

# **Case History of the Skeena Fisheries Commission: Developing Aboriginal Fishery Management Capacity in Northern British Columbia**

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*Abstract.*—Pacific salmon are important to the First Nations of the Skeena River watershed in British Columbia. The Skeena Fisheries Commission (SFC) was formed in 1985 through a memorandum of understanding between the watershed's five First Nations: Tsimshian, Gitksan, Gitanyow, Wet'suwet'en, and Lake Babine. SFC focuses on salmon management, research, and conservation through governance and technical committees. This paper describes the development of fishery management capacity of SFC within the context of the cultural importance of salmon, the history of salmon management measures, and land claims. Capacity is analyzed in terms of the ability to perform eight management functions: policy making, negotiation and resource planning; stock assessment; fishery monitoring; enforcement and compliance; research, habitat and enhancement activities; data gathering and analysis for resource planning; creating benefits for fishermen and communities; and training and education. Policy making, negotiating, and planning occur between SFC and the Canadian Department of Fisheries and Oceans (DFO) through formal and informal consultations and monthly technical meetings. SFC also participates in committees at the federal and international levels. Stock assessment activities include spawner enumerations, counting weirs, mark-recapture studies, hydroacoustic surveys, and sampling fish for genetic stock identification. Catch monitoring of the food fishery has been regularly conducted since 1991. First Nation Rangers and federal Fisheries Officers enforce traditional and federal law, respectively. Member First Nations conduct research projects with assistance from SFC staff and infrastructure. Habitat and conservation enhancement projects include road culvert assessments and hatchery rearing of Kitwanga Lake sockeye salmon *Oncorhynchus nerka*. The creation of benefits for communities occurs through two in-river fisheries. Finally, training and education include SFC-run workshops and specialized training by external sources. SFC will conduct most management functions in the future; however, funding remains a constraint to program expansion. Key elements of the success of the SFC include: the cultural imperative to protect fish, the community origin and leadership of the SFC, a favorable political environment, the early recognition of the need for a watershed-wide organization, and the availability of government funding.

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## Introduction: Skeena Fisheries Commission Overview

The Skeena River watershed is the second largest in British Columbia, Canada, at 54,432 km<sup>2</sup>. The river mouth is located at approximately 54°N, close to Prince Rupert and just south of the Alaska panhandle (Figure 1). The Skeena River extends from the humid coast through the Coast Mountains into the relatively dry interior plateau. The river supports approximately 300 stocks of salmon of six species adapted to the varying environments of its tributary streams. Most important from a fisheries perspective are the sockeye salmon, *Oncorhynchus nerka*, mostly originating in Babine Lake, and pink salmon, *O. gorbuscha*, originating in the lower portion of the watershed.

The Skeena River drainage is an area of flourishing aboriginal culture based on salmon. The Skeena Fisheries Commission (SFC) is an aboriginal organization focused on fishery management, research, and conservation (Pinkerton 2009, this volume). It was formed through an inter-tribal memorandum of understanding in 1985 and is the only organization in British Columbia to have signed a watershed-level agreement with Canada's Department of Fisheries and Oceans (DFO). This agreement was established in 1991. The SFC signatories are the First Nations with traditional territory in the Skeena River drainage and the adjacent north coast of British Columbia. The SFC includes the Tsimshian, Gitksan, Gitanyow, Wet'suwet'en, and Lake Babine Nations. The Commission, as directed by signatory First Nations, responds to management and fishing opportunity priorities relating to the broad aboriginal interest in the fishery resource. SFC First Nations seek economic development through fisheries that respect aboriginal rights and maintain the viability of the resource. The SFC has been committed to four principles:

- the obligation to protect, conserve, and catch fish according to traditional law;
- the maintenance of the aboriginal right to fish for food, social, ceremonial, and economic purposes;
- the recognition of the dependence on the fishery resources as a mainstay of economic, social, and cultural well-being; and
- the priority of the right to fish after conservation needs for threatened stocks are met, which supersedes non-aboriginal fishing interests.

The SFC operates through a traditional consensus model, whereby commissioners who form the Governance Committee represent their respective First Nation-level interests. Each commissioner acts as the communication vehicle between the Nation and the Commission. Commissioners direct the SFC's progress by providing governance and accountability for its resources and projects, as well as advocating the Nation's interests at a watershed level. Commissioners set priorities, review plans and reports, and communicate SFC plans and policy back to their Nations. SFC commissioners have typically been the fisheries portfolio managers in their respective Nation's administration. The Commission presents a unified approach to resource management while recognizing that each First Nation in the SFC maintains its own bilateral relationship with the governments of Canada and British Columbia.

The Skeena aboriginal culture, built on thousands of years of effective fishery management, emphasizes the need to conserve salmon. With this perspective, current management challenges of the SFC include:

- maintaining production of the large salmon stocks while increasing attention to less abundant stocks to ensure overall sustainability;
- addressing the biological impacts of resource development;

