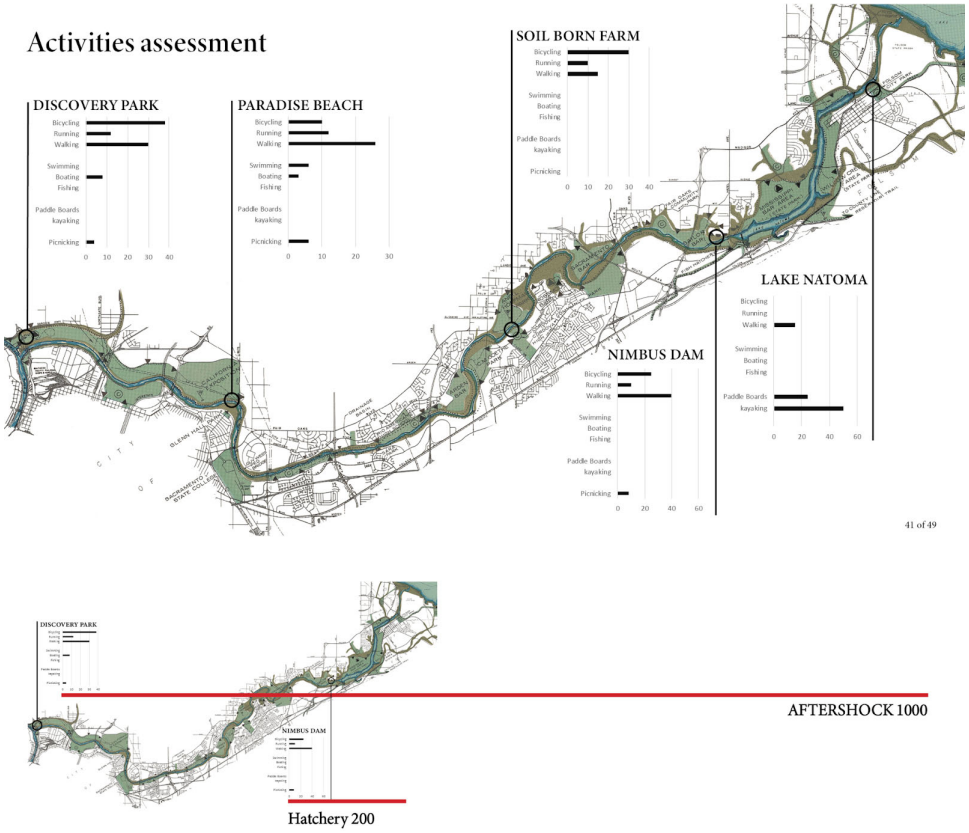


Figure 7. Use counts by site (see appendix)

Looking at the influence of the stream profile on use we found that access to the water strongly drove use patterns. Most of the users we encountered were on paved trails or roads with fewer users venturing out to the waters edge or interacting with the water. The steepness of the banks or presence of public access elements like ramps seemed to be the major contributing factor here. For example we observed users swimming at Paradise beach and nowhere else. Paradise beach is a gravel point bar that offers a gentle grade for easy access to the water's edge from the levee top (see fig). Similarly we observed a large group of kayakers and paddle boarders on Nimbus lake where a small craft put-in allowed access despite steep banks. During the salmon run we did not observe anyone down at the water's edge watching the migration in places where the banks were steep and difficult to navigate, however at the visitor center where good access and interpretative programming were in place hundreds of people had gathered. This is perhaps unsurprising but underscores the importance of public access. It is especially worth considering what kinds of access can support what kinds of activities associated with distinct stream conditions.

