# The American Indian Quarterly

VOLUME 31, NUMBER 3, SUMMER 2007

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Published by The University of Nebraska Press

# Returning to Selective Fishing through Indigenous Fisheries Knowledge

*The Example of K'moda, Gitxaała Territory*

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The historical abundance of salmon along the west coast of North America has been significantly reduced during the last two centuries of industrial harvest. Commercial fisheries from California to Alaska and points in between have faced clearly documented restrictions on fishing effort and collapse of specific salmon runs.[1] Even while salmon runs on some large river systems remain (i.e., the Fraser and Skeena rivers), many smaller runs have all but disappeared. The life histories of many twentieth-century fisheries have been depressingly similar: initial coexistence with indigenous fisheries; emergence of large-scale industrial expansion followed by resource collapse; introduction of limited restrictions on fishing effort, which become increasingly severe, making it hard for fishing communities to survive and to reproduce themselves. Yet for nearly two millennia prior to the industrial extraction of salmon, indigenous peoples maintained active harvests of salmon, which are estimated to have been at or near median industrial harvests during the twentieth century.[2]

Part of the explanation for salmon stock collapses in the twentieth century resides in the different methodologies used by the indigenous and industrial fisheries. As Joseph E. Taylor comments, "aboriginal and industrial harvests appear statistically similar, but the fishery had changed radically. Indians had harvested various runs and species from March to November, but Euro-American consumers preferred the deep orange meat of chinook [spring] and sockeye. Canners quickly learned to concentrate on the runs of favored species between April and July."[3] While our research substantiates Taylor's contention that "what distinguished the two fisheries was their raison d'être," our results directly contradict

his unsubstantiated claim that "aboriginal fishers harvested for local use, and technology, demography, and culture combined to moderate catches."[4] In fact fish and fish products harvested in one area were often traded for benefit across great distances.[5] In addition, as we will argue, indigenous fishing technologies were highly effective and afforded the capacity for harvesting vast quantities of fish. Furthermore, our research reveals that these technologies were regulated by traditional structures of resource management that controlled harvest pressure, and these controls were combined with active habitat management and enhancement. At the same time, salmon and other fish and food products were traded across large distances for economic benefit, albeit within a noncapitalist economy.

At the beginning of the twenty-first century, the Canadian government is turning toward more active intervention in the regulation of salmon harvests. In light of growing concerns regarding certain species of salmon (particularly coho) and an emphasis on managing to the weakest run in mixed-stock fisheries, attention is returning to types of fishing gear that were able to harvest fish in the millions without apparent ecological damage.[6] Starting in the late 1990s, Canada's federal Department of Fisheries and Oceans began to explore the use of selective fishing gear—such as beach seines, floating and mobile fish traps, and fish wheels—to improve the salmon fleet's ability to avoid nontarget species. While similar in some ways to indigenous technologies, few of these projects have attempted to employ traditional First Nations gear and technology in any meaningful sense.[7]

In this paper we argue that a reintroduction of ecologically appropriate traditional fishing gear is one path toward truly sustainable fisheries. We emphasize how these technologies are associated with particular forms of resource management that limit and disperse harvest pressure. This is accomplished by documenting the linkage between traditional fishing gear, local ecological knowledge, and contemporary conservation potentials.[8] In developing this argument, we draw upon research conducted in collaboration with fishers and elders from the Gitxaała First Nation and in particular their concept of *syt güülm goot*: "being of one heart." This concept underpins Gitxaała approaches to resources and how they should be used and shared. It is premised upon a community-based conception of resource use in which people and nonhumans share important reciprocal relationships of trust, respect, and—when

things go wrong—retribution.[9] (We will return to this concept in our discussion of community-based use and conservation principles.) In what follows, we first outline the ethnographic context within which this research was conducted. The balance of the paper then describes the case study of customary fishing at K'modamowdah and the implications of traditional technology and ecological knowledge for contemporary resource management.

## GITXAAŁA AND THE TS'MSYEEN PEOPLES

The Ts'msyeen peoples consist of seven contemporary villages spread along the northern coast of British Columbia and inland nearly 150 kilometers along the Skeena River (Lax Kw'alaams, Metlakatla, Gitxaała, Gitga'at, Kitasoo, Kitsumkalum, and Kitselas). Some Ts'msyeen people, descendants of the followers of the Christian missionary William Duncan, live in the community of New Metlakatla just across the U.S.-Canada border between Alaska and British Columbia. These contemporary communities share a common language and history. Long before Europeans and other newcomers arrived in this land, the Ts'msyeen, their ancestors, and their neighbors were part of a thriving world system that extended from the Aleutians south to California and beyond.

The territory of the Gitxaała people extends across a coastal archipelago that reaches from Porcher Island on the north, south to Princess Royal Island. From this vast territory, Gitxaała people harvest varied and rich resources such as, but not limited to, seaweed, shellfish, marine mammals, fish, fowl, wild game, and a multitude of forest foods and materials.

The regulation of natural resources was and still is, to the extent possible in the colonial context, governed in accordance with Ts'msyeen social organization. While the intent of this paper is not to explore or explicate in great detail the complex social structure of Ts'msyeen societies, it is important that the reader understand the basic system of organization in order to appreciate the ecological and management potential inherent in customary Ts'msyeen fishing gear and technologies.

Ts'msyeen society is organized in a number of ways: clan affiliation, social class, house-group membership, and village residence. Each individual (with the exception, in the past, of slaves) belongs to one of four clans: *ganhada* (raven), *gispuwada* (blackfish), *lasgeek* (eagle), or *laxgibu*

(wolf). Clans do not exercise any specific political authority; that rests with a *sm'oogyit* and the house-group. Clan affiliation, reckoned matrilineally, does inform who can marry whom and, consequently, determines alliances between members of specific house-groups.

Historically, three or four social classes can be identified: high-ranking titleholders and other titleholders; freeborn commoners without rights to hereditary names; and slaves, those born to slaves, and people captured during wars. Members of the titleholding classes formed the hereditary leadership of Ts'msyeen communities. They are the *sm'gyigyet* (singular *sm'oogyit*, meaning "real people"), or chiefs, who hold specific rights and responsibility with respect to other community members. The origins of a *sm'oogyit*'s right to governance can be found in the *adaawk* (the "sacred tellings," or history) and is often linked to an event in which an ancestor received a gift or privilege from the spirit world, through political conquest, or through an alliance with another community.