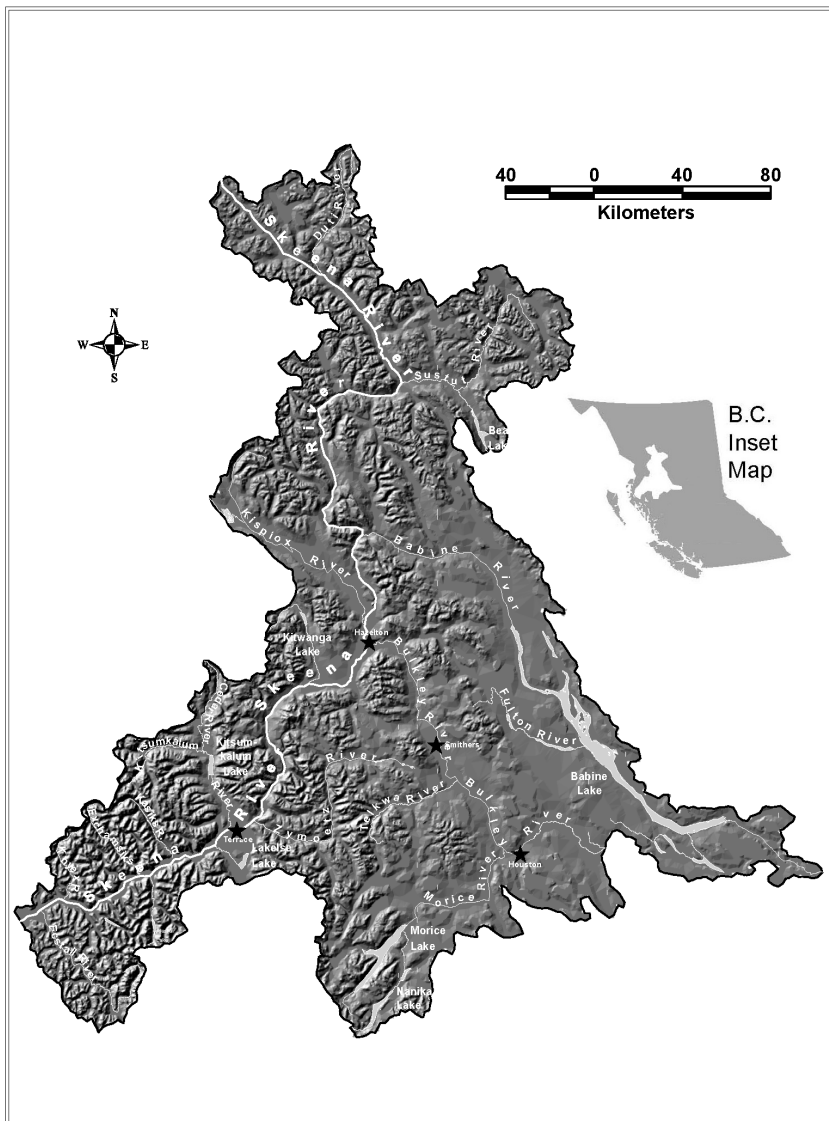


FIGURE 1. The Skeena River watershed.

- accelerating postlogging watershed recovery with localized restoration projects;
- maintaining and increasing benefits from salmon fishing;
- moving some parts of north coast salmon fisheries to more terminal harvest localities; and
- increasing job opportunities for SFC member Nations in fisheries and watershed management.

The SFC sponsors a Technical Committee comprised of biologists and technical staff from each member First Nation who meet regularly together and with DFO to discuss relevant issues. SFC also has two biologists on staff who conduct research, training, and outreach activities. SFC and member Nation staff conduct research projects and produce reports and publications.

This paper discusses the evolution of

SFC's capacity to manage fisheries within the Skeena River watershed. Spaeder (2004) defines capacity building as "the process by which individuals, organizations, institutions, and societies develop abilities (individually and collectively) to perform functions, solve problems and set and achieve objectives." This process is discussed here in terms of the history, background, and context of SFC which have given rise to its current level of capacity. Aspects of SFC's current programs which aim to create further capacity are also described. Specifically, SFC's capacity in terms of its ability to perform "management functions" involved in fishery management is analyzed (Pinkerton and Weinstein 1995).

### **Salmon and Skeena Aboriginal Peoples**

The people of the Skeena River watershed, especially those of the upper river (Gitksan, Wet'suwet'en and Lake Babine Nation or Ned'u'ten), continue to depend heavily on salmon for food. This dependency results in the highest per capita salmon consumption in Canada; indeed salmon is viewed as the fundamental foodstuff. Skeena River aboriginal culture emphasizes the requirement to carry out fisheries without waste and with respect for the fish.

The Skeena First Nations are organized into political units known in English as "Houses," through which they hold title to their territories. Houses are extended family units headed by a chief who is the ultimate authority over decisions involving the territory. A House chief together with subchiefs ensure that resource harvesting is conducted properly, that is, they determine who can harvest and where, the equitable distribution of the harvest (Morrell 1989), and they ensure that conservation concerns are met. Thus, among the Gitksan, fishing rights apply to catches at specific fishing sites. These sites have high

value and are part of the property held by that chiefly name. Pinkerton and Weinstein (1995) note that the traditional management system was quite comparable to the current state-sponsored system in terms of the management functions it performed.

### **Aboriginal Salmon Fisheries and the Historical Restriction of Fishing Rights**

When British Columbia joined the Dominion of Canada in 1871 fishing was conducted almost entirely by Native people. Native fisheries were not regulated by the state but by traditional law (Harris 2001). Native people sold fish to the Hudson's Bay Company and other traders and continued to trade among themselves. Many of the Indian reserves along the British Columbia coast and on major rivers like the Fraser and Nass rivers were negotiated and established by the Joint Indian Reserve Commission in the 1870s and 1880s with the understanding that unencumbered fisheries would play a key role in indigenous peoples' livelihoods (Harris 2002). However, as industrial commercial fisheries were established and grew to be a key part of the provincial economy, earlier treaty promises that guaranteed the right of First Nations to continue fishing were ignored. The first government regulation began with the Fisheries Act of 1878 largely as a response to the expansion of salmon canneries on the coast. In 1888, fisheries regulations specified the conditions under which native people could catch fish, limiting catches for purposes of consumption, not for sale. At first, these regulations were sporadically enforced, but increasingly by the end of the century, enforcement actions were taken against native fishers. By 1907, paramilitary action sought to shut down native weir and trap fisheries in the upper Skeena River at Hazelton and on the Babine River. These native fisheries were seen by

the government and the fishing industry as a threat to the survival of stocks that were being heavily exploited by cannery fleets.

The Fisheries Act's separation of Native fisheries into consumption and sale persists to the present time. It was further entrenched in the Supreme Court decision in *R. v. Sparrow* (1990),<sup>1</sup> which strengthened Indian rights of access to salmon for "food, social and ceremonial" purposes. This interpretation stands in direct conflict with the perspective of north coast aboriginal societies, which view fishing rights as indivisible. In the Skeena River, the political activity over the past 30 years surrounding fisheries can be seen as a prolonged and somewhat effective program to reverse the changes that were effected in the late 19th century.

### **Post-1977 Skeena Fishery Management Developments**

In the Skeena River watershed, only sporadic, largely ineffective effort occurred by the Canadian Government to enforce fisheries regulations until the late 1970s. These efforts included requiring licenses to gill net, implementing fishing closures, and the prevention of small-scale local sales. In 1977, a major "sting" operation was staged in the Skeena River Valley to require fishing permits and regulate the aboriginal small-scale sale of salmon. The undercover operation resulted in 23 charges. The newly formed Gitksan and Wet'suwet'en Tribal Council decided to support the defense of the charged individuals. By 1979, all of the charges had been dropped after the court defeat of several of the cases. This situation contributed to a genuine attempt at negotiation between the parties. An agreement was made in 1979 to permit unlimited food fishing but was not extended into 1980 due to a dispute over a

proposed Chinook salmon closure (Morrell 1985, 1989). An attempt by Gitksan and Wet'suwet'en villages to assume control of fisheries within the small allocated reserves played out in the early 1980s but was ultimately unsuccessful.<sup>2</sup>

The Gitksan Wet'suwet'en Tribal Council was established in 1977; it filed a formal land claim with the Canadian government during the same year (this ultimately became the Delgamuukw case that was decided by the Supreme Court of Canada in 1997).<sup>3</sup> As part of the effort to demonstrate the Native culture as an intact management system, monitoring information was collected on the food fishery during the 1980s. The Tribal Council hired a biologist to compile data and information on Native and other Skeena River fisheries, and to present management proposals of the Tribal Council to the DFO and treaty negotiators of both government levels. The biological study was completed in 1985, and laid the foundation for future fisheries work.