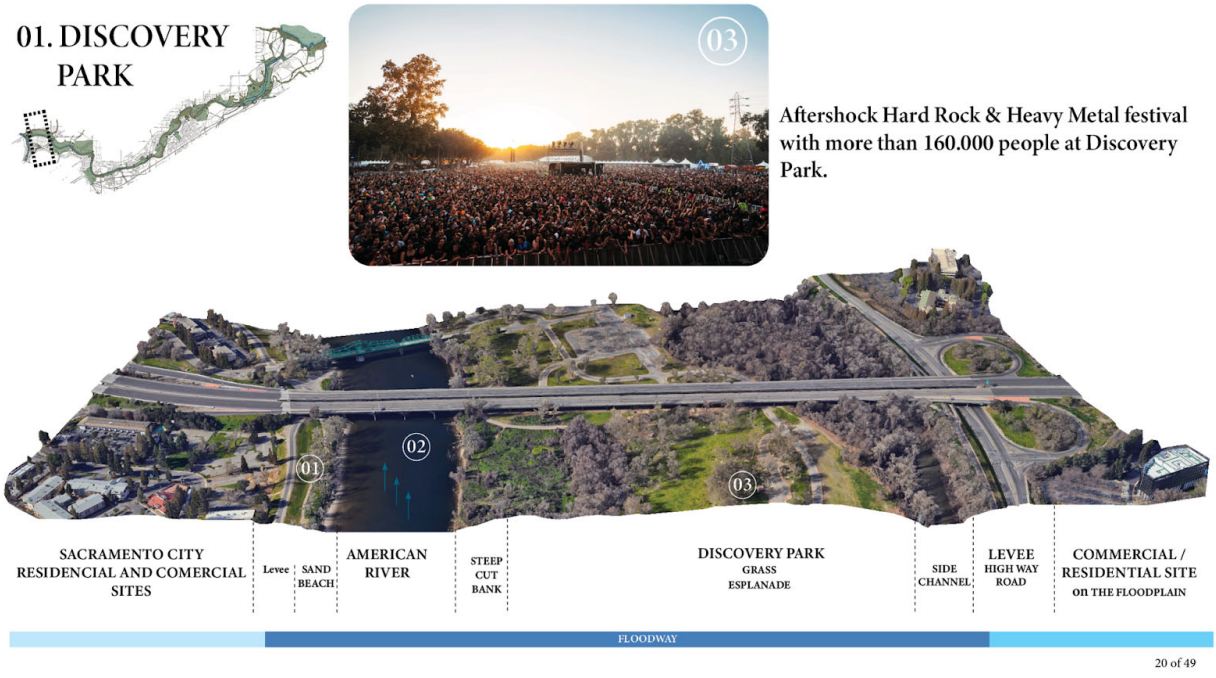


Figure 8. Discovery Park

Figure 9. Paradise Beach

Figure 10. Solid Born Farm

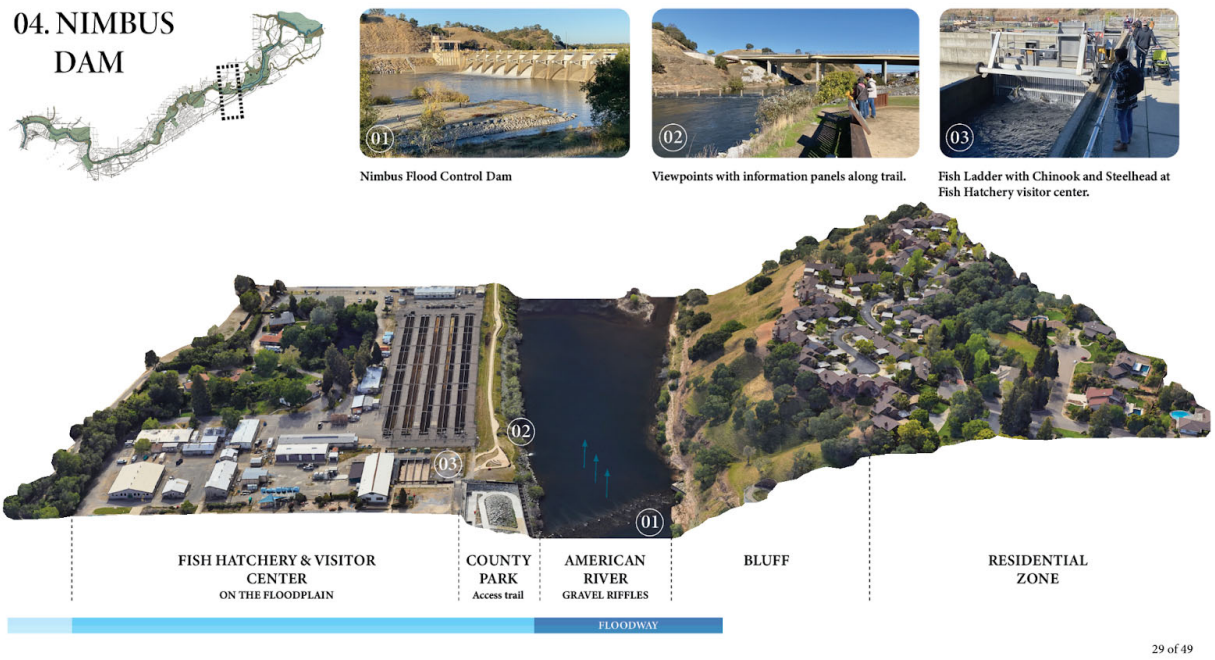


Figure 11. Nimbus Dam

Figure 12. Lake Natoma

The frequency of visit survey results mostly matched the times of day, and times of year we recorded the observations (see figure 13 below). We were visiting the site on weekends in the fall, so we encountered users who reported that they visited on weekends in the fall. We also happened to visit on days where there were large annual gatherings, which skewed our results to overrepresent users who visited the Parkway infrequently. Repeating the same method at the same sites over a longer time period and varying the times of day or year would help make these data more representative.

