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**Title**

Managed Annihilation: An Unnatural History of the Newfoundland Cod Collapse

**Permalink**

<https://escholarship.org/uc/item/8cv3b447>

**Journal**

Electronic Green Journal, 1(32)

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**Publication Date**

2011

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## Review: *Managed Annihilation: An Unnatural History of the Newfoundland Cod Collapse*

By Dean Bavington

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Bavington, Dean. *Managed Annihilation: An Unnatural History of the Newfoundland Cod Collapse*. Vancouver, BC: University of British Columbia Press, 2011. 186pp. ISBN 9780774817486. US \$35.95, paper, acid-free.

Dean Bavington's *Managed Annihilation* is a cautionary tale for our times. Western style management, mediated by state bureaucracies and economic rationality, may administer natural resources into oblivion. Bavington argues that this is precisely what happened with the Newfoundland cod fisheries collapse, made official in 1992. The basic problems were these: fisheries managers did not understand the behavior of fish, they did not understand the behavior of humans, and they did not understand the relationships between fish and humans. Yet they continued to manage as if they did.

Bavington traces part of the history of cod fishing in Newfoundland and describes the shifts from subsistence fishing to small scale mercantilism to market-based fishing economies and large scale exploitation. Over a 400 year period of small scale fishing, fishermen caught about 50 million ton of cod. Over a 90 year period of industrial fishing leading up to the collapse of the fishery, fishermen harvested the same tonnage. Unlike subsistence fishermen, however, industrial harvesters fished year round and targeted all cod, including spawning and pre-spawning fish, as well as cod's prey such as squid and capelin. Between 1960 and 1992, 99.9 percent of the cod's spawning biomass had been eliminated. It is difficult to imagine a starker instance of managerial failure.

The primary focus of *Managed Annihilation* is on the conceptual and practical inconsistencies of modern industrial fishing, which was ushered into being with the help of fisheries science, new politically expedient management regimes, and emerging global economies. Fisheries science gave us the idea maximum sustainable yield, based on population estimates and models of population structure that were, simply, wrong. These estimates and models, however, provided managers with the illusion that they could manage cod population fluctuations and harvest sustainably. Economics gave us the idea of maximum economic yield, based on the assumption that industrial fishermen were rational economic actors intent on maximizing profits, but not to the extent of catching all of the available fish and thereby undermining their own industry. This idea was also wrong.

The story of failure is further complicated by Canada's 1977 declaration of a 200 mile exclusive economic zone, which effectively brought cod and other fish populations under state control off Canada's east and west coasts. Ownership of ocean resources was necessary in order to effect both maximum sustainable yields and maximum economic yields. Without ownership, fishermen had no incentive to act according to either biological or economic models of rationality. Yet rather than producing biological predictability and economic stability, as the models foretold, the results were resource collapse and economic precariousness.

After the collapse, attention turned to aquaculture and to scientific ideas focused on ecosystems rather than single species. Humans were better integrated into ecosystem models—models newly based on risk and uncertainty, rather than predictability and control. Fishermen's knowledge of local habitats was incorporated into ecosystem models at the same time that managerial responsibility shifted from managers to all resource users. Meanwhile, the Canadian government distanced itself from its own complicity in the fishery's failure.

Bavington does not describe in any detail the vagaries and varieties of local fishermen's knowledge. Because such knowledge is increasingly incorporated into ecosystem models and management efforts, a

careful ethnographic analysis is needed. Although Bavington provides a brief discussion of alternatives to contemporary resource management regimes, a fuller discussion of this topic is also needed. Greater attention to these two topics would, I think, help clarify the directions new resource management will take.

The collapse of the cod fishery should have occasioned thoughtful self-evaluation of management. It did not. Instead, the collapse provided the opportunity to expand management, not analyze its assumptions. Bavington offers a critical analysis of those assumptions. His book will be of interest to specialist and general reader alike, and will appeal to those looking for alternatives to Western style resource management.

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**Electronic Green Journal, Issue 32, Fall 2011, ISSN:1076-7975**