The Gitksan Wet'suwet'en Watershed Authorities were established in 1985 to manage the up-river fisheries and collect data on the fisheries and fish habitat of the upper Skeena River. The Skeena Fisheries Commission was started in 1991 as a watershed-wide organization to represent Native fisheries interests in dealing with the federal and provincial governments and the coastal fishing industry.

### **Scientific and Technical Fishery Management Capacity Building**

The first Fisheries Technician training course was held on the Gitksan territory in 1983–1984. The course was a combination of scientific and technical training with a strong field emphasis and the intention of combining study of traditional management with sci-

<sup>2</sup>*R. v. Nikal* (1996) 1 S.C.R. 1013.

<sup>1</sup>*R. v. Sparrow* (1990) 1 S.C.R. 1075, henceforth "*Sparrow*."

<sup>3</sup>*Delgamuukw v. British Columbia* (1997) 3 S.C.R. 1010, henceforth "*Delgamuukw*."



entific management. Several of the trainees became the core of the Gitxsan-Wet'suwet'en Fisheries program and the Skeena Fisheries Commission. One of them is a respected chief in the Feast Hall and a co-author of this paper, and another currently serves as staff director. Since this first training, several additional technician training courses have been offered locally. The most effective was a course run by the Gitxsan Watershed Authorities in cooperation with Malaspina College, a community college on Vancouver Island (now a small university) specializing in training for fisheries and aquaculture. About one half of the students in this course were already being employed seasonally by the Gitxsan Wet'suwet'en or Gitanyow, and resumed working when their training course ended. Currently, each SFC member Nation has one to several full-time technicians and several part-time fisheries technicians.

Currently, few First Nations biologists are employed within SFC member Nations. Several others work for other First Nations. The few numbers may be related to the low completion rates of high school by aboriginal students, both in the region and in British Columbia, as well as the low rate of university attendance. In addition, aboriginal students who do attend university tend not to study fisheries science. Transition programs which help aboriginal students to adjust culturally to the university setting are available at several British Columbia universities and are probably helpful. The University of British Columbia has recently begun an Aboriginal Fisheries Program to address the noticeable lack of aboriginal fisheries students. The university also offers a generous scholarship for First Nations postgraduate students in fisheries.

### **Management Functions**

Pinkerton and Weinstein (1995) created a conceptual framework to help analyze

the "degree" of co-management in a range of fisheries cases from around the world. Among other issues, they examined how and whether community-based and First Nations fisheries organizations were involved in a range of fishery management "functions." These functions were adapted by Soto (2006) to examine the extent of fishers' participation in integrating their knowledge into fisheries management. The framework of management functions was further adapted and applied in the context of capacity building here. This management function classification will be used to discuss current activities of the SFC. The present manuscript focuses relatively more on technical capacity than leadership and organizational capacity.

### ***Decision making and resource planning***

Within the SFC traditional territories, traditional law still tends to determine who fishes when and where. This approach is certainly true for gill net sites on the Skeena River, dip net sites on the lower Babine River, and with recent modifications, gaff fishing sites on the Bulkley River (Morrell 1989). Furthermore, many native organizations reflect the traditional system; for example, the fishermen's organizations formed in 2006 to participate in the in-river commercial fishery were based on Gitxsan houses and mostly fished within the house territory or adjacent to house-owned gill net sites. On the north coast, the role of traditional fishing site ownership is less obvious but still plays a role especially in areas remote from the large commercial fishing fleet.

At the federal level, SFC has had some degree of influence on fisheries policies. This influence could be attributed to an increase in "political capacity" on the part of SFC and its leadership within the greater context of several Supreme Court decisions that have strengthened First Nations' position in terms of aboriginal rights and title.<sup>4</sup>

Open exchange and negotiation between the DFO and the SFC occur in ongoing formal and informal consultations. Usually, several meetings occur each year to discuss the Integrated Fisheries Management Plan which governs north coast in-season fishing decisions. In addition, both the SFC Commissioners and the Technical Committee meet with DFO annually in December for a postseason review and to consider what changes may be necessary for the coming year. During the summer fishing season, weekly conference phone calls occur between DFO managers and the SFC prior to announcement of coastal commercial openings and to discuss issues that have arisen.

The Technical Committee meets with DFO staff on a monthly basis to discuss issues of special interest, share information, host guest speakers, and plan technical training. The Technical Committee has been active in planning through workshops and the provision of input into DFO's Wild Salmon Policy and Core Stock Assessment initiatives, and the documentation and preparation of technical materials for an ocean zone planning initiative. The SFC head scientist is a member of the salmon subcommittee of the PSARC (Pacific Scientific Advice Review Committee), the DFO committee that reviews technical reports, especially those with policy implications.

At the international level, the SFC participates in the Pacific Salmon Commission activities. The chair of SFC is one of the six Northern Boundary Panel members. The SFC head scientist serves on the Northern Boundary Technical Committee.

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<sup>4</sup>Important cases include *Sparrow* (1990), *R. v. Gladstone* (1996) 2 S.C.R. 723; *Delgamuukw* (1997); *R. v. Joseph Andrew Jack, Arnold John and Martin John* (1995) 16 British ColumbiaLR (3d) 201 (British ColumbiaCA) at 208, henceforth "Jerry Jack"; *Haida Nation v. British Columbia* (Minister of Forests) (2004) 3 S.C.R. 511, (2004) SCC 73; *Taku River Tlingit First Nation v. British Columbia* (Project Assessment Director) (2004) 3 S.C.R. 550, (2004) SCC 74.