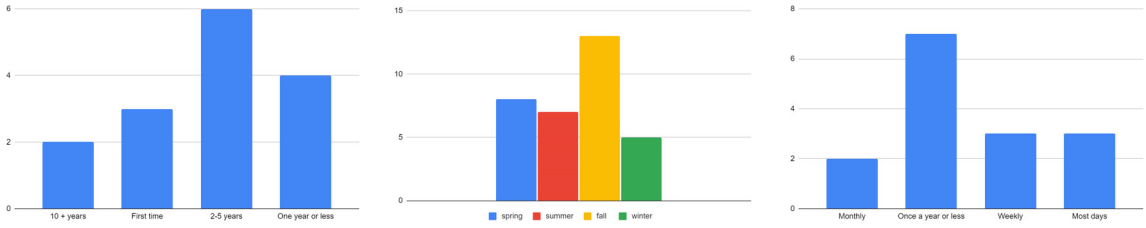


Figure 13. Frequency of visit survey results

Responses from the questionnaire indicated that users perceived the Parkway as a highly attractive public space with many diverse opportunities for recreation. We found a wide diversity of uses, ranging from active recreation and nature appreciation, to unexpected uses like "AFTERSHOCK". Users rated the amount of recreational opportunities as median 4 out of 5. This would indicate that the Parkway is meeting its goal of providing recreational opportunities.

Figure 14 Word cloud of responses to "What activities bring you here?"

In general respondents indicated they perceived the Parkway as highly natural, with a median of 4 out of 5. This perception was mostly shaped by the presence of vegetation and proximity to the river. Some indicative comments were “It’s all natural” “It’s pretty stinkin’ natural.” Opportunities to see and approach the river or explore spontaneous trails contributed to users' sense of “naturalness” while proximity to buildings or infrastructure created a sense of unnaturalness. Interestingly very few responses mentioned modification of the river channel or the floodplain as major factors in their perception of the naturalness of the site, including in interviews conducted on the levee top or adjacent to dams.. These examples suggest user perception of “nature” is mostly shaped by their immediate surroundings, and not by a sense of larger ecological and hydrological processes. The Nimbus fish hatchery visitor center provided a very successful example for public engagement with the river's ecological processes and awareness of the extent of modification. Here the Parkway appears to be meeting its goal of providing “Naturalistic open space”, but could improve in helping users understand and engage with the river.

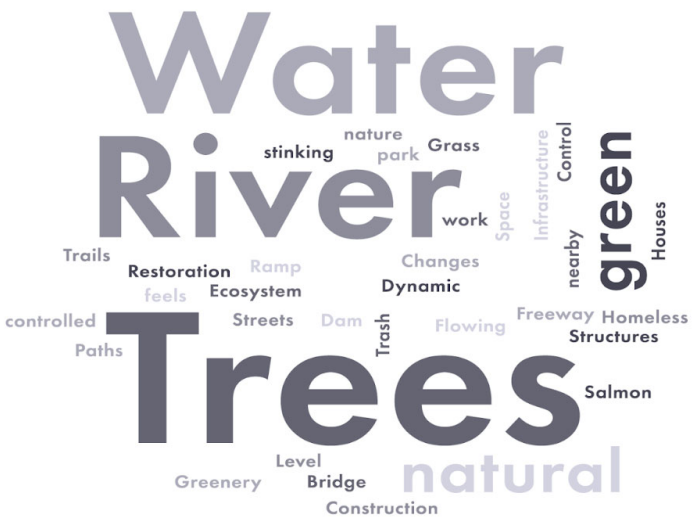


Figure 15 Word cloud of responses to “Why do you feel the area is natural or unnatural?”

In general users reported that the Parkway was not “Hazardous or dangerous”with a median score of 2 out of five for feeling of danger or hazard. Almost without exception respondents mentioned homelessness, drug use, or crime as the main factors in their perception of hazard or safety. Respondents often indicated that the time of day dramatically impacted their

sense of safety and that they felt the Parkway was not safe at night. Few responses related to hazards from the river itself. When respondents did mention hazardous river conditions they were concerned about the safety of children on steep banks, or swimming. One respondent expressed a strong confidence in flood control infrastructure. Considering all of the interviews took place within the floodplain, in a region that has historically experienced large damaging floods it is surprising that so few respondents considered floods to be a major risk factor. For the question of ensuring public safety the Parkway seems to be meeting its goal, users mostly felt safe. However they reported major concerns as well with safety at certain times of day. In particular addressing the many homeless encampments seems to be a top priority. This issue alone could be a focus for future studies of social connectivity. While we did not assess the condition of the flood control infrastructure our results do seem to indicate that there is a poor understanding of the flood risk within the Parkway and the importance of the flood infrastructure for reducing flood risk. This could be an area of improvement for planners and designers.

