PERGAMON

Marine Policy 26 (2002) 253–259

MARINE POLICY

www.elsevier.com/locate/marpol

Enhanced fit through institutional interplay in the Pacific Northwest Salmon co-management regime

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Received 18 December 2001; accepted 23 January 2002

Abstract

This article examines the dynamic institutional landscape of Pacific salmon management and allocation in Washington State, focusing on tribal efforts to enhance fit through institutional interplay. Affirming rights reserved by Northwest Indian tribes in treaties signed in the 1850s, the courts established a framework for the co-management of salmon by state and tribal governments. Within this structure, tribal efforts have significantly enhanced the fit between management institutions and natural systems. This has occurred through institutional changes in the production of knowledge for management, linking local, regional and international allocation processes, altering the mandates of existing institutions and creating new ones with more salmon-centric agendas.

Keywords: Co-management; Pacific salmon; Fisheries management; Institutional analysis

1. Introduction

Pacific salmon are transboundary animals. They migrate through numerous bodies of water and a gauntlet of fisheries in a number of different but sometimes overlapping regulatory regimes. Indigenous peoples in western Washington State have historically been at the "end of the line," allowed to harvest what little remained after the salmon migrated through numerous non-Native commercial and recreational fisheries [1,2]. Native fisheries were often curtailed or closed completely by state management agencies due to concerns for the conservation of the run. The needs and demands of indigenous harvesters were overlooked in favor of non-Indian fishing groups who possessed greater financial resources and capital investments and were more effective at "capturing" agency support.

The conflicts engendered by these perceived inequities have been adjudicated through the federal court system many times and the special rights of tribes to harvest salmon have been recognized and affirmed. As a result of these judicial decisions, the current "cooperative" regime for the management of Pacific salmon by Washington State and tribal governments has emerged. The current co-management regime provides an institutional basis for the allocation and management of Pacific salmon in the state of Washington. Co-management is a means of coordinating the activities of state and tribal "self" managers.

Management is complicated by the geographical scale of salmon production, encompassing terrestrial and aquatic habitats, extending from inland watersheds to ocean basins, and encountering different property and governance regimes. Salmon management is further complicated by the need to have, on the one hand, fine-grained units capable of understanding and responding to the specific cultural and ecological context of local communities as well as integrated coast-wide structures for management and allocation [3]. This raises questions regarding the congruence between institutional structures and biophysical systems.

Social institutions and ecological systems have different "sizes" or dimensions that can be defined spatially, temporally, and functionally. Fit refers to the way in which institutions match the ecosystems with which they interact [4]. Institutional effectiveness is at least in part a function of the match between institutional characteristics (i.e., social, geographical and functional scope) and the natural context of ecological systems [5].

The space that institutions operate within may overlap or interact with that of other institutions. Interplay

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0308-597X/02/$ - see front matter
PII: S0308-597X(02)00007-6

refers to these interactions that occur among or between institutions [4]. Many human activities, such as logging, farming, hydropower development and urbanization, deleteriously impact the salmon. Institutional effectiveness is also a function of an institution's ability to control all relevant impacts to the resource in question or to influence the activities of those regimes that have control. Thus, salmon management institutions need to address the full extent of the migratory range as well as the full suite of impacts to the resource, not merely harvest impacts.

In this paper, I examine the institutional dimensions of Pacific salmon management, the emergence and structure of a state-tribal cooperative institution for the management of salmon in Washington State. I appraise the role of co-management in changing the fit of the salmon management regime with respect to the biophysical system and look at how co-management has influenced the activities of other institutions, both vertically and horizontally arrayed. Specifically, I focus on the production and distribution of knowledge for use in management of Pacific salmon fisheries, on the institutional structure of coast-wide salmon allocation and on the conservation of freshwater salmon habitat.

2. Methods

This paper is based upon active participation and research conducted during the years 1987–1998. For the years 1987 through 1991, the author was an active participant in the salmon co-management regime in the Pacific Northwest, working as a fisheries management biologist in Washington State. From 1993 to 1998, the author engaged in focused research utilizing a variety of data-collection methods.

Focused interviews were conducted with 109 number of individuals in Washington State, including tribal and state fisheries managers and tribal salmon fishermen, primarily during the years 1994 and 1995. The interviews were semi-structured and included a combination of open and close-ended questions. The interview questions probed the many aspect of salmon fishing and management [6]. In addition, informal open-ended conversations took place with other respondents.