Ownership of, access to, and rights of use of resource-gathering locations were and are governed by multigenerational matrilineages called *walp*, or houses. Notwithstanding the prominence of a paramount *sm'oogyit* at the village level, the effective source of political power and authority with respect to the territories lie with the house leaders. Membership in a particular house-group is determined matrilineally, by one's mother's position. This social unit is the effective political building block of the Gitxaała and other Ts'msyeen villages. Each house owns and has responsibility for a patchwork quilt of resource-gathering and social-use areas. Taken in combination, the house territories form the backbone of each village's collective territory. Contiguous house territories, situated around natural ecosystem units such as watersheds, combine to form each village's collective territories.

Villages consist of groups of related and allied house-groups who traditionally wintered together at a common site. While there have been some changes following the arrival of Europeans (for example, Lax Kw'alaams consists of the members of formerly nine separate winter villages clustered in the Prince Rupert Harbor and Metlakatla Pass area), the village of Gitxaała has been continuously inhabited for more than nine millennia. Within the village there is a paramount *sm'ooygit* who is the house leader of the most powerful house-group in the dominant clan. While this person has traditionally wielded much power and economic wealth within the village, it is important to point out that his authority resides in the power and prestige of his house-group.

Ts'msyeen people continue to rely extensively upon their ability to fish, hunt, and gather food and other resources from their territories. As recently as the 1960s, the customary annual cycle of resource harvesting involved long periods away from the central villages, during which time entire extended families moved between a variety of resource-gathering sites. With the incorporation of contemporary fishing and hunting gear plus motorized boats and vehicles into the resource-gathering cycle, Ts'msyeen people tend to spend shorter periods of time at their resource-gathering sites. Nonetheless, people continue to harvest and process specialized foods, such as *oolichan* (an important fish used for oil), seaweed, sea mammals, halibut, salmon, and mountain goats, at customary resource-gathering locations. While there have been changes in the ways in which Ts'msyeen people live on and from their land because of the influx and interferences of K'amksiwah, they continue to maintain a strong attachment and reliance upon using their territories.[10]

## ENGAGEMENT IN THE INDUSTRIAL SALMON FISHERY

Social change came rapidly during the 1800s and early 1900s in Ts'msyeen territories. Following the initial forays of merchant traders and waves of disease came industrial resource extraction industries. Part of the powerful fact of Ts'msyeen and Gitxaała society is that despite all of the adversity, these nations have continued through to today with a sense of self and history intact. While nonindigenous newcomers are at times preoccupied with the identification of "authentic Indian" culture and practices, it is important to remind ourselves that all societies change over time, but that does not render their sense of self, history, or values as inauthentic. Gitxaała have been fishers for several millennia, and while the most recent century has ushered in a period of significant change, it has not erased the fact that Gitxaała remain today a nation of fishers with a strong set of social values and practices that are rooted in their *adaawk* (history) and *ayaawk* (laws).

The first north coast salmon cannery was built on the Skeena River in 1876. During the next eight decades, almost forty cannery sites were developed and later abandoned on the north coast of the mainland.[11] While Ts'msyeen and other First Nations people provided the bulk of the labor and fish for these canneries during the early era of the industry, they were steadily displaced and replaced as producers and workers.[12]

The northern canning industry was quite literally built upon the traditional fisheries of the Ts'msyeen. Some canneries were located at Ts'msyeen shore stations and village sites, which disrupted traditional patterns of harvesting.[13] During the late nineteenth century, the canneries relied on supplies of fish both from their fleet of gillnetters and from the traditional fish camps of the Ts'msyeen chiefs.

The Ts'msyeen had developed an efficient yet sustainable method of harvesting salmon as the fish returned to their creeks to spawn. Tidal traps built around the mouth of creeks caught them at low tide in stone-walled pools. The fish were smoked and dried and later traded throughout large commercial networks that extended far beyond the immediate networks of house-group or village.

The stone traps were eventually replaced with drag seine nets. A large net was set from a boat and winched into the beach. The drag seine camps employed extended kin to harvest and process various species of salmon. With the establishment of the canneries, the hereditary chiefs, who organized production, integrated the sale of salmon to the canneries into their established patterns of trade, sale, and community consumption.

Ts'msyeen drag seine camps operated until 1964, when they were officially shut down by the Department of Fisheries for "conservation" reasons. However, long before this point, the ownership of these sites and associated fishing rights had been subtly undermined by industrial interests. The canneries obtained official ownership of the drag seine sites by the early years of the twentieth century, even while customary control and ownership continued to be recognized and practiced within the Ts'msyeen world. It became departmental policy not to grant seine licenses to Indians, and this persisted until the 1920s.[14] The canneries continued to recognize chiefly authority over these operations, however, if only to ensure a reliable supply of fish and labor power. The camps were a key site of the integration of the traditional economy with the capitalist economy and of chiefly power with industrial interests.

While many chiefs and their families spent part of the fishing season at their drag seine camps, the majority of village members began to move to the canneries for fishing and processing employment. The canneries used "village bosses" to recruit fishermen and processing workers. Sometimes whole villages moved to one particular cannery. Elders today recall that the Ts'msyeen villages were empty in the summer, with only one elderly man left behind as caretaker.

First Nations cannery fishermen were not independent primary producers but rather dependent producers.[15] Until 1927 their licenses were issued through the cannery, and even after the shift to free entry, most Native fishermen continued to be "attached" to the canneries.[16] They used cannery boats and nets and often relied on cannery credit throughout the winter. First Nations fishermen continued to receive a daily wage after independent fishermen had moved to a piece rate (price per fish) system.[17] This served to keep them working for the entire length of the season. The desirability of First Nations fishermen's labor was linked to the need for their detailed local knowledge of fish and how to catch them and also to the canners' need of the female labor that accompanied the men to the canneries.

The canneries were also a site for the reproduction of the traditional economy. The canneries became the summertime centers of indigenous commerce. Families brought their surplus foodstuffs to the canneries to trade and sell. The industry drew from both coastal and interior villages and thus provided the opportunity to trade for the particular food specialties of each community. Gitxaała women traded dried herring eggs, abalone, clams, cockles, and seaweed for moose meat and berries with Gitsxan women and for oolichan products with the Nisga'a.