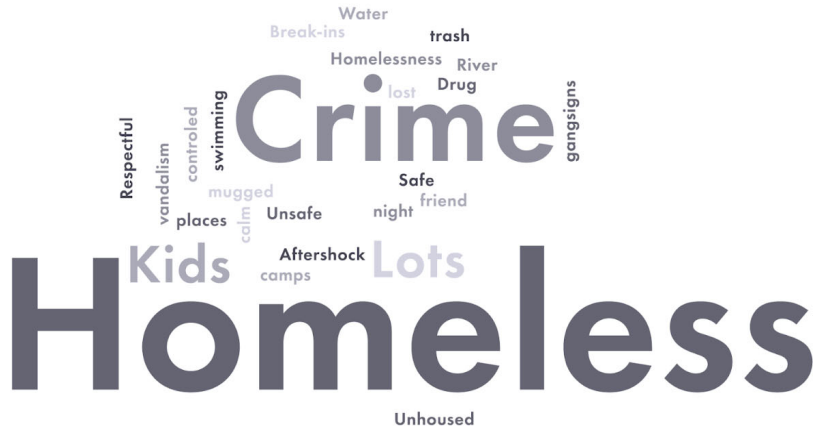


Figure 16 Word cloud of responses to “Why do you feel the area is hazardous or safe?”

Limitations & Directions for Future Study

While these results offer a useful snapshot of some of the uses of the Parkway they have major limitations for drawing general conclusions. We found through this process that finding and interviewing members of the public can be a highly time consuming process. We only interviewed 15 members of the public due to time constraints and in the interests of giving equal weight to each of the sites. We also conducted field work in a very limited time frame over two weekends in the fall.

Sampling a much wider user group over a much longer time frame would greatly enrich the data. In general we found that the quantitative methods were much less revealing than the qualitative ones. When we asked the open response questions we received much more in depth and revealing insights into users perceptions than when asking them to assign a number value. For future studies we would recommend more of an ethnographic approach with less focus on gathering quantitative data. Our study also did not capture data on age, ethnicity, gender, income, or other demographic characteristics that would help determine trends in preferences or perceptions across different user groups.

Future studies could focus on some of the highly seasonal but highly popular events we encountered. Every fall the Chinook and Steelhead make their way up the American to spawn. Likewise every fall the Heavy Metal fans make their way to AFTERSHOCK to party. An interesting study could be to engage with these user groups more in depth by conducting interviews and collecting demographic data. Comparing demographic data and perceptions between concertgoers, fishviewers, and conventional visitors might reveal some interesting patterns or demonstrate the effectiveness of interpretive sites like the Nimbus Dam. As our observations indicate homelessness is a major concern in the Parkway and among the public. A study focusing on homelessness would be very interesting though difficult to find effective and respectful methods. Another interesting future study could look entirely at the gravel bars to see what kinds of uses occur in the *espace de liberte,* though from our experience we would suggest doing field work in the summer and not fall in order to capture peak times for swimming.

Conclusion

Our observations of the Parkway indicated that it broadly is meeting its goals as a multibenefit space and exhibits a great deal of social connectivity. The Parkway appears to provide a great deal of recreation opportunity, a space that is at least perceived as highly natural, and provides users a sense of safety. Despite the general success in meeting these goals we identified some areas of improvement.

From user responses and our counts the Parkway is clearly a well used recreational space. We observed large groups of people engaged in a diversity of activities ranging from quiet contemplation to enjoying Heavy Metal music with a crowd of thousands of others. The diversity of uses we observed underscores the importance of thinking beyond conventional ideas about social uses of urban rivers. If planners constrain their goals to the more typical exercise and nature appreciation they might miss opportunities to engage with a wider community of users (say Heavy Metal music fans). It also underscores the importance of closely considering time of day, location and year when doing a use assessment. This brings up the larger issue of how to include the broadest swath of the public when conducting use assessments. Trying to engage with communities who don't use the Parkway currently, or with homeless populations who may be difficult to reach seem especially important. Additionally understanding how demographic attributes like age, race, or income affect Parkway use would be important to inform planning. For future studies we suggest focusing more on ethnographic methods that use in depth interviews to understand the full diversity of uses and perceptions.

The stream conditions and level of access strongly determine uses. For example a gravel bar facilitated swimming and a reservoir facilitated small boats. In the locations with public access to the water we observed a great deal of interaction with and engagement with the river. Public access is difficult in parts of the Parkway because the banks are very steep where incision has occurred. We recommend focusing on the gravel point bars as convenient points of public access. There may be areas of Parkway where the channel could be allowed to migrate more, and gravel bars could form. Since these provide both high quality public space and improved habitat value they should be a focus of design efforts.