### ***Stock assessment and escapement monitoring***

Skeena River salmon stock assessment activities by the DFO involve collection of two data types: analysis of commercial catch rates for gill net and seine net boats and the Skeena River-mouth test fishery which provide in-season data; and season-end escapement estimates from upriver spawning areas. This approach allows sockeye salmon management for the Skeena River-wide aggregate stock, which is essentially management of the two highly abundant and enhanced sockeye salmon stocks of Babine Lake. The test fishery results are calibrated with escapement estimates from the Babine River counting fence below Babine Lake. Postseason DNA analysis of a subsample of the test fishery allows for post season evaluation of at least some of the other 27 sockeye salmon stocks.

Stock assessment activities comprise much of the field work of Skeena Fisheries Commission members. Evaluation of spawner populations by ground, boat, and air surveys provides information on the status of the >300 salmon spawning populations in the Skeena River watershed. Collection of these data are labor intensive and relatively expensive. Over the last 15 years, government agencies have discontinued most population surveys, many of which have been carried out for 50 years or more, and provide the best available long-term indices of salmon population status. First Nations have been filling this gap and now perform approximately one half of all of the stream surveys (Figure 2).

The Babine counting fence, located at a traditional weir fishing locality, is used to enumerate returning sockeye salmon and also to provide data on other species, although it only counts part of the Babine River chinook salmon *O. tshawytscha* population and the early part of the coho salmon *O. kisutch* run. This facility has been operated by the DFO since the 1950s but is now operated by the





Lake Babine Nation. A single counting weir is operated by the province of British Columbia in the upper Skeena River primarily to count returning steelhead trout adults *O. mykiss*.

SFC members operate two other counting weirs, a sophisticated permanent fence on the Kitwanga River and a low-tech wood and tubing weir on the Slamgeesh River. The Kitwanga River counting weir (Xsi Tax Tin) enumerates all six species of salmon; it provides total counts of the threatened Kitwanga Lake sockeye, high quality data for chinook and coho salmon escapement, and the only accurate counts of chum *O. keta* and pink salmon in the Skeena River. In the far northern part of the watershed, the Slamgeesh weir provides accurate sockeye and coho salmon escapements. The stock assessment projects at the Kitwanga and Slamgeesh Rivers also function in the spring to count and tag sockeye and coho salmon smolts. At this point, all sockeye salmon smolt enumeration by the DFO has ceased and coho salmon are marked at only two sites, both associated with small hatcheries.

At Moricetown canyon, a mark and recapture program is carried out to estimate populations of sockeye and coho salmon, and steelhead trout. Fish are captured in seine nets below Moricetown Canyon, tagged and recovered in dip-net fisheries in the canyon and upstream by swimming counts at spawning areas. These efforts, begun in 2001, provide improved estimates for the Bulkley River aggregate populations of the three species.

For the past four years, the SFC has been carrying out hydroacoustic surveys on Skeena lakes to count sockeye salmon fry in the expectation that these counts will provide better stock status data than the former visual surveys especially for turbid stream and lake spawning populations. Periodic assessment of all of the Skeena River sockeye salmon rearing lakes are planned.

### ***Fishery monitoring***

Under the DFO's Aboriginal Fisheries Strategy agreements, monitoring of the catch in native fisheries is a central responsibility of the First Nations. The Gitksan and Wet'suwet'en negotiated one of the first Aboriginal Fisheries Strategy agreements in 1985 and have been leaders in monitoring their fisheries. The techniques chosen had already been established by Morrell (1985) and used between 1978 and 1985. Regular monitoring began in 1991. Annual estimates of catch are prepared for a number of fisheries including:

- a large fishery below Hazelton on the Skeena River using set gill nets;
- a large fishery between Hazelton and the Babine River confluence on the Skeena River using set gill nets;
- a small fishery on the lower Bulkley River using set gill nets;
- a drift gill net fishery in the vicinity of Kitwanga and Kispiox on the Skeena river;
- a small fishery on the Babine River using set gill nets;
- a dip net fishery at Gisgagaas on the Babine River;
- a large fishery at Moricetown Canyon employing gaffs for chinook; and
- a large fishery at Moricetown Canyon using dip nets.

The last two monitoring efforts are managed by the Wet'suwet'en Fisheries, the others by the Gitksan Watershed Authorities.

The large Gitksan fisheries are set gill nets fished generally at large eddies where salmon movement is concentrated and predictable. Approximately a hundred sites are used at some time but most of the production is from a smaller number of sites. Fishing is exclusively under the supervision of the chiefs who own the specific fishing sites. The estimate of catch is based on separate estimates

of effort and catch per unit effort (CPUE). The estimate of effort is based on two or three river boat surveys each week supplemented with information from fisher interviews and knowledge of their fishing habits. The catch estimate comes from log books kept by fishers supplemented by direct samples made during river cruises and interviews. The error in the catch estimate is similar to the uncertainty around the CPUE estimate. For further details see Morrell (1985). Generally 20–35% of the set catches are recorded which results in extremely well sampled fisheries.

The long-term record of the Gitxsan fisheries (Figure 3) shows remarkably consistent catches, a characteristic one might predict of a food fishery fishing an abundant resource. In years of relatively poor sockeye salmon runs the effort increases, while in years of abundance the effort is reduced to levels sufficient to provide sustenance. In contrast, the commercial fisheries on the coast and in-river are highly variable in catch because they effectively intercept all fish in excess of the escapement requirement and the constitutionally protected aboriginal food fisheries.

Commercial catches of Skeena River sockeye salmon thus vary from zero to several million fish depending on run size.

The Wet'suwet'en fisheries take place at Moricetown Canyon below a waterfall on the Bulkley River. A summer gaff fishery is directed at Chinook salmon that congregate below the falls; an adjacent dip net fishery peaks later in the season and is directed at sockeye and coho salmon. Steelhead trout are generally released. Fishermen are effectively monitored by observers who record catch number and species. Most hours of fishing and nearly all days are recorded by the monitors. Missing portions of days are filled in with average values.