The canneries provided a nexus for indigenous trade and created avenues to maintain and develop indigenous networks in the emerging industrial economy. However, industrial development on the north coast also worked to disrupt and inhibit the First Nations economic system. The reserve system and natural resource regulations worked in combination to expropriate First Nations land and resources and to create a dependent labor force for the developing industries. Later policy worked to exclude First Nations people from the workforce and to replace them with white workers and resource producers.

The integrated system of resource use—combining the commercial and subsistence harvest of various resources on their traditional territories that had worked for several generations of Ts'msyeen people—became increasingly incompatible with the pattern of industrial development on the north coast in the later decades of the twentieth century. In 1964 the Department of Fisheries prohibited the use of drag seines in the salmon fishery. The fishing camps that had provided opportunity for commercial fishing and the harvesting and processing of an array of traditional foods became unviable. Without the cash income provided

by the drag seine, many Ts'msyeen families could no longer afford to move to the camps for the summer, and they took cannery work, when it was still available.

In 1968 the Davis Plan, named after the minister of fisheries at the time, restructured the commercial fishing industry in British Columbia. License limitation was introduced, which increased the value of salmon licenses and resulted in heavy capitalization of the fleet. The policy shift also prompted the rapid centralization of salmon processing. Women lost their jobs, men lost their boats, and families lost their source of credit.

First Nations fishermen were forced out of the industry at higher rates than were nonindigenous fishermen. Government programs to support First Nations fishermen during the 1970s failed to counteract the losses. Their participation dropped to 29 percent by the early 1990s.[18] Communities like Gitxaała, which had enjoyed 100 percent employment (although seasonal) until the 1960s, found themselves without jobs for the first time.

The fishing industry underwent further restructuring in the late 1990s. License buybacks were initiated to reduce the fleet capacity. First Nations fishermen who had persisted in the industry were vulnerable, and many were forced to sell their licenses because of their debt load. Communities like Gitxaała lost up to 14 percent of their employment during this latest policy shift. Through all of these transitions and transformations, our research would suggest that the core values, approaches, and intellectual frameworks that have guided Gitxaała practices and interactions with the social world of beings have remained, as Jay Miller has so aptly noted, "a light through the ages."[19]

## STONE TRAPS AND ECOLOGICALLY APPROPRIATE GEAR

As briefly mentioned, the customary fishing methods of Northwest Coast First Nations comprise a highly varied and refined assemblage of technologies, reflecting millennia of development and innovations. These fishing technologies and gear were designed with the micro-ecological factors such as tides, eddies, and other water features; seasonal aspects; and the behavior of target species in mind. The method and gear used at a particular site was selected according to multiple factors to improve efficiency without destroying fish stocks for future use. These

highly specialized technologies allowed for sustained yields of salmon, providing adequate food supplies for many indigenous nations for thousands of years.[20]

Traditional fishing gear included gaffs, clubs, traps, weirs, trolling hooks, drag seines, gill nets, tidal traps, spears, dip nets, hooks on lines, and fish rakes.[21] Each of these items were associated with particular fishing sites, species, and seasons. The following case study explores the interconnection between locally appropriate gear types, indigenous knowledge, and their conservation potential.

## FISHING AT K'MODA: CASE STUDY

K'moda is a river and lake system at the head of Lowe Inlet within Gitxaała territory. Over the course of the past century and a half, this place has been at the center of significant social transformations.

In the late 1880s one the earliest salmon canneries in British Columbia was established here. Drawing upon local Gitga'at and Gitxaała community members, the cannery operated for more than several decades spanning the late 1800s and early 1900s. Coastal steamers made regular stops in this coastal way stop along the Inside Passage route from Vancouver to Alaska. The Harriman Expedition, notable for the number of indigenous objects it removed without permission and donated to U.S. museums, passed through here on its way north to Alaska in 1899. Photographer Edward Curtis took a few pictures of the area while other scientists onboard collected plant samples. The 1881 census-taker had previously passed through this site. In his personal journal, he recorded his trials and tribulations while attempting to gather census data during his visit to the Gitxaała houses at the mouth of the K'moda.

Records of customary use and commercial trade by Ts'msyeen *sm'gyigyet* are captured in the Canadian *Sessional Papers*.[22] One early reference dated 1890 notes that "the chief at Lowe's Inlet, assisted by his sons, caught and sold to two canneries on the Skeena River forty thousand fish, at an average of seven and eight cents each."[23] Though the Indian Agent who made this report identifies the fishers as a father and sons, knowing what we know today we can be fairly certain that this was Sm'oogyit Tsibassa, also known as H'el, his nephews, one or more of his brothers, and his own sons all accompanied by wives, daughters, and children. The 1881 census-taker notes several houses at this location.

All in all we can be fairly certain that at least forty to fifty people were involved in the harvesting of these 40,000 fish sold over the course of one entire fishing season to the aforementioned canneries. If one takes the low figure, we can assume a "commercial" catch of 1,000 salmon per person over a period of about eight weeks—that's about 125 fish per person per week. Not really a lot of fish given the productive capacity of the river and lake system being fished nor the evidence of harvest recorded in the adaawk that reference K'moda. While one cannot claim as true, one can strongly suggest that this was a surplus volume of fish that the *sm'oogyit* was confident could be sold without harm to the future of the run.[24] Oral accounts describe the close interconnection between the customary use of the area and the development of a local—Gitxaała and Gitga'at—labor force that caught and processed salmon in the Lowe Inlet cannery. The central role of this customary site is further emphasized in the records of the *k'msiwah* in that the meetings that established reserves for Gitxaała were held at this location. For generations this site has been the house territory of the leading *sm'oogyit* from Gitxaała, Tsibassa and H'el.

The late Sm'oogyit H'el (Russell Gamble) explained that during the mid-period of the twentieth century, K'moda was occupied by the chief and house-group from late spring through early fall. Resources gathered included, but were not limited to, mountain goats, deer, a range of different berries, bark, clams and cockles, seals, and, of course, salmon and other fish. Elders who were young children during the early twentieth century recall the life of the campsite during the leadership of Sm'oogyit H'el (Edward Gamble), nephew and heir of Tsibassa. Edward Gamble was the named hereditary chief who held this site in the decades prior to his heir, Russell Gamble.