A variety of management meetings and teleconferences were observed from 1993 through 1995. Meetings of the Northwest tribes, the state of Washington and its stakeholders, and state-tribal co-management meetings were attended. These included North of Falcon meetings, Pacific Fishery Management Council meetings, tribal caucuses, in-season management conference calls and state-tribal co-management meetings as well as a number of specific issue-related meetings.

All relevant fisheries management documents were reviewed, including publications of the Washington Department of Fisheries and Wildlife, the Northwest Indian Fisheries Commission, the Pacific Fishery Management Council, the National Marine Fisheries Service, the United States Fish and Wildlife Service, and individual tribal governments and management offices.

3. The natural system

This article is focused on the management of five species of Pacific salmon (*Oncorhynchus* spp.); pink, coho, chinook, sockeye, and chum salmon. These species range north from California to the arctic reaches of Alaska. The dimensions of the natural salmon system are determined by several characteristics of salmon.

First, they are anadromous, and are dependent on two distinct environments, marine and freshwater, during their life cycle. Salmon spawn and rear as juveniles in fresh water, migrate to marine waters, feed, grow and return to fresh waters to spawn and die. Thus, their anadromous life history links them to both fresh and marine water habitats. In this respect they are also linked to riparian and upland terrestrial habitats because land use practices can and often do directly impact freshwater systems.

Secondly, salmon possess a keen homing sense that allows them to return from their long migrations to their river or stream of origin. This trait has led to relative geographic reproductive isolation and the evolution of discrete populations or stocks of salmon.

Finally, Pacific salmon undertake extensive migrations and as such they are transboundary creatures. They migrate through different political jurisdictions, across international, national, state, and local political boundaries. They pass through a gauntlet of fisheries in both fresh and marine waters and are harvested by Indian and non-Indian fishermen, commercial, recreational, subsistence and ceremonial fishermen. These fishermen utilize a diversity of fishing gears entailing differing degrees of capitalization. Pacific salmon are also captured in fisheries not directed at salmon at all. As such, a multiplicity of different management institutions seek to regulate the capture of Pacific salmon.

Western Washington is increasingly impacted by humans. Many of the watersheds that support salmon have been detrimentally impacted by human activities, such as logging, hydropower development, land conversion, pollution, water withdrawals for irrigation, residential and industrial uses, road building and poorly constructed culverts. As a result of these habitat impacts, as well as overfishing, salmon populations throughout the Pacific Northwest have declined and several Washington stocks are now listed as threatened and endangered under the Endangered Species Act.

4. Institutional change: the emergence of co-management

The tribes of western Washington signed treaties in the 1850's which stipulated that "the right of taking fish, at all usual and accustomed grounds and stations, is further secured to said Indians, in common with all citizens of the Territory" [7]. In the following years, the government made little effort to ensure the tribes any harvest of salmon. Tribal fisheries were often closed by the state due to concerns over the conservation of the salmon run.

After years of litigation, the landmark *US vs. Washington* decision (also called the Boldt decision) was handed down in 1974 by Justice Boldt [8]. It was upheld by the United States Supreme Court in 1979 [9]. The Boldt decision allowed tribes to harvest up to 50% of the harvestable salmon run and gave the tribal governments the authority to manage on and off-reservation tribal fisheries. The decision also set up the framework for the formation of cooperative management between tribes and state management agencies to coordinate the management of salmon fisheries in the waters of western Washington State. An earlier decision in 1969, the *Sohappy vs. Smith* decision (also called the Belloni or *US vs. Oregon* decision) initiated a similar process on the Columbia River [10]. The *Hoh vs. Baldrige* decision in 1981 mandated that the 50% allocation of salmon should occur on a stock-by-stock basis [21]. This decision transformed the landscape of salmon management throughout western Washington.

The state-tribal co-management regime in Washington is based upon recognition of prior rights. Decision-making occurs by consensus of the parties and voting is rare. Co-management proceeds through a series of meetings held throughout the year bringing together state and tribal co-managers, encompassing a variable group of fisheries managers, policy representatives, fisheries biologists, and government officials. The location and timing of meetings changes frequently.

Judge Boldt stipulated that tribes have expertise in fisheries management before they assume management authority. Accordingly, tribes obtained expertise and established departments of natural resources. The Northwest Indian Fisheries Commission was formed to give tribes technical assistance in the short term. Each tribe now has a fishery manager and a natural resource management staff that includes a variety of biologists and technicians.

Tribes are involved in collecting a wide variety of fisheries and habitat-related information. They conduct test fisheries and collect fisheries catch and effort information, including coded wire tags and genetic stock information. Tribes conduct stream surveys to get escapement information and engage in research to answer a variety of basic and applied questions (i.e., understanding the impacts of logging on salmon habitat). They are engaged in habitat restoration activities as well as in enhancement activities, including both hatchery production and supplementation efforts. They are active in both harvest and habitat regulatory arenas and are responsible for tribal fisheries enforcement. Finally, tribes are formally involved in coast-wide salmon management and many other environmental fora.