Catches by other First Nations in the Skeena River watershed and north coast are often not as well delimited as the Gitxsan and Wet'suwet'en fisheries. The large sockeye salmon fishery that takes place at the Babine River counting weir has been effectively counted since the Lake Babine Nation took over stock assessment activities in 2006. The Tsimshian gill net fishery at Kitselas Canyon and at Little Canyon are relatively well sam-

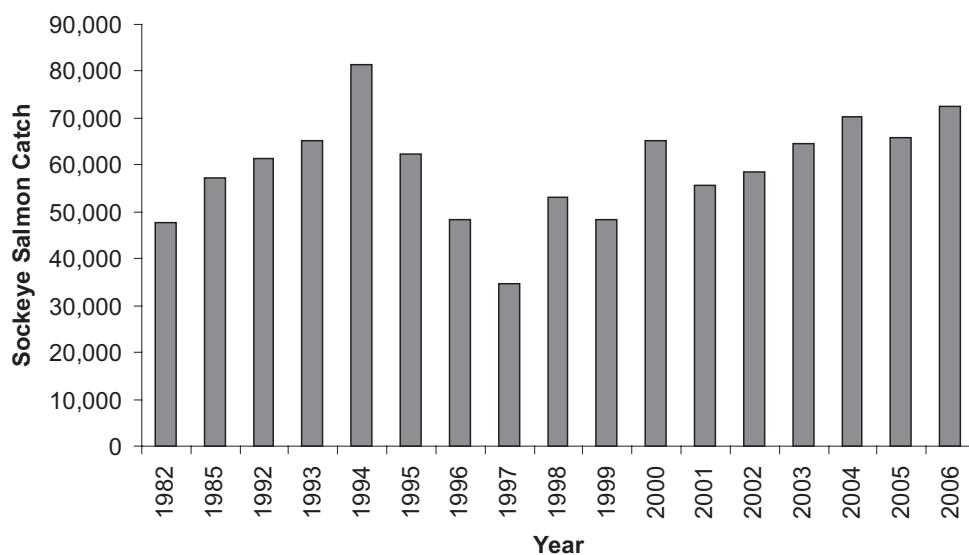


FIGURE 3. The Gitxsan sockeye food fishery catch, taken with set gill nets on the Skeena River. See text for more discussion.

pled, but statistical analysis is not performed. The numerous food fisheries of coastal Tsimshian are not well monitored because of their diffuse nature and an unwillingness to separate food fisheries from commercial fisheries. In general, the quality of data on Native food fisheries has improved greatly since the involvement of First Nations as managers began in the early 1990s.

SFC member Nations have carried out at least six contracts with the DFO to monitor sport fisheries for salmon in upriver areas. The Provincial fisheries agency is responsible for management of sports fisheries on trout, steelhead, and various nonanadromous fish species. As of 2007, the provincial region staff in the local administrative centre, Smithers, has been unwilling to hire First Nations fishery groups to carry out creel surveys. Poor advertising and a poorly defined contracting procedure facilitates awards to a handful of consultants. The local policy is at variance with Provincial practices and is a holdover from the 1970s.

### ***Enforcement and compliance***

Within the territories, traditional law regarding who fishes and where is enforced through political institutions, primarily through the feasting system or “potlatch.” SFC member Nations share common elements of law around the use and conservation of fish. These elements of traditional law include:

- an overall context of respect for the fish and its continuance into future generations;
- protection and maintenance of fish habitat;
- strict laws pertaining to the use of fish including the full use and prevention of waste of harvested fish;
- control by the hereditary chiefs of access to all fishing grounds and of all aspects of harvesting, processing, and distribution of

fish and their products (Morrell 1989); and

- high expectations that people will govern themselves according to the traditional law.

Two types of uniformed fisheries compliance officers exist on the Skeena River: (1) Rangers who work for a member Nations’ fishery management organization such as the Gitxsan Watershed Authorities and (2) DFO Fisheries Officers. Both groups are primarily aboriginal. The Rangers collect monitoring information on the food and commercial fisheries. A high level of cooperation exists between fishermen and the Rangers in part because they are community members and in part because information collected in the monitoring exercise is never used for enforcement. The Fisheries Officers are local aboriginal people trained by the DFO. They have been working within the DFO system since the early 1990s and are now in or nearing senior positions. Their position within the local communities and their understanding of the requirements of traditional law as well as Canadian law makes them effective.

The practical enforcement of fishing rules occurs in two ways: fishing sites are determined by traditional law, and violations of fish sale are dealt with by the DFO Fisheries officers. By way of an example, in the demonstration fishery that took place in 2006, one fisher illegally retained coho. He was charged by the Fishery Officer and will eventually appear in court. The community of fishermen took immediate action and suspended the miscreant and his house group from further fishing in 2006 or future years pending the legal outcome of the charges. In 2006, in the Excess to Spawning Salmon Requirements (ESSR) fishery, each group fishing in the Babine River developed their own policies (administration and rules) for the season with help from the Gitxsan Watershed Authorities. Disagreements among some fishermen occurred in the Babine River and several indi-

viduals were suspended from fishing by the chiefs for not obeying the agreed upon fishing policies.

### **Research**

Each Nation has one or two biologists who, at times, conduct research projects. SFC has a Head Scientist (one of the co-authors) who provides technical assistance and guidance to member Nations for research and other activities. SFC is located in Kispiox, and has a building that includes a laboratory and a Geographic Information Systems (GIS) facility. The Kispiox Biological Laboratory has a range of equipment including various microscopes with cameras, a fume hood, chemicals, weigh scales, a drying oven, and sediment analysis equipment. The facility has been used for scale and otolith reading, sediment analysis, biological sampling of various salmon stages and populations, and plankton analysis for recent sea lice research projects.

Many of the SFC research projects have been able to incorporate traditional ecological knowledge. The Gitxsan have developed a research laboratory on Slamgeesh Lake, a remote fly-in facility in the uppermost Skeena River drainage. It was begun in 1999, at a time when great concern existed about upper Skeena River coho salmon populations. The site was selected because it was an important Gitxsan fishing site and trapping centre, and had received little attention from government managers and biologists. It was certain that the locality was suitable for enumerating salmon since it is known as a former weir and trap site. Fisheries work has been carried out along with work on traditional sites, Gitxsan-imukx names, and youth camp involvement.

The Kitwanga Lake Sockeye Restoration project is a reaction to the dismay in Gitanyow about the decline of the sockeye salmon stock that the village depended on. Efforts have been made to restore the sockeye run of the Kitwanga River, which has dropped as

low as several hundred fish some years. The habitat studies described in the next section were informed by aboriginal knowledge of the former spawning sites and population size (which numbered in the tens of thousands).

Most of the research projects that have been carried out in the past eight years have been funded after development of competitive proposals. For the most part, projects have been funded by the DFO and the provincial Ministry of Environment and Ministry of Forests. A few generally small grants have come from environmental organizations and corporate developers in the forestry and energy sectors. In the last few years, funding from the provincial and federal governments for habitat, enhancement, and stock assessment projects has sharply declined. During this period, and to some extent in compensation, the Pacific Salmon Commission Northern Fund has become the largest source for research funding. The SFC is now in a situation where it is often easier to get money for technically demanding projects than simpler labor intensive projects. This makes acquiring and retaining experienced biologists critical, but works against the general need to provide employment opportunity within the native communities.