Over the course of the twentieth century, the fishing patterns at K'moda moved from customary harvesting for consumption and trade (up to about 1880), to a period of intense industrial harvesting co-existing with customary harvesting (1880–1930), to locally controlled drag seining (1930–1967), and finally, to less intensive occasional customary harvest using gillnets (1967 to present). In what follows, the key aspects of the customary techniques of fish harvesting will be described. The data we draw upon comes from site visits to K'moda with Sm'oogyit H'el and interviews with Gitxaała elders and community members who actively use or used this place for the harvest of fish and other resources.

Three key customary fishing techniques have been deployed at K'moda: gaffs, stone tidal traps, and drag seines. Up until the late 1800s, fishing

by gaffs and with the stone trap was the key technique for harvesting salmon. Coincident with the development of the industrial salmon canning fishery, Gitxaała fishers switched to drag seining. This innovation accommodated the reduction in labor force caused by the waves of disease and dislocation brought by invasive nonindigenous humans. Each of the three methods of fishing are described here.

*Method 1. Gaff Fishing*

The creek mouth at K'moda enters the inlet over a short waterfall. During the highest point of the tidal cycle, the falls are almost level with the ocean surface. However, for the bulk of the time the falls range from a few feet to more than thirty feet in height over the ocean level. Fish entering the creek mouth do so primarily on the flooding tide.

Fishing by use of gaff is a one-fish-at-a-time process.[25] The fisher uses a pole with a hook attached at the end, which he lowers into the water. The pole is moved around and fish are located by "feel." When a fish is in position, the fisher executes a sudden motion, engaging the gaff hook in the fish, and then deftly pulls the fish ashore. Fishing in this manner, by an experienced gaff fisher, allows for the targeting of individual fish. This technique is suited to harvesting large salmon, such as coho and spring, that enter the spawning stream in lower numbers than the pink, sockeye, or dog salmon. At K'moda, gaff fishing took place earlier in the season than did either stone trap fishing or drag seine fishing.

Oral accounts describe water currents, uplifts, and small eddies that advancing salmon were able to use to move over the falls. At some point in the twentieth century, the Department of Fisheries and Oceans decided that the falls were an impediment to the spawning salmon. DFO officials blasted out the rock in the falls and installed a fish ladder. By all accounts this re-engineering of the watercourse adversely affected the ability of salmon to enter the creek mouth and reduced the efficacy of the traditional fish gaffing sites used for catching coho salmon.

*Method 2. Stone Trap Fishing*

Stone traps can be found throughout the Northwest Coast region.[26] Traps were typically located near streams and rivers where migrating salmon traveled as they returned to spawn in the fall. Traps consist of a series of stones arranged in a semicircular design. Boulders and stones

were stacked upon each other. No mortar was used to hold the stones together; instead, careful selection and placement of the stones was required. In this way the wall of stones would remain upright in rough weather and throughout vigorous tidal action. Stone traps were used by house-groups, relying on collaborative labor under the guidance of the house leader.

Stone fishing traps use the principle of "tidal drift" to catch fish. Salmon gather at the mouth of their birth river or stream in preparation to spawn. When the water is deep enough the salmon enter the river system and swim upstream. As the tide comes in the salmon are pushed toward the shore and the waiting trap. When the tide recedes the salmon move downstream, away from the shore. As the fish swim away from the shore with the current they become trapped by the wall of stones. Fishers would position themselves along the wall as the tide dropped and splash the water to keep the fish from swimming out before the water was lower than the wall.

The K'moda stone trap is located in a small cove near but not in or across the opening of the creek. Its design, like all stone fishing traps, uses tidal drift to capture fish. Elders report that the numbers of salmon returning to spawn in creeks and streams prior to the mid-twentieth-century expansion of the salmon cannery fishery were so vast that a trap located at a beach anywhere close to a stream would provide a rich harvest: "The salmon would go up the stream packed together so tight you'd swear there wasn't room for one more fish."[27]

Trap placement, however, typically takes advantage of the micro movements of local currents—this technology is not simply placed near or in a creek mouth. At K'moda, the trap is located to the north of the creek's actual mouth. During our observations of tidal patterns, we noted that at about three-quarter ebb a back eddy formed, which would have acted as a great broom, sweeping any fish that were around into the belly of the trap. Then, as the tide receded, the current would have dropped the fish behind the trap's wall, allowing the fishers to select those fish that were required for processing that day.

*Method 3. Drag Seining*

For most of the twentieth century the preferred fishing technique at K'moda has been drag seining. Drag seines are set from the deck of a

fishing skiff out from the beach and around the target school of fish. At K'moda two fishing sites were preferred: one at the site of the stone trap and the other from a large smooth rock near the tidal falls at the mouth of the creek. From the stone trap site a large human-powered windlass was used to winch the net onto the beach. Hand power alone was used when fishing from the rock in the creek mouth. From both locations the seine was set from a fishing skiff twenty to twenty-five feet in length, powered by human hands.

Drag seine camps, located at salmon streams throughout the territories, were the focus of Gitxaała resource-use activity during the first seven decades of the twentieth century. More than a dozen major camps were operating in the middle of the century. Elder Sampson Collinson remembers:

> There were four drag seines on the west coast of Banks. Three inside on Principe, two across from there at Curtis Inlet, Patterson Bay. One at Union Pass, one to the west of there and one at K'moda. There were four to five people on each boat drag seining—ten adults at each camp, and all the children. The women fished too.[28]

These camps were typically located on the sites of traditional stone fish traps. Some camps accessed several different streams and several species of salmon. The sites were owned by house-groups and managed by a house leader who was responsible for maintaining the territory and organizing harvesting activities. Clarence Innes says:

> At the drag seine camps they cleaned their streams. They walked the streams and anything harmful they cleaned it up before the season. The chief used to go and look at his territory from time to time. They used to do a ceremonial cleansing too. They always let fish go up the river. They just took what they needed. The leader started the discussion among the tribe, got advice from the people about how many fish to take. If they saw a species was in trouble, they wouldn't make it extinct. They were responsible.[29]

In addition to harvesting salmon for commercial sale and community use, the camps were a base for other subsistence activity. While the men fished, women engaged in a number of activities, including seaweed and berry picking and fish processing. Men traveled extensively from the camps, primarily on the weekends, to hunt and gather other resources,

such as seal, sea lion, and halibut. The lakes and mountains at the top of the streams were popular hunting locations for deer, porcupine, beaver, and mountain goat.