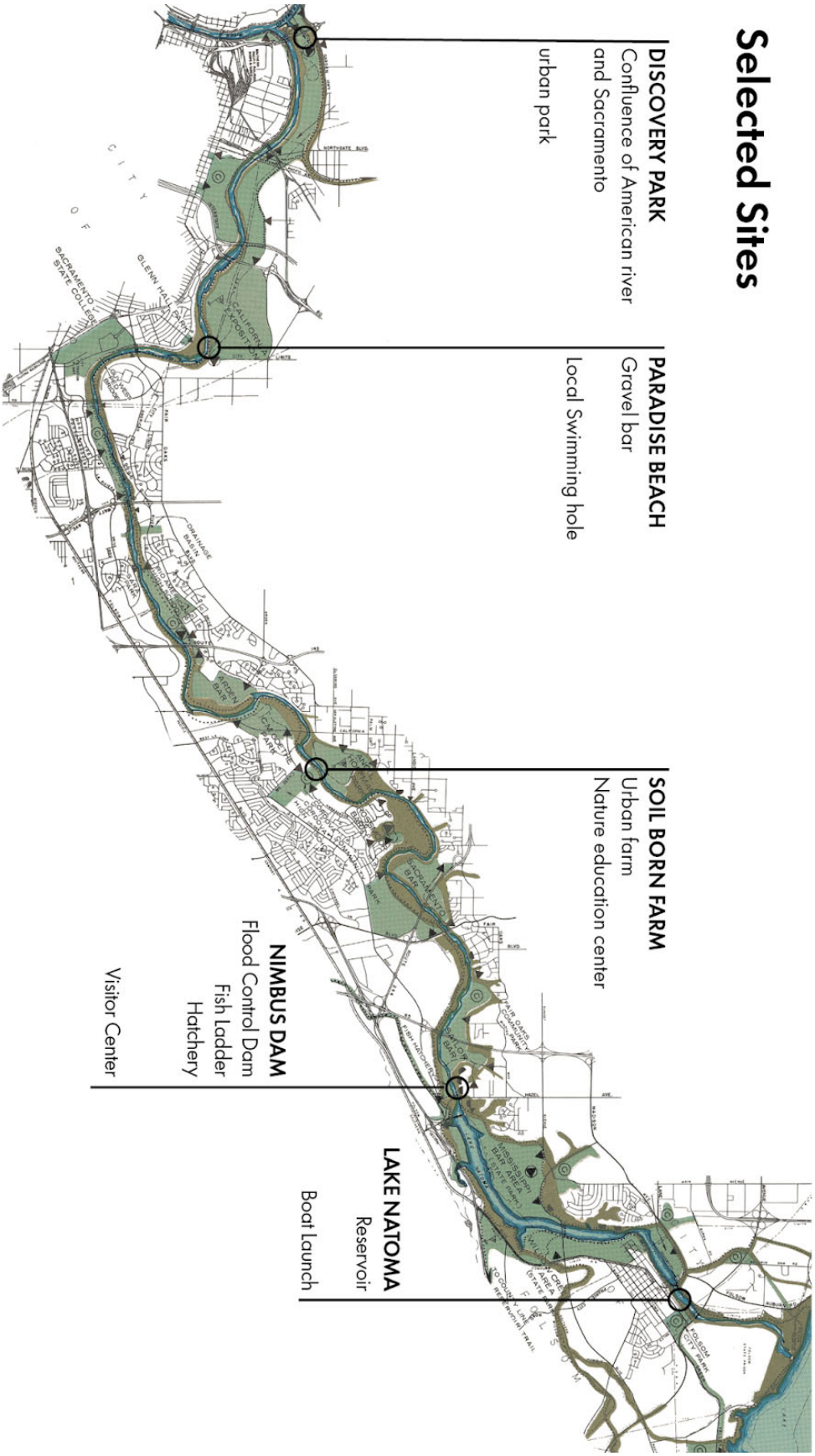
Although the public viewed the Parkway as very natural they exhibited a lack of understanding of river processes and flood risk that could be partially addressed though improved interpretation or public outreach. Public perception of the natural quality of the area

was mostly dependent on seeing trees and water near them. This is encouraging in a way in that it seems like the public's desire for natural open space is fairly easy to satisfy. However it also indicates that the users seemed mostly unaware of the profound alterations to the river. The interpretive signage we encountered was often in poor condition and almost completely overlooked by passersby. The only location where users were highly engaged with river processes was the Nimbus Dam Fish Hatchery. The Hatchery had a high degree of public access but also offered activities and was designed to facilitate public engagement. Since improved understanding and appreciation of natural hydrologic and ecological processes might help generate public support for projects to restore these processes we recommend focusing on interpretive designs that offer more active engagement.