### **Habitat and enhancement**

In the 1990s, two major programs funded fisheries habitat and enhancement efforts in British Columbia: Habitat Restoration and Salmonid Enhancement Program (HRSEP, 1997–2002) and the Watershed Restoration Program (WRP). The former program, funded by the DFO, supported scores of small enhancement projects—mostly incubation boxes for coho and chum salmon and stream rehabilitation projects (Gottesfeld et al. 2002). Community hatcheries established at Kispiox and Fort Babine produced coho and chinook salmon for enhancement of local stream populations. Coho salmon juve-

nile density assessments were also popular. The WRP was developed by the Province in 1995 to restore the terrestrial and aquatic productivity of watersheds negatively impacted by logging. Most of the WRP work was conducted by provincial staff and private consultants. The work consisted of fish habitat, riparian, and upslope assessments, and road deactivation. Projects were designed to create or restore off-channel habitat, restore the riparian zone, diversify habitat, and stabilize stream channels. Skeena River projects provided employment to some band members, and projects in Gitanyow and Gitsegukla were run by consultants working from band headquarters.

The effectiveness of the many WRP projects is poorly documented. Few attempts were made to evaluate the response of fish populations to habitat manipulations anywhere in British Columbia. The SFC is currently conducting several projects to evaluate the efficacy of the WRP projects and recommend future restoration efforts.

In the past decade, most of the logging companies pulled out of the Skeena River watershed, as high quality forest stands were harvested. Logging continues in the southern edge of the Skeena River watershed where a mountain pine beetle outbreak has caused timber salvage. The legacy of logging damage to salmon habitat has not been effectively addressed because of a withdrawal of Forest Service staff from the region. Fortunately, many of the streams damaged by logging seem to be recovering on their own.

In the Skeena River watershed, a major impact of logging and development activities such as road and rail construction, is the restriction of fish access to upstream waters, often the result of poorly designed road crossings. Culvert assessments were part of the upslope activities of many WRP projects and some culverts were removed and logging roads deactivated. In the past four years, SFC members mapped and evaluated all of the

paved highway and railroad stream crossings in the Skeena River watershed. Evaluation of impacts to salmon streams is of little value if it does not lead to mitigation. The reports produced by the SFC prioritized the replacement of major structures that isolate salmon habitat. Thus far, planning has occurred and funds secured to restore the highest priority fish access blockage in the Skeena River watershed on the floodplain near Exchamsiks. Additional access restoration projects are planned for the future at one each year.

In 2005–2006, SFC technical staff participated in the Ministry of Forests expert hydrology panel to assess the logging status of all third-order watersheds in the upper Skeena River, to identify the fisheries values, and to examine proposed logging development to determine whether more logging could proceed without hydrological complications.

Overall, efforts to rehabilitate and protect habitat decreased in the past decade as a result of the termination of the WRP and HRSEP. Funding from the Pacific Salmon Commission's Northern Fund now supports some restoration and enhancement efforts. The Northern Fund is especially interested in projects that increase the production of salmon. For example, the Gitanyow Fisheries Authority was recently able to expand productive capacity by about 1,000 coho by opening an extra eight kilometers of prime coho salmon spawning and rearing habitat blocked by beaver dams.

For the past few years, the Gitanyow Nation has developed a program to restore the sockeye salmon production of the Kitwanga River. This program has included environmental monitoring of the lake, assessment of sockeye salmon spawning and rearing habitat, and in the last year, efforts to improve the spawning area by gravel placement and gravel cleaning. In a joint project with the Gitxsan Watershed Authorities, the Kispiox Hatchery is now being used for a conservation enhancement effort to improve the sta-



tus of Kitwanga Lake sockeye salmon by increasing the smolt output.

### ***Data gathering and analysis for resource planning***

The Gitxsan and Wet'suwet'en realized the importance of cartography for resource management in the 1970s. The pursuit of land claims required maps to explain the claim; one of the strong points of the court case was maps of the landscape full of Gitxsan and Wet'suwet'en named features and uses. Initially the maps were prepared by Marvin George, from Hagwilget. Under his leadership the Gitxsan and Wet'suwet'en became one of the earliest adopters of digital mapping and GIS in British Columbia in the late 1980s. Initially, GIS mapping made the numerous modifications of the chief's evolving territorial maps easy to produce. Spatial analysis was soon adopted as the key to the management of cultural resources, forests, fisheries, and mineral deposits. The Sustainable Watershed Assessment Team of the Gitxsan and Wet'suwet'en became one of the leading groups in promoting aboriginal resource management and traveled around Canada giving presentations. The GIS department now has two full-time technicians and produces professional quality maps. The mapping and database capacity is routinely used for recording escapement, mapping spawning beds, mapping environmental impacts, and culvert placement.

### ***Creating benefits for fishermen and communities***

From its founding, the SFC strove to expand aboriginal fisheries, to secure the right to fish for sustenance, and to redevelop aboriginal fish sales to provide economic opportunities for First Nations. Beginning in 1992, provisions were negotiated for inland fisheries as ESSR fisheries. High survival of

Lake Babine sockeye salmon in the Pacific Ocean created a series of large returns in the mid 1990s which led to concerns about mixed stock problems at high exploitation rates (over 70%). The large returns also made it easy to allocate part of the catch to more terminal fisheries. The SFC has insisted that ESSR fisheries employ only selective live-capture fishing gear such as dip nets, small beach seines, fish wheels, or fish traps. As fish are removed individually from the gear, nontarget species are released unharmed. So far the ESSR fisheries have only allowed sockeye salmon capture, but a small ESSR fishery occurred at Moricetown for pink salmon in 2004 and 2005. In the years of high harvest, equal or larger numbers of sockeye were taken by the Lake Babine Nation and small numbers by the Tsimshian villages of Kitselas and Kitsumkalum in comparison to the Gitxsan portion of the fishery (Figure 4).

Catching salmon in the Skeena River is far less capital intensive than fishing in competitive fisheries along the coast. It is also much simpler and cheaper to monitor and manage fishing in the river than along the coast. The salmon caught are weighed, iced, and shipped from a few landing stations which are community controlled. The low management costs means that most of the revenue from the ESSR fisheries has gone to the fishing crews, typically more than 80% of the commercial sale price. Part of the remainder, 10% under the terms of the agreement, must be used to pay for salmon stock management and stock assessment expenses. The ESSR fisheries have contributed from tens of thousands of dollars in 1992 to several million dollars in the large fisheries directly to the fishermen. Since participating in the ESSR fishery requires prolonged activity from several weeks to a month, those most likely to benefit from the activity are people in the villages without regular jobs.