The department of fisheries closed drag seining in 1964, citing conservation concerns. This closure, however, is considered by Gitxaała members as part of the long history of their dispossession from the fishing industry and the denial of their aboriginal rights. The removal of the commercial drag seine component of fishing camp activity led people to fish at other sites using the purse seines or gillnets within the mainstream industrial fishery. The successful combination of commercial and subsistence harvesting that the drag seine camps allowed was no longer possible because of externally imposed government regulation. The result was a reduction in the Gitxaała people's ability to maintain harvesting at all of their customary sites as they had previously done.

## CONSERVATION POTENTIAL

All three of these fishing techniques relied upon similar principles of regulating who could fish, when they could fish, and how much fish they could take. Although the introduction of drag seine gear is more recent than the stone trap or gaff fishing at K'moda, it does have historical antecedents within Ts'msyeen fishing techniques. Nets of various sorts, including encircling seine-type nets, have been used for millennia by Ts'msyeen fishers. The key point in gear selection has been based upon the particular ecological conditions at a site and the social dynamics of the community actively engaged in fishing the site. It should be pointed out that a variety of gear is employed not only across different sites but even at the same site. Thus, during particular points of the year, spear and gaff fishing techniques are deployed to harvest salmon.

A critical aspect of these three Gitxaała fishing techniques is the ability to avoid, or to release unharmed, nontarget species. One of the problems encountered in the contemporary industrial fishery is the mixed-stock nature of the coastal salmon fisheries. The fleet encounters a mass of fish that may include several species, spawners from a variety of creeks within the same species, and juveniles. The industrial operators have found it difficult to release nontarget species without stress or damage. When it was discovered in 1997 that coho stocks in the Fraser and Skeena river systems had drastically declined, the salmon fleet was required to release

coho live at specific times and in particular areas.[30] The stress placed on the fish during harvest required that they be individually resuscitated in "revival boxes" of fresh flowing seawater before release. Selectivity, both for species and for particular spawning runs, continues to be an issue for commercial salmon harvesters. The priority of weak-stock management to preserve biodiversity obligates the DFO to manage according to the weakest run of spawners in a system. If harvesters cannot identify and avoid salmon from a particular creek that has been identified as weak, then an entire fishery can be reduced or closed.

The technology of gaffing is both species and run selective. As harvesting occurs at the mouth of a particular creek, the harvester knows exactly which spawning population is being targeted. As fish are individually harvested at close range, the fisher can target a particular species (spring salmon rather than coho, for example) or small fish.

Similarly, stone traps are located at the mouth of creeks. As documented in the method discussion, harvesting was regulated based on the house leaders' observation of spawner abundance, and a specific ratio of harvest was maintained to prevent overly pressuring one run of fish. The trap functions to corral the fish into a small pond of water, and they are then removed by harvesters. The fishers can select by species and age at this point and leave the nontarget or juvenile fish to escape the trap as the tide increases. The drag seine, being very close in function to the stone trap is selective on the same basis.

Ts'msyeen technologies are also supported in their conservation potential by the social relations that guide and control their use. Whereas the industrial techniques of fish harvesting have relied upon gillnets, purse seines, and trollers and a driving force of catching efficiency, customary Ts'msyeen fishing techniques have been regulated by community-based use and harvesting principles that de-emphasize accumulation for accumulation's sake.

## COMMUNITY-BASED USE AND GITXAAŁA CONSERVATION PRINCIPLES

The integrated and community-based nature of Gitxaała resource use structures a balance between community needs and ecosystem health. Gitxaała people have been taught by their elders to take only what they need and not overexploit the natural resources. "Take what you need"

was in fact the standard response in reply to questions about how to use the resources sustainably.[31] Merle Bolton says, "The only way they taught you things like that—was take what you need. Get no more than that. If you get more, give it to your neighbour who doesn't have it. We never stockpiled anything."[32]

Need-based resource use—harvesting the minimum required for food, trade, and sale for a reasonable livelihood—has allowed the Gitxaała people to sustain themselves in their territory for millennia. Community members do not approach a harvesting activity without first estimating their required amount of that particular resource. They do not harvest everything that is available at a particular moment but fulfill their minimum needs. Clarence Innes describes fishing for salmon for his household, for family, and for those without the means to fish for themselves: "We have numbers in our heads of what we can handle—there's no waste."[33]

Similarly, Colin Nelson emphasizes the self-regulation involved in need-based harvesting and the importance of these limits:

> Before I leave, I find out who I want to help, who I want to give to. That tells me how much I need. . . . You just feel it. You know when you have enough. You don't shoot animals you have no use for. If you're going to treat Nature like that she can come back on you twice as hard.[34]

Goal-oriented harvesting, rather than "stockpiling," or hoarding for individual benefit, results in small-scale harvesting spread over the course of the year.[35] Combined with the seasonal harvesting of specific resources, this results in a comprehensive system of controlled, conservative resource use. Furthermore, integrated, community-based resource use ensures widespread provisioning without excessive pressure on any species.

Marvin (Teddy) Gamble describes how his grandfather, Sm'oogyit H'el (Edward Gamble), would walk along the spawning bed above his customary fishing site to make sure there were enough fish for escapement before he would allow fishing to take place. Teddy Gamble also explains how another customary leader would control fishing effort at another site:

> They would put a gate across the creek mouth. When the school of fish reached a certain level—they could tell by the darkness of the

school in the water—they would open the gate to let the fish up to spawn. Then they would fish the drag seine [outside the gate].[36]

Today those with the means to fish and harvest other resources provide family members and other community members with food. Those who regularly harvest traditional foods share with a network of up to a dozen other households. These contemporary distribution networks parallel the community distribution that occurred early in the century when all Gitxaała families were engaged in subsistence harvesting.