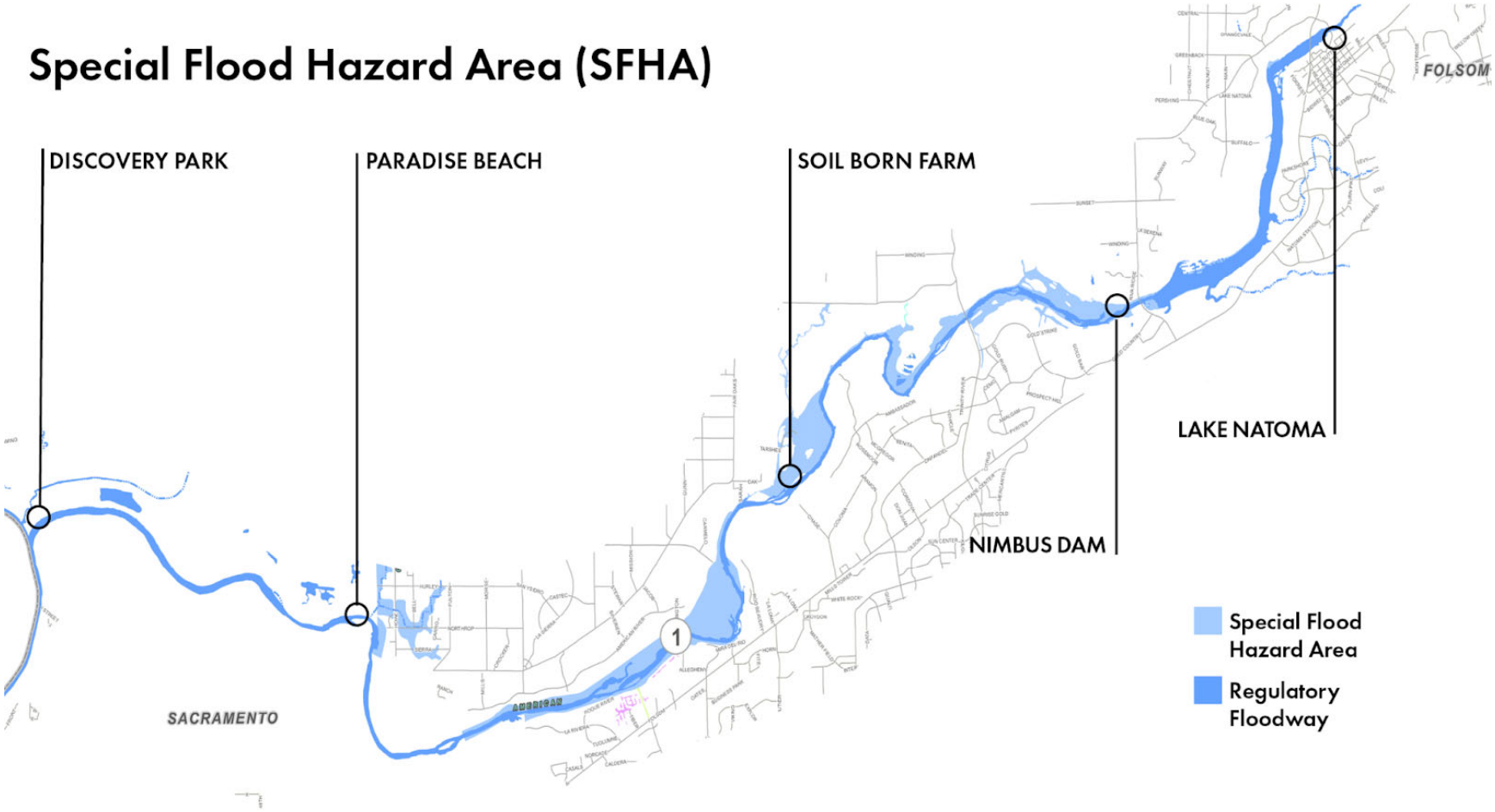
Users perceived the Parkway to be mostly safe but their perception of safety was driven mostly by concerns over homelessness and crime, and not by an awareness of flood risk. This suggests firstly that addressing social issues like homelessness should be a core goal of Parkway management and planning. And secondly, public engagement and awareness of flood risk could be improved for the Parkway and perhaps the region. If users are not aware of the risk and importance of flood control when they are fully within the flood control system that would suggest a generally low perception of risk in the surrounding communities. There may be ways to help the public visualize the risk through design or public outreach.

The American River Parkway is a complex site, with a wide array of users, and overlapping management priorities. Despite the complexity and challenge of managing such a site It seems to be functioning quite well at providing multiple benefits to the surrounding communities. We also identified areas for improvement and some of the challenges the Parkway faces. As ecologists and hydrologists, flood risk managers, open space planners, and designers respond to the increasing push for multibenefit projects in urban rivers, studying the actual use and function of places like the American River Parkway will be increasingly important. In order for these multibenefit approaches to succeed they should be grounded in actual field studies of social use and connectivity, and should avoid cliched or conventional assumptions about socal use. A research program conducting similar studies of other urban rivers could inform planning and design for truly multibenefit projects that respond to their local context.