5. Institutional fit and the production of knowledge

Salmon managers need information originating at different scales, both fine-grained information as well as information on coast-wide trends. For example, it is critical to know when a culvert on a small tributary like Kennedy Creek in south Puget Sound is blocked, thereby impeding upstream migration of salmon to spawning grounds. It is also important to know how many fish were harvested in Alaska and British Columbia in order to have an idea of the salmon population entering Washington waters. Salmon managers need to integrate and utilize information produced at different scales. They need to match the institutional mechanisms for producing and distributing knowledge with the biophysical imperatives of the salmon system.

In her analysis of the failure of the dam spanning the Teton River in 1975, Schmidt developed a typology of knowledge distinguishing between bottom–up knowledge, requiring bodily involvement, and top–down knowledge, which is gained through the use of impersonal instruments [11]. Schmidt further categorizes bottom–up knowledge into "a feel for the hole" which relates to individual expertise or artistry, a slightly mysterious understanding acquired through intimate practice (214); "a feel for the whole" which represents the collective knowledge of a subject which might be held incompletely by any one individual, created through informal gatherings in bars after work and on weekends (215); and "intimate knowledge" which represents the understanding of a specific thing acquired over long periods of time (221).

This distinction between bottom–up and top–down knowledge is similar, although not identical, to the work of Rushforth who categorizes knowledge into primary and secondary components in his writings of Bearlake Athapaskan Indians [12,13]. Primary knowledge is defined as an individual's "fully justified" beliefs which are acquired through experience, including social interactions, while secondary knowledge is based indirectly on experiential or primary knowledge. These taxonomies also relate to the dichotomy between scientific and traditional knowledge understandings of phenomenon that many researchers have described. In these understandings, scientific knowledge encompasses understandings derived from short-time spans and large geographic areas while traditional knowledge generally emerges from long-time series gathered within limited areas [14].

The understanding that emerges from these different ways of classifying and analyzing knowledge is that individuals interpret and validate information differently, thus creating and giving authority to different types of knowledge. These differences in interpretation and validation are often culturally based. Additionally, different institutional structures may facilitate or impede certain types of communication and information flows.

Fisheries management regimes tend to privilege scientific knowledge over experiential or traditional knowledge. Many indigenous cultures validate bottom–up, primary and traditional forms of knowledge over top–down, secondary or scientific. The question then becomes one of looking at how co-management has impacted the production, distribution, legitimization and utilization of knowledge.

Within the current co-management regime, tribes have management authority and have acquired or developed expertise in fisheries management, established tribal departments of natural resources. This expertise was stipulated by Judge Boldt in his original ruling. These tribal management offices, as well as most tribal reservations are adjacent to various bodies of water, the rivers, bays and inlets of the region. This alone has lead to a significant decentralization of management efforts around western Washington. Prior to this, the Washington Department of Fish and Wildlife's offices were quite centralized, with most situated in the state capital, Olympia. Now fisheries managers are present and active on most major tributaries in western Washington. This has increased the geographic range of fisheries research and allowed managers to increase knowledge about more watersheds throughout the region. It has also increased the absolute number of individuals and agencies engaged in fisheries research and the production of knowledge. Overall, both the monetary and human resources directed at salmon management are higher in post-co-management Washington than before.

Co-management has allowed new technical perspectives (from new tribal players: tribal councils, fishermen and fisheries staff) to enter the management arena. Within tribes, managers have access to input from tribal fishermen, fish committee members, and elders and thus there are avenues for different types of knowledge (i.e., experiential, traditional) to enter into the management process.

The initial contentiousness surrounding co-management in Washington and lack of trust among state and tribal co-managers meant that much technical analyses were duplicated or subjected to critical review. On the one hand this can be interpreted as inefficient, however, it has provided the basis for fisheries data and analyses to be subjected to peer review, critique and refinement.

Finally, the Boldt decision, in granting the tribes half of the harvestable salmon, focused technical attention on quantifying the abundance of salmon stocks for allocative purposes. This necessitated better estimating techniques and modeling capabilities, and a much finer understanding of the stock specific components of salmon runs. Thus, much effort has been focused on stock identification techniques, run size updating methodologies and on developing coast-wide integrative models for understanding exploitation rates by all fisheries along the Pacific coast gauntlet.