During the first half of the twentieth century when most families harvested the bulk of their food themselves, there was a structured distribution that allowed for a more balanced diet. Harvesting was thus community-based, with families and houses harvesting particular resources to distribute throughout the village. An elder describes this community-wide system: Violet Skog says, "People were *syt güülm goot* [of one heart]. They helped each other, they shared everything."

A house-group would not take their entire supply of a particular resource, such as fish from one single source or run, but rather would harvest smaller amounts from a variety of sources. With respect to salmon, older people point out that there are only particular runs that would be (are) used for smoking or drying salmon. Thus, families caught specific runs of fish for different processing methods. This is a form of conservation in which a house takes a select amount of fish from a series of runs rather than all of their needs from only one run of salmon.

There is also a larger aspect of this harvesting approach, which involves community distribution: Ken Innes says, "Certain fish camps caught certain fish—some pinks, some dogs, etc. Back in the village they would barter with each other so their diet was balanced. So they just took so much out of each creek."[37]

The community-wide system of distribution ensured both household survival and nutritional balance and also encouraged the sustainable harvest of resources. The geographical scope of the Gitxaała territories, and the varying abundances and varying species within those territories, were maximized through this ethic of *syt güülm goot*.

In addition to encouraging sustainability, this system also provided an adaptation to seasons of scarcity. Each house-group would visit their own territory. If that area wasn't productive, they would request permission from another house to harvest what they needed from the second house-group's territory.

This system provides a structure of community support that negates a need to stockpile, or harvest the totality of available resources at any given moment. The ethic of *syt güülm goot* is an example of a local system of resource use that prevents the "tragedy of the commons" (a situation in which individualistic harvesters enter into an escalating cycle of competition that leads to resource collapse). Gitxaała people organized their harvesting of natural resources in such a way as to mitigate the adverse effects of the "tragedy of the commons" through processes in which resource use was territorialized but flexible enough to adapt to regional and seasonal scarcity.

## THE PATH TO SUSTAINABLE FISHERIES

Members of the Gitxaała and Ts'msyeen nations have a long history of using site-specific and locally appropriate fishing gear to harvest a variety of fish species. Individually and as a nation, Gitxaała and Ts'msyeen people are engaged in the commercial fishery on the coast, in social and ceremonial fisheries within their traditional territories, and in experimental communal fisheries in the Skeena River estuary. Many community members still practice and maintain traditional customary fishing sites, despite the many forces that have compromised their ability to do so.

During the last two decades the value of Traditional Ecological Knowledge (TEK) to resource management systems has been increasingly recognized as a way to counteract resource management failures. One of the major failures of twentieth-century fisheries management has been the lack of attention to long-term effects of industrial resource extraction. TEK has the potential to be a crucial tool in efforts toward both long-term sustainability and immediate resource conservation. TEK provides a storehouse of knowledge, not always easily assessable, but important in making sense of long-term historical processes.[38] Fisheries scientists have begun to see considerable value in integrating fisher's knowledge with biological science.[39]

TEK can positively inform resource management because sustainability and conservation are inherent to traditional harvesting.[40] Furthermore, because TEK is locally developed and oriented, it provides highly specific and detailed information that can create more appropriate and successful management systems.[41] TEK is associated with a long history of resource use in a particular area and is thus the cumulative and dynamic

product of many generations of experience and practice.[42] The value of TEK is located in its historical and local nature, providing an alternative to dominant management structures that are relatively new, externally formulated, and rarely site-specific.

While TEK has begun to be integrated into resource management in general and fisheries management in particular, the focus has been on linking traditional knowledge of marine resources with biological science.[43] Scant attention has been paid to traditional fishing techniques and technologies and the ways in which they might contribute to sustainable harvesting and species conservation, and indeed, provide an alternative to current practices. Traditional knowledge of salmon production may be of significant value in the current search for successful selective fishing techniques for the British Columbian salmon fisheries.

Gitxaała fishing traditions reflect several millennia of site-specific and species-specific harvesting. Harvesting at creek mouths allows the targeting of specific, healthy stocks of fish. Traditional technologies are selective, and the rate of harvest is controllable. Nontarget species can be released, and spawning requirements met. A well-developed system of territorial and resource stewardship has structured harvesting, processing, and distribution to maintain fish stock health as well as meeting community needs for food and commerce. The system of ownership encourages habitat restoration and closely managed harvesting. While colonial disruptions to these traditional patterns of use and systems of ownership have had an impact on Gitxaała resource use during the last century and a half, Gitxaała knowledge and technology persists as a viable alternative to current management and fishing methods.

It is critical to emphasize, however, that a simple technological shift is not the answer to the problems that plague industrial fisheries. While Ts'msyeen technologies are clearly more controllable, selective, and sustainable than many of the current methods used to harvest salmon, they are intimately connected to and dependent on a particular set of social relations and intimate ecological knowledge. Terminal fisheries (fishing at the spawning creek rather than off the coast in mixed-stock scenarios) can be just as destructive as offshore harvesting if they are not carefully controlled according to the carrying capacity of the specific run. Gitxaała offers the important insights of ecological knowledge and resource management ethics and techniques as much as their technological expertise for the industrial fishery.

NOTES

This paper is dedicated to the memory and life of Sm'oogyit H'el (Russell Gamble), who passed away November 11, 2006. K'moda was an important place for Sm'oogyit H'el, personally and historically. This paper is our small way of respecting and honoring his work, leadership, and support and assistance of our work. We also wish to acknowledge H. B. Menzies for joining us on our trip to K'moda and for sharing his lifetime of knowledge of fishing and of the north coast with the project team. Thank you to Marvin and Roberta Gamble for opening their home to the researchers and for providing transportation to K'moda. Thanks also to members of Gitxaała who provided feedback and commentary throughout the research period and beyond. Funding for the initial research project was provided by Fisheries Renewal BC (An Evaluative Study of the Management and Conservation Potential of Traditional Ts'msyeen Fishing Gear and Ecological Knowledge: A Pilot Project—Grant FS00-28). The research project was aimed at evaluating the management and conservation potential of traditional Ts'msyeen fishing gear with the aim of developing selective fishing gear based on traditional indigenous ecological knowledge.