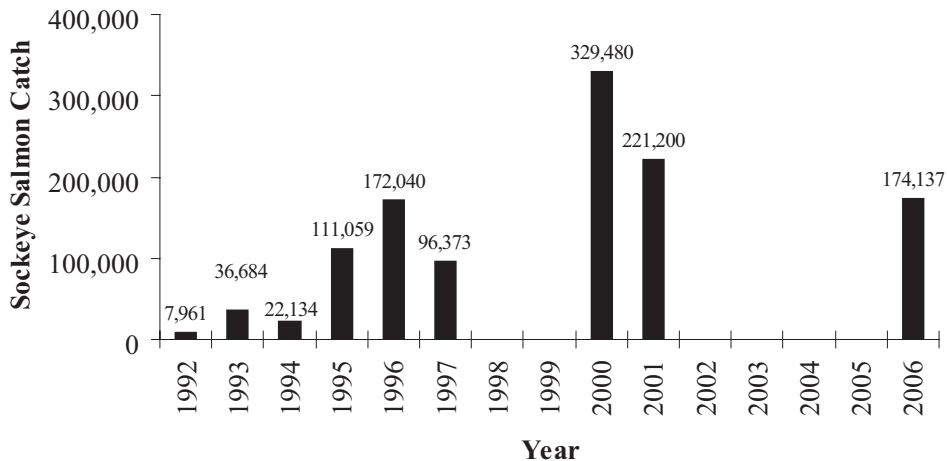


FIGURE 4. Gitxsan Excess to Salmon Spawning Requirements (ESSR) catches. The catch for 2006 is the total of an ESSR fishery at Gisgagaas (92,347) and a commercial demonstration fishery at Kitwanga (81,790).

Although the large proportion of the total catch value that accrues to the fisherman is a positive attribute, the irregularity of annual fisheries openings has prevented capital investment in the fishery and has not created a stable source of income. This is an inevitable feature of an ESSR fishery because upriver fisheries occur only in years of exceptionally large runs.

Starting in 2005, the SFC negotiated an arrangement in which some of the potential salmon catch of coastal gill netters and seine boats is leased and the “fishing rights” exercised in upriver fisheries. In 2005, the first agreement was made, but the sockeye salmon returns were too poor to permit fishing on the coast or upriver. The following year, 2006, was a year of higher sockeye salmon returns, and the first demonstration fishery was held in the Skeena River. The fishery was held simultaneously with a terminal ESSR fishery in the Babine River further upstream. This resulted in a catch of 84,000 fish in the demonstration fishery and 92,000 fish in the ESSR fishery. Together these fisheries caught approximately 8% of the sockeye salmon return.

The demonstration fishery brought in

over half a million dollars to the fishers and generated employment in the community; each group of fishers started their own small company, paid off their debts, and made some profit. The fishery took place near Kitwanga and employed only selective gear. This approach avoided bycatch of steelhead trout and chum salmon, which experienced poor returns, as well as coho. A system of fishery openings and closures was used to reduce pressure on wild sockeye stocks. This system appears to have been successful in largely avoiding the early-timed Nanika River run; however, it overlapped the late arrival of Kitwanga Lake sockeye salmon which was sampled at the nearby Kitwanga River fence. The fishing plan was changed with discussion between Gitanyow Fisheries Authority and Gitxsan Watershed Authorities, and a two day closure followed by a week-long closure was instituted to pass many of the Kitwanga River sockeye salmon.

### *Training and education*

The SFC attempts to fill many of the training needs in fisheries biology and man-

agement. Training in formal programs was discussed briefly earlier. In-service training needs require that training takes place at several technical levels to meet the needs of our management organizations and employees. We attempt to keep our training sessions local and focused on local problems. We can carry out much of the training using our internal expertise; alternately, we bring in experts to run workshops. Training at the most specialized level sometimes involves sending one or two employees to distant urban centers.

The SFC holds workshops for training technicians of member Nations' staffs in:

- map interpretation, Geographic Position System (GPS) data collection, and introduction to GIS;
- otolith collection and preservation;
- scale reading/age interpretation;
- and data logging.

Technical sessions for tribal biologists and advanced technicians have included:

- a series of sessions to discuss and review Behaviour and Ecology of Pacific Salmon and Trout (Quinn 2005);
- presentations of special topic lectures at Technical Committee meetings, for example, the dynamics of gravel movement in salmon spawning grounds;
- and workshops on Chinook salmon, the Core Stock Assessment process, and the Wild Salmon Policy.

Examples of specialized training include hydroacoustic surveys and analysis techniques and advanced GIS topics.

## **Discussion**

### ***Future prospects***

The SFC originated at a time when the

thrust of efforts was to demonstrate the right to fish. Substantial success has occurred in this effort. At this point, the SFC has become a credible partner with the DFO and at the technical level is involved in ongoing efforts to undertake complementary activities. In the long run, we envision becoming responsible for most if not all technical and management activities now being carried out by the provincial and federal governments.

Real co-management requires comparable levels of expertise and decision making power. For the technical aspects of fishery management, we try not to hire consultants but prefer to train our First Nations members and to hire and retain specialized expertise in the region. Once the technical capacity exists, the SFC can and does compete with consulting companies and government agencies for technical assignments.

The low human population density of the Skeena River watershed means that natural resource exploitation is, and will continue to be, a significant economic sector. The ongoing stream of resource development proposals from corporations such as mining companies, lumber and pulp mills, harbor development, and pipelines raises a series of policy challenges. These challenges could be dealt with in several ways: by taking contracts for environmental assessment, by collecting environmental data to resist the development proposals, or by permitting development with constraints designed to protect First Nations' interests. It is likely that the era of allowing proposals sponsored by developers and governments to proceed on their own is over, to be replaced by new processes acceptable to First Nations empowered by recent Canadian court decisions requiring consultation and accommodation.

At present, SFC funding derives from three sources: two sources are from federal programs (Aboriginal Fisheries Strategy and Aboriginal Aquatic Resources and Ocean Management), the third from research con-

tracts, especially with the Northern Fund of the Pacific Salmon Commission. In the recent past, significant funding came from DFO in support of stock assessment activities and community fisheries programs, from the provincial WRP, and from the provincial Forest Service. In the past decade, a sharp decline in fisheries expenditures has occurred by both levels of government. This situation likely will be exacerbated by ongoing challenges to the DFO such as a response to the LaRoque court decision, which bars using fish sales to offset management costs. At the regional and area management levels of the DFO, the expectation exists that some relief from the budgetary restrictions will come from transferring technical tasks to First Nations. The ability of First Nations to take on these responsibilities is limited mostly by their own small budgets. With the ongoing pattern of reduction in size of government, much more of the research and scientific work is contracted out to consultants. Intercepting these contracts provides a source of funding to technically capable First Nations and enables them to cover other unfunded management biology aspects.