Thus, state-tribal co-management in Washington has created an institutional mechanism for collecting and disseminating finer-grained knowledge about the system. Co-management allows those with top–down knowledge, knowledge of the hole, and intimate knowledge to share their various forms of knowledge and to therefore create a collective knowledge of the whole. Co-management also provides mechanisms for this shared knowledge to be critiqued and further refined.

6. Institutional fit and the allocation of salmon

Pacific salmon originating from Washington State are harvested in a multitude of different fisheries that occur throughout the year along the Pacific coast in Southeast Alaska, British Columbia, Canada, Washington and Oregon. Some salmon fisheries occur in "terminal" areas at the end of the salmon's migratory route, such as rivers, at a time when salmon have become segregated into local stock units. Other fisheries, often termed mixed-stock fisheries, occur in "pre-terminal" areas where salmon runs composed of multiple stocks swim together. These fisheries intercept salmon that eventually would pass through other fisheries.

While many non-Indian fishermen have a degree of mobility, able to move among fisheries in different locations to take advantage of different salmon runs, Indian fishermen are constrained to fish within tribal usual and accustomed fishing areas. This lack of mobility puts Indian fisheries at risk when local runs become depleted because these fishermen are not able to relocate out of their tribal usual and accustomed fishing areas to alternate areas with healthy runs. Thus, from a tribe's point of view, to be effective, salmon management cannot be merely local or regional. It must rather be a coast-wide endeavor, occurring at different spatial and social scales. Further, the policies and decisions that are arrived at in each region must be communicated and coordinated among all.

Because of the allocational requirements of the *US vs. Oregon*, *US vs. Washington* and *Hoh vs. Baldrige* decisions, an institutional means of linking ocean fisheries with terminal area fisheries was needed. The Washington and Oregon tribes and states of Oregon and

Washington developed the North of Falcon process as a corollary process to the Pacific Fishery Management Council, one of the regional management councils established under the Fisheries Conservation and Management Act of 1976.

The North of Falcon process emerged in the early 1980s as a forum that brings together state and tribal managers, representatives of various stakeholder organizations as well as individual interested fishermen from the region north of Cape Falcon, located on the northern coast of Oregon. Participants meet before the fishing season several times to develop, through negotiation, iterative technical assessments, and by consensus a region-wide fishery management plan for the season [15]. Ultimately, the goal of the forum is to develop an allocation agreement to divide the runs of Pacific salmon stocks between the various offshore and inshore, marine and riverine, commercial and recreational, tribal and non-tribal fisheries. Within this broad forum, smaller caucuses often break out to negotiate specific stock and regional sharing arrangements. Some of these agreements are framed as Memoranda of Understanding and attached to the season fishing plan that is submitted to the federal district court for review as stipulated under the original Boldt decision.

The management of salmon fisheries in Washington must also be coordinated with fisheries in Alaska and Canada that harvest these salmon. This coordination is also necessary because Canadian fish are harvested in Washington waters, notably the Fraser River sockeye salmon, harvested by Indian and non-Indian fishermen in the Strait of Juan de Fuca and San Juan Islands. To jointly manage these fish, the US and Canada established the International Pacific Salmon Fisheries Commission in 1937. This Commission proved inadequate because its jurisdictional scope did not encompass the entire suite of relevant fisheries, excluding Alaskan fisheries that intercepted Canadian sockeye. Initially, Alaska was unwilling to negotiate a more comprehensive agreement. Because of this, the Northwest tribes initiated litigation in the "All-Citizen's Case" [16]. This suit sought to count Alaskan harvests within the non-Indian 50% allocation that had been established by the courts. The leverage provided by this suit brought Alaska into the negotiations and a US–Canada Pacific Salmon Treaty was signed in 1985, encompassing five species of salmon, a larger geographic area and more, although not all, salmon fisheries within this area. Tribal and state co-managers are critical participants in the Pacific Salmon Commission process, accounting for two of the four seats held by US Commissioners. A new agreement was signed by Canadian and US officials in 1999 [17].

Tribes are now involved in four management and allocation processes that occur at increasingly larger spatial and social scales: watershed-specific (state-tribal Memoranda of Understanding), regional (North of Falcon), coast-wide within the US (Pacific Fishery Management Council) and along the entire Pacific coast (US–Canada Pacific Salmon Commission). These processes and fora bring tribal and state managers together with a wide variety of other stakeholders from the region at regularly scheduled meetings. Salmon harvest levels and escapement goals in Washington are now set, through the North of Falcon forum, with respect to ocean fishing levels set by the Pacific Fishery Management Commission and these are set with respect to those set by the US–Canada Pacific Salmon Commission. Conversely, ocean fishing levels are set with some consideration of terminal area fisheries. Thus, the Northwest tribes have been able to substantially improve the fit of the management and allocation regime with respect to the coast-wide range of the migratory salmon.