1. See, for example, Joseph E. Taylor, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (Seattle: University of Washington Press, 1999); G. Meggs, *Salmon: Decline of the British Columbia Fishery* (Vancouver: Douglas and MacIntyre, 1991); Terry Glavin, *Dead Reckoning: Confronting the Crisis in Pacific Fisheries* (Vancouver: Greystone Books, 1996); and Arthur F. McEvoy, *The Fisherman's Problem: Ecology and the Law in California Fisheries, 1850–1980* (Cambridge: Cambridge University Press, 1986).

2. Glavin, *Dead Reckoning*; Michael Kew, "Salmon Availability, Technology and Cultural Adaptations on the Fraser River," in *A Complex Culture of the British Columbia Plateau: Traditional Stl'atl'imx Resource Use*, ed. B. Hayden (Vancouver: UBC Press, 1989).

3. Taylor, *Making Salmon*, 63.

4. Taylor, *Making Salmon*, 64.

5. Charles R. Menzies, "Aboriginal Fisheries Are Commercial Fisheries: Report to Native Brotherhood of BC," unpublished manuscript in author's files; see also Richard Daly, *Our Box Was Full: An Ethnography for the Delgamuukw Plaintiffs* (Vancouver: University of British Columbia Press, 2005).

6. Kew, "Salmon Availability;" Diane Newell, *Tangled Webs of History: Indians and the Law in Canada's Pacific Coast Fisheries* (Toronto: University of Toronto Press, 1993); Douglas C. Harris, *Fish, Law and Colonialism: The Legal Capture of Salmon in British Columbia* (Toronto: University of Toronto Press, 2001).

7. See Kimberly Linkous Brown, "As It Was in the Past: A Return to the Use of Live Capture Technology in the Aboriginal Riverine Fishery," in *Traditional*

*Ecological Knowledge and Natural Resource Management*, ed. Charles R. Menzies (Lincoln: University of Nebraska Press, 2006), for a discussion of the recent attempts to deploy traditional indigenous fishing gear in British Columbia.

8. It is important to note that we are saying "contemporary conservation potentials." We are not suggesting that "conservation" in its popular contemporary form was a principle or value held by Ts'msyeen peoples eons ago. In fact, conservation is not a term that can be found in the Ts'msyeen languages. The relations between all social beings—which include fish and humans—are such that "conservation" in its contemporary sense is foreign to Ts'msyeen peoples. By this we mean that the social relations between all social beings involve giving of one's self, reciprocity, and even retribution. For the Ts'msyeen peoples, *not* consuming or catching fish could be as disrespectful as taking too many. This does not, however, preclude the possibility that there are conservation lessons here for contemporary resource harvesters and that the colonizers might be able to learn something of value from the knowledge, wisdom, and practices of the Ts'msyeen and Gitxaała peoples.

9. We are trying to avoid the K'amksiwah (the Sm'algyax term for Euro-Canadians) distinction between people and animals. Within a Gitxaała/Ts'msyeen framework "animals" are social beings. So when we reference *syt güülm goot* we mean relations between people and people, which includes and implies between humans and "animals." This point is important because the notion of relationships is a central one that links all social beings. Within a Gitxaała framework, as has been noted by a few K'amksiwah anthropologists (see, for example, Paul Nadasdy, http://weblogs.elearning.ubc.ca/ecoknow/archives/024600.html [accessed November 20, 2006], for an account of sentient animals giving themselves to First Nations hunters), there is an understanding that those who are "harvested" are engaged in a real social relationship with the harvester. The difficulty lies in the structure of the language within which we are writing and the concepts that find themselves inserted into our thinking through the hegemonic processes of the colonizers. Part of the work of an indigenous scholar is to attempt to break down these externally imposed concepts so that we can assert and develop our indigenous ways of thinking, knowing, and observing.

10. "K'amksiwah" is the Sm'algyax term for Euro-Canadians, which roughly translates to "Ghost People." One of the ways the territorial attachment can be demonstrated is by an examination of health indicators. An unpublished northern British Columbia health study found that the actual health indicators were higher than expected based upon what is known about the relationship between socioeconomic indicators and health indicators. The explanation for the higher than expected health values lies in the reliance of northern BC indigenous peoples upon the natural resources of their territories.

11. Gladys Young Blyth, *Salmon Canneries: BC North Coast* (Lantzville BC: Oolichan Books, 1991), 53.

12. For a thorough discussion of First Nations labor in the canneries, see Newell, *Tangled Webs*; Rolf Knight, *Indians at Work: An Informal History* (Vancouver: New Star Books, 1996); Alicja Muszynski, *Cheap Wage Labour: Race and Gender in the Fisheries of British Columbia* (Montreal: McGill-Queens University Press, 1996).

13. James McDonald, "The Marginalization of the Tsimshian Cultural Ecology: The Seasonal Cycle," in *Native Peoples, Native Lands: Canadian Indians, Inuit and Metis*, ed. Bruce Alden Cox, 109–216 (Ottawa: Carleton University Press, 1991).

14. Newell, *Tangled Webs*, 54.

15. In essence, the term "primary producer" is used to refer to those, such as fishermen and farmers, who are engaged in the direct harvest or removal of resources from nature. This is the first step in creating a commodity. Secondary production, for example, refers to manufacturing—turning raw resources into finished goods. The adjectives "independent" and "dependent" in this case refer to the extent to which the basic unit of production (in our case a family-based fishing enterprise) is tied to a larger corporate structure or its varying degree of formal and or legal independence. In this case, First Nations fisheries, though having direct control over their fishing operations, were tied by economic and legal mechanisms to the industrial fishing corporations and thus can be referred to as dependent producers.

16. Newell, *Tangled Webs*, 74.

17. James McDonald, "Social Change and the Creation of Underdevelopment: A Northwest Coast Case," *American Ethnologist* 21, no. 1 (1994): 167.

18. Gordon Gislason et. al., *Fishing for Answers: Coastal Communities and the BC Salmon Fishery: Final Report*. (Victoria: Ministry of Agriculture, Fisheries, and Food, 1996).

19. Jay Miller, *Tsimshian Culture: A Light through the Ages* (Lincoln: University of Nebraska Press, 1997).

20. Newell, *Tangled Webs*; Patricia Berringer, *Northwest Coast Traditional Salmon Fisheries Systems of Resource Utilization* (Vancouver: University of British Columbia, 1982); Hilary Stewart, *Indian Fishing: Early Methods on the Northwest Coast* (Seattle: University of Washington Press, 1997).