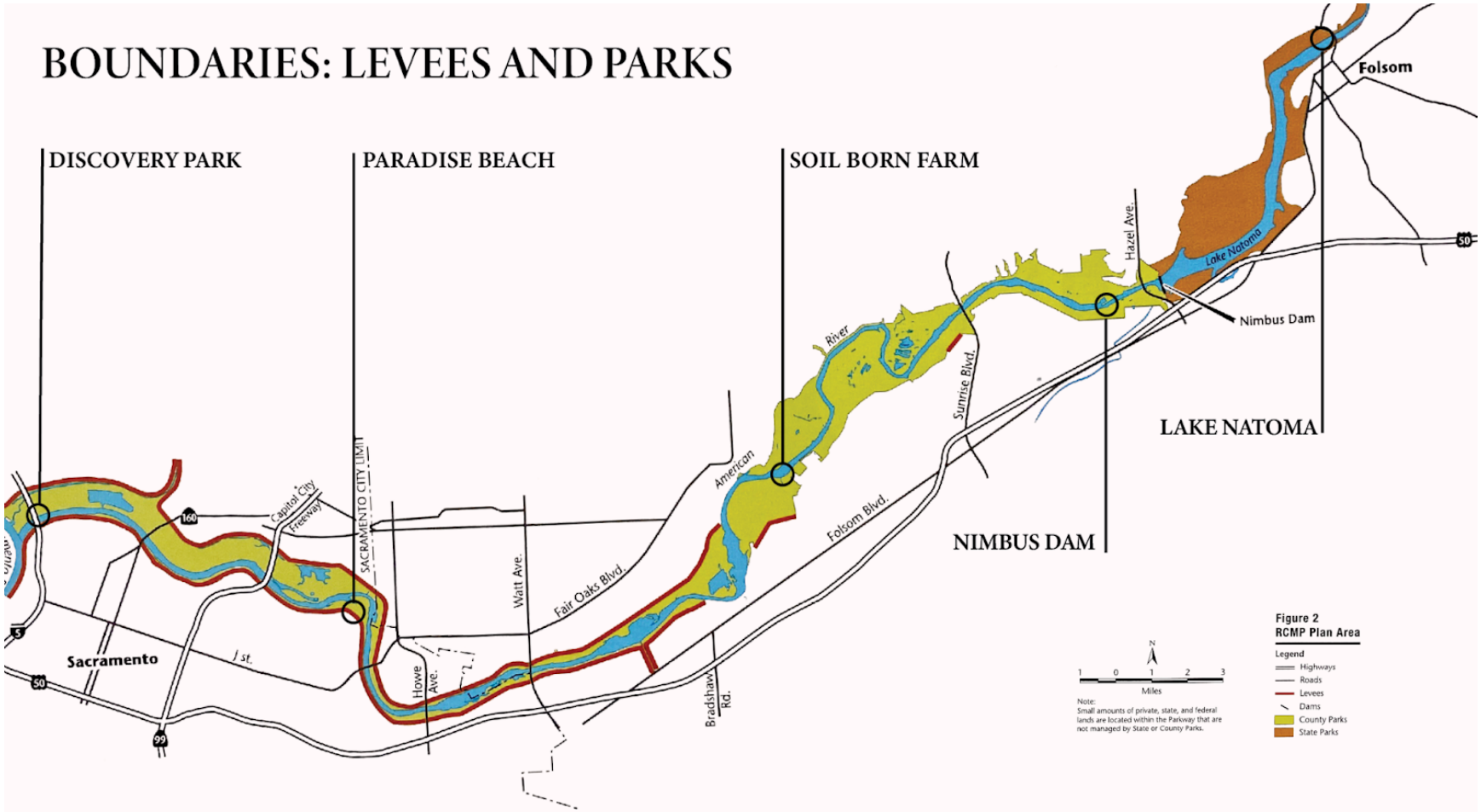
Appendix


Selected Sites
DISCOVERY PARK
Confluence of American river and Sacramento
urban park
PARADISE BEACH
Gravel bar
Local Swimming hole
SOIL BORN FARM
Urban farm
Nature education center
NIMBUS DAM
Flood Control Dam
Fish Ladder
Hatchery
Visitor Center
LAKE NATOMA
Reservoir
Boat Launch