7. Institutional interplay and the conservation of salmon habitat

When the tribes initially filed the *US vs. Washington* suit in 1970, they asked not only for a judgment concerning the extent of their fishing rights, but also for relief from the environmental destruction that had impaired their treaty fishing rights by reducing the abundance of salmonid populations. Judge Boldt chose not to issue a decision on this environmental portion of *US vs. Washington*, called "Phase II." It was vacated without prejudice, lacking an appropriate test case.

The threat of a Phase II decision, however, has been used by the Washington tribes to bring government and industry officials to the table to negotiate alternative means for addressing habitat-related conflicts. Because of this, many respondents whom I interviewed for this research felt that the tribes have a "bigger hammer than the state" when it comes to habitat issues.

This "hammer" has provided tribes with leverage to insinuate themselves into many existing habitat related fora. There has been a proliferation of new programs and initiatives developed by state and tribal co-managers focused on a wide array of ecosystem-wide problems. Tribes are now involved in watershed analysis, management and restoration activities; forestry, agriculture and land-use management programs; water quantity and quality issues; land-use application and permitting processes and habitat protection and restoration projects [18].

Habitat-related programs that have benefited or were created as a result of tribal involvement include, the Timber, Fish and Wildfire Agreement, the "For the Sake of the Salmon" initiative, the Coordinated Tribal Water Quality Program, the Chelan Agreement of 1990, the Agricultural Forum, the Forest Ecosystem

Management Team process, the Federal Energy Regulatory Commission dam relicensing process. There are additionally a host of local and regional watershed groups, such as the Nisqually River Council, the Skokomish River Basin Restoration Council, the Nooksack Salmon Enhancement Association, and the Hood Canal Plan, that have developed or benefited from tribal efforts.

Recently, the Washington tribes have filed suit in federal district court seeking to force the state of Washington to fix and maintain hundreds of culverts under state roads that impede salmon migration [19]. The suit, filed as a sub-proceeding of *US vs. Washington*, ended months of unsuccessful negotiations between the state and tribes over the state's responsibility and willingness to fix the faulty culverts. The suit is seen by some as the test case that will be used to adjudicate the Phase II portion of *US vs. Washington* [20].

Tribes have forged functional linkages and played a role in reconfiguring the agendas of institutions whose activities impinge on the health of the salmon resource. These legal maneuvers by tribal co-managers have accompanied a shift in fisheries management to a more ecosystemic approach that focuses on the watershed as a whole, including coastal, estuarine, freshwater, riparian and upland habitats. This intellectual and value shift has enlarged the traditionally narrow focus that fisheries managers have applied in the past. This shift reflects traditional Native ideologies as well as current scientific understandings.

8. Conclusion

Co-managers have been successful in producing knowledge at different scales to better reflect local ecological conditions and coast-wide trends. Co-management has also provided for the production and integration of different types of knowledge and created institutional paths for the transfer of knowledge at different geographic and political scales. It has created technical and policy processes where these flows of information are integrated, allowing the creation of a knowledge-of-the-whole to emerge. Because of the substantial decentralization of research and management that accompanied the shift to co-management, managers are now better able to accommodate the social and cultural needs of the local tribes and fishing communities. Co-management has substantially enhanced the institutional fit of the management system, focusing fisheries managers' attention on a more expansive geographic region and a more inclusive suite of impacts.

Despite these positive changes, tribes have not been entirely successful at reversing the degradation of the salmon's habitat and some stocks have continued to decline. This is evidenced by the continuing listings by the National Marine Fisheries Service of Columbia River, Puget Sound, and Pacific coast stocks under the Endangered Species Act. Thus, it is not clear if the tribal right to harvest and co-manage salmon will continue to be meaningful in the future.

Although tribal efforts to improve the fit of the management regime with the salmon system have met with success, there remain many human activities outside the purview and control of salmon managers that contribute to the decline of the salmon. These negative problems of interplay comprise a formidable institutional challenge that must be addressed if the salmon runs of the Northwest are to recover to their former health and size. Such an endeavor necessitates the adoption of a more "salmon-centric" agenda by public policymakers. The answer will lie not in the creation a new centralized layer of bureaucracy nor in the form of another comprehensive planning exercise, but by carefully crafting connections among the existing institutions and actors, encompassing all relevant scales and ensuring that flows of information occur in all directions.

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