21. McDonald, "Social Change," 135.

22. *Sessional Papers* are reports and papers which have been tabled in the House of Commons (and sometimes the Senate) and deposited with the Clerk. These papers include annual reports of government departments and boards, the Estimates, the Public Accounts, and the reports of the Royal Commissions.

23. The early reference is from *Sessional Papers*, 1890, vol. 10, no. 12.

24. Drawing upon our oral history, archival, and ethnographic reach this number of fish—40,000—was not unfeasible nor unreasonable given the work expended to maintain the productivity of the large lake system that supported the production of several different runs of salmon. The methods under which

fishing at this site would have been regulated would have ensured a continued production of fish at volumes high enough to sell the surplus to the cannery. What did fail the system was the Canadian Fisheries Act, which made criminal aboriginal resource management practices and attempted to shift the ownership of fishing rights toward nonindigenous fishers and fishing companies.

25. See Morgen E. Smith, "Managing by the Numbers? Examining Barriers to Harvest Assessment in a Southeast Alaska Subsistence Salmon Fishery" (master's thesis, Department of Anthropology, University of British Columbia, 2003), for a discussion of gaff techniques in Tlingit territory.

26. See, for example, Stewart, *Indian Fishing*; Stephen Langdon, "Tidal Pulse Fishing: Selective Traditional Tlingit Salmon Fishing Techniques on the West Coast of the Prince of Wales Archipelago," in *Traditional Ecological Knowledge and Natural Resource Management*, ed. Charles R. Menzies (Lincoln: University of Nebraska Press, 2006).

27. From field interview, March 2000. In this and other interviews, community-based fishers, including Ts'msyeen and nonindigenous respondents, report a significant decline in salmon when speaking of specific sites. That is, they will report that the run in river *x* or stream *y* has declined over the course of their fishing career, even when they will insist that salmon stocks in general are fine and government restrictions on fishing effort are misplaced. This apparent contradiction can perhaps be explained in terms of local fishers' understanding of specific fishing sites that they may have observed over the course of several decades and may also be able to draw upon multigenerational information. This site-specific knowledge can be read against their involvement in the commercial fishery where their annual catches have not themselves declined. Thus, two specific experiences (local knowledge versus a more global knowledge) come together to produce a result that is, for the observer, a potential contradiction.

28. From Forests and Oceans for the Future interview database, authors' files.

29. From Forests and Oceans for the Future interview database, authors' files.

30. See Parcival Copes, *Coping with the Coho Crisis: A Conservation-Minded, Stakeholder-Sensitive, and Community-Oriented Strategy* (Victoria: BC Ministry of Fisheries, 1998).

31. Need is clearly a socially defined notion that can vary according to numerous factors. Within Gitxaała society, social need would include provisions for immediate household consumption, distribution through the feast system, and exchange for economic benefit.

32. It is important to note that the notion of "stockpiling" as used in this quote and elsewhere in this paper reflects an indigenous critique of white market-driven societies. From the perspective of Gitxaała, the dominant white society is one based upon hoarding and attempting to control production and distribution of important goods and services. The nonindigenous world is seen to be one in which no individuals "give" unless they feel they will receive something in

return. While this may not be an accurate description of the behavior of all non-indigenous people, it is one that is considered to be correct in a general sense. Thus, when Gitxaała people say they do not stockpile, it might make more sense to others for us to say "in Gitxaała we do not hoard food simply to derive a profit from it. Nor do we attempt to control access to key resources to the exclusion of those in need."

33. From Forests and Oceans for the Future interview database, authors' files.

34. From Forests and Oceans for the Future interview database, authors' files.

35. See note 32 for an explanation of stockpiling.

36. From Forests and Oceans for the Future interview database, authors' files.

37. From Forests and Oceans for the Future interview database, authors' files.

38. See Charles R. Menzies, ed., *Traditional Ecological Knowledge and Natural Resource Management* (Lincoln: University of Nebraska Press, 2006); Paul Nadasdy, "The Politics of TEK: Power and the 'Integration' of Knowledge," *Arctic Anthropology* 36, nos. 1–2 (1999): 1–18.

39. Jeffery A. Hutchings and Mark Ferguson, "Links Between Fisher's Knowledge, Fisheries Science, and Resource Management: Newfoundland's Inshore Fishery for Northern Atlantic Cod, *Gadus morhua*," in *Finding our Sea Legs: Linking Fishery People and Their Knowledge with Science and Management*, ed. Lawrence Neis, 82–110 (St. John's: ISER Books, 1999).

40. Richard Kuhn and Frank Duerden, "A Review of Traditional Environmental Knowledge: An Interdisciplinary Canadian Perspective," *Culture* 16, no. 1 (1996): 71–84.

41. Kenneth Ruddle, "Local Knowledge in the Folk Management of Fisheries and Coastal Marine Environments," in *Folk Management in the World's Fisheries: Lessons for Modern Fisheries Management*, ed. Chris Dyer and J. McGoodwin, 161–206 (Niwot: University of Colorado Press, 1994); Barbara Neis et al., "Fisheries Assessment: What Can be Learned from Interviewing Resource Users?" *Canadian Journal of Fishing and Aquatic Sciences* 56 (1999): 1949–63; Fikret Berkes, *Sacred Ecology: Traditional Ecological Knowledge and Resource Management* (Philadelphia: Taylor and Francis, 1999); Evelyn, Pinkerton, "Introduction: Attaining Better Fisheries Management through Co-Management: Prospects, Problems, and Propositions," in *Co-Operative Management of Local Fisheries: New Directions for Improved Management and Community Development*, ed. E. Pinkerton, 3–33 (Vancouver: University of British Columbia Press, 1989).

42. Berkes, *Sacred Ecology*; J. T. Inglis, *TEK: Concepts and Cases* (Ottawa: International Development Research Centre, 1993); Martha Johnson, *Lore: Capturing Traditional Environmental Knowledge* (Yellowknife: Government of the Northwest Territories, 1992).

43. See Nadasdy, "Politics of TEK," for a critique of linking science and the TEK approach.