### ***Shaping the research direction of the SFC***

Often the perception of the priorities for fisheries projects that can be carried out differs among the provincial and federal governments and the SFC. Differences in decisions about the type of information to be collected, the area where the activity takes place, and the type of research to be conducted arise frequently. In part, these differences are due to differing geographic perspectives. The DFO managers tend to address coast-wide issues and spend much of their time dealing with the coastal commercial fishing industry. First Nations concerns tend to be more local and focused on conservation. Often this involves conservation of smaller units than the DFO has the political

will, capacity, and funding to address. This situation is especially true for many chiefs whose territory includes salmon spawning grounds for stocks that are not large enough to noticeably contribute to coastal catches, but which formerly supported small upriver settlements. Differences with the DFO are discussed in Technical Committee meetings, and in meetings between the Commissioners and area and regional managers. Often these disagreements are resolved in favor of DFO since they control of most of the funding.

In the past few years, minor conflicts have occurred with outside nongovernment conservation groups and academics. These groups tend to represent an urban world view that is insensitive to aboriginal interests. A central part of this view is the assumption by some representatives that they hold a superior understanding of what kinds of conservation activities are needed, a position that makes dialog difficult. In northern British Columbia, a considerable scope for improvement of relationships exists between environmental NGOs and Native groups, including the potential for strong long-term cooperation.

### ***Key elements for success***

What factors have contributed to the SFC and its member Nations' successful expansion into fisheries management, and allowed the SFC to develop an effective voice and considerable political influence on federal fisheries policy in British Columbia?

The commitment to protect salmon is a cultural imperative originating in traditional law and an important incentive for involvement in fisheries management. The importance of salmon is universally appreciated in First Nations communities, and this extends to support for fish habitat protection, efforts to enumerate fish, and for restrictions on harvesting weak stocks.

A key aspect of SFC capacity development was that the impetus for training and the development of management capacity came from within the aboriginal community. The understanding of the chiefs and those they selected for training was that fishery management was a critical aspect of the political development of the community. Some of the trainees who started in 1984 gave up well paying jobs to take on the project for their community. The concern and support of the community was clearly communicated to the students during training by one chief, who said, "We'll be watching you."

Leadership in fisheries management was available within SFC member communities, and the potential success of the organization was increased by the presence of key individuals who were technically trained and who assumed leadership roles, such as Neil J. Sterritt, the early Gitxsan and Carrier (now Wet'suwet'en) Tribal Council leader, and Marvin George, a trained forest cartographer. Continuity is important for effecting political change. The success of the SFC and its member nations is in part due to fifteen years of the same people managing the fisheries with a continuity of program and direction.

Increased aboriginal participation in fisheries management emerged within the political context of the 1970s and 1980s, during the push by aboriginal people across North America for autonomy, including control over natural resources. The Sparrow Case in 1990 affirmed communal rights to fish and emphasized the development of co-management models. In the Skeena River region, this push congealed around the partially successful land claims efforts heard in the Delgamuukw case. Other decisions including the Calder<sup>5</sup> case in 1973, which led to the Nisga'a treaty negotiations, the local Gitxsan fisheries cases of 1978 to 1980, and the series of Supreme Court decisions after the Sparrow and Delgamuukw de-

cisions, combined to increase the federal and provincial governments' political will to negotiate and accommodate Native aspirations.

During the Delgamuukw case, the use of outside expertise became familiar to the community and eased the acceptance of outside scientific experts. SFC Nations were thus able to strengthen their proposed policies with scientific studies. For example, Morrell (1985, 1989) contributed to increased awareness and emphasis on "weak-stock management" which has ultimately led to the Wild Salmon Policy. SFC Nations have pushed for a return to more terminal and selective fisheries that would allow for finer tuning of harvest rates and for additional fisheries benefits upriver. These policies were articulated long before the DFO acknowledged conservation problems associated with mixed stock fisheries (Morrell 1985; Wood 2001).

Early on, Skeena First Nations recognized the need for Skeena River-wide management and cooperation between neighboring First Nations, between First Nations and provincial and federal governments, and in a larger realm with broader based organizations such as the Skeena River Watershed Committee (Pinkerton 2009) and panels of the Pacific Salmon Commission.

The convergence of these factors led to the provision of funding from the Federal Government for fishery management efforts as part of fisheries agreements and for technical training of fisheries managers and enforcement staff. The federal HRSEP and the provincial WRP made abundant funding available during the 1990s for simple labor intensive community based programs. Concurrently, funding from the Aboriginal Fisheries Strategy permitted SFC Nations to test various selective methods of capture. SFC Nations also gained legitimacy by choosing to conduct commercial fisheries entirely with selective gear, permitting species which require additional protection to continue their migration unharmed.

<sup>5</sup>*Calder v. The Attorney-General of British Columbia* (1973).



### *Is the SFC a model for other First Nations?*

The political success of the SFC is largely dependent on the Canadian and B.C. political milieux and might not be easily transplanted to other jurisdictions. The legal support for aboriginal fisheries is ultimately based on the guarantee of preservation of “existing aboriginal and treaty rights” in the Section 35 of the Constitution Act of 1982 and the uncertainty surrounding the lack of negotiated treaties with most aboriginal groups in B.C. This creates the possibility that litigation may expand aboriginal fishing rights and provides the governments with incentive to investigate co-management.

Extending the SFC experience to other First Nations groups may be difficult even within Canada. A reduction of government funding for relatively simple field tasks such as salmon spawner enumeration, performing herring spawn and Dungeness crab surveys on the coast, and assessing logging damage to streams, makes it difficult for First Nations groups to finance the development of technical expertise and to assume management of their fisheries resources. This situation is unfortunate for Native communities and conservation of the resources. Research funding through the Pacific Salmon Treaty is currently the most significant source of new money. Successful projects under this program require sophisticated scientific input and direction, which is out of reach of most village-based groups. To some extent, funding for technical training and resource data collection is available through the ongoing British Columbia land claims treaty process in the form of Treaty Related Measures. These funds may assist other First Nations in creating or strengthening their natural resource management programs.

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