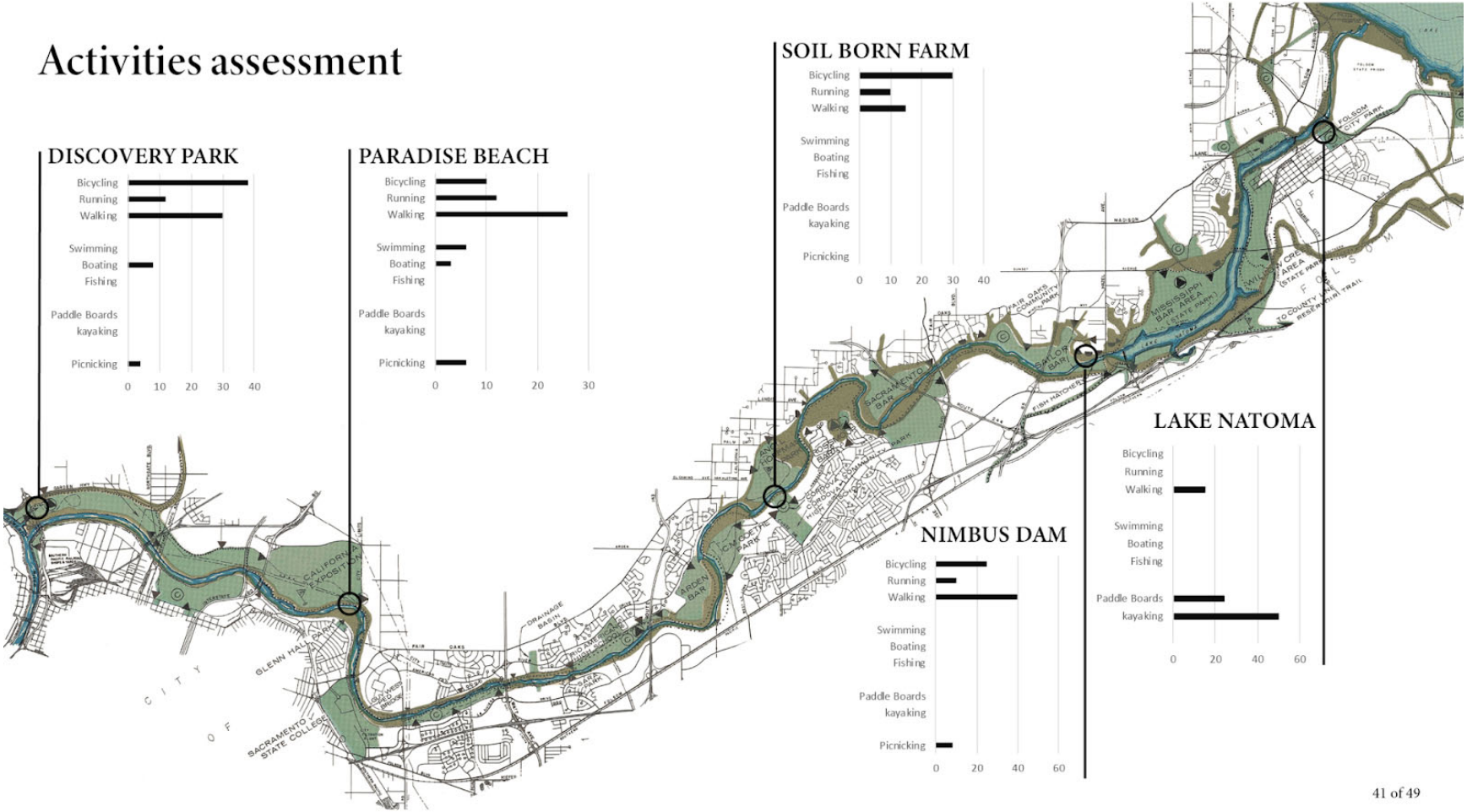
Special Flood Hazard Area (SFHA)

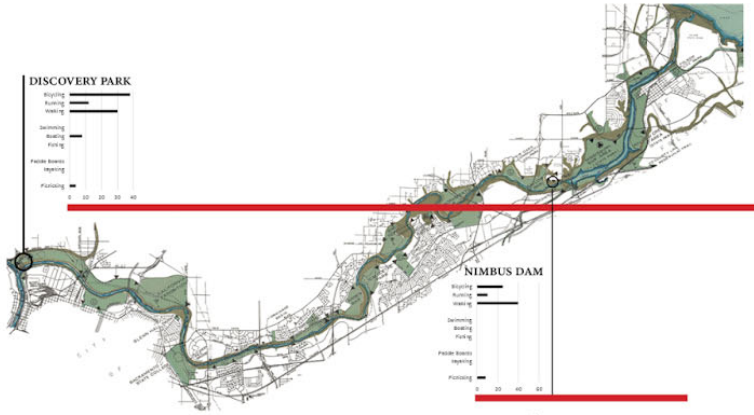


BOUNDARIES: LEVEES AND PARKS



Activities assessment





AFTERSHOCK 1000

Hatchery 200