The Southeastern Alaska Salmon Industry: Historical Overview and Current Status

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Salmon have been a fundamental part of human life in Southeastern Alaska (Southeast) for thousands of years. The salmon resource was the foundation of the indigenous Native subsistence culture in Southeast and was the focus of the first major industry following the Russian sale of Alaska to the United States. The salmon industry in Southeast has experienced significant booms and busts and was at the center of the battle for Alaska statehood.

Today, Alaska is the last, great producer of the full diversity of wild Pacific salmon species in North America. Southeast is a cornucopia of salmon; nowhere else on the Pacific coast of North America are all five species of anadromous salmonids found together in such abundance. And no other animal is as interconnected with the ecosystems of the north Pacific coast as are wild salmon. Their life history takes them from headwater streams to the open ocean. When they return to their spawning streams, their bodies feed the wildlife and even the trees of the Alaska rainforest. Refer to Chapter 8 for more detailed information on the ecology of salmon in Southeast.

The discussion of the Southeast salmon industry begins with Native fisheries, followed by a brief description of the modest Russian fisheries in Southeast. This chapter also addresses the long and difficult period of federal management, changes that accompanied statehood, the restoration of salmon stocks, and the building of a sustainable industry. The concluding section provides an overview of the status of the salmon fishery at the beginning of the new century.

FIG 1. Native fish camp near Sitka, Alaska circa late 1800s. Salmon and other seafoods have provided the human inhabitants of Southeast with abundant food resources for centuries. (Alaska State Library, Kelly Collection, P427-43)

NATIVE FISHERIES

Salmon harvest was a cornerstone of the Tlingit, Haida, and Tsimshian Indian way of life and survival for many centuries, perhaps several thousand years (Price 1990), before European contact (Fig 1). Writing between 1880 and 1904, George Emmons (1991) explained:

> The most valuable property of the Tlingit was the fishing ground or salmon stream, which was a family [lineage] possession, handed down through generations, and never encroached upon by others. In the case of a poor family that lacked a stream sufficient for their needs, or if they had suffered a failure of the run, another lineage might extend an

> invitation to fish in their stream, but only after the owner had satisfied his needs (Emmons 1991).

De Laguna (1960) explained Tlingit land and resource ownership in terms not of acreages, but rather of specific places integral to a way of life: salmon streams, hunting areas, and berry gathering places. Price (1990) explains that salmon were crucial to the Tlingit and Haida economies because they were the most important food source.

Investigating the salmon fisheries of Alaska for the U.S. federal government in 1900, Moser (1902) recorded that many of the smaller salmon streams were known by the name of the family leader who administered ownership of the salmon run. For example, on eastern Prince of Wales Island, "The … Peter Johnson stream and lake system … is claimed by a Native, from whom it derives its name."

Moser (1902) described a Tlingit salmon fishing season on a larger stream, the Chilkoot River, which was owned by many lineages and had probably changed very little from the centuries-old customs:

> The rapids are all staked off, each stake indicating the fishing-place allotted to an Indian family, which is handed down from one generation to another and jealously guarded against intruders. During the fishing season the Indians build platforms over or secure canoes to their claims, and from either conduct the fishing, by means of a large iron barbless hook secured to the end of a stout pole. The impaled fish is thrown into a box alongside of the fisherman. At one point of the rapids runways have been constructed by piling rocks in parallel lines and confining the water to narrow channels.

Moser (1899) also described stream barriers used to concentrate salmon for easier harvest: "It is said that the Indians appreciated the necessity of allowing the fish to ascend the streams to spawn, and therefore after obtaining their winter supply they opened the barricades."

RUSSIAN FISHERIES IN ALASKA

From 1741 to the American purchase of Alaska in 1867, Russia was the dominant European presence in Alaska. The Russian venture in Alaska was motivated primarily by the sea otter fur trade, not fisheries. Although Russia laid claim to a vast expanse of territory, the reality was that in Southeast the Tlingit largely confined the Russians to the vicinity of their fort-like settlements, or redoubts (Gibson 1996, Worl 1978). The Tlingit controlled most of the region by strength of arms, and constrained the Russians to New Archangel (Sitka), Wrangell, and a few other settlements (Gibson 1996). The Russians depended on the Tlingit for survival, trading for and purchasing fish such as salmon and halibut, venison and other wild game, and potatoes, which the Tlingit quickly learned to grow in abundance (Gibson 1996, Haycox 2002).

In some locales, the Russians copied Indian techniques for fish trapping with added deliberation and efficiency, sometimes blocking an entire salmon run from its upstream spawning area. Moser (1899) described the activities:

> The Russians built 'zapors' or dams with stone piers across the streams, near the settlements, from which they drew their salmon supply. The ruins of some are still standing, at Redoubt [near Sitka], Afognak, and other places. The injury these zapors caused to the fisheries is acknowledged by everyone who has any knowledge of the subject.

In addition to catching salmon for the sustenance of their people, the Russian America Company engaged in limited salmon exports from Alaska to Russia and to the new territories of the United States on the Pacific coast. Annual shipments of salted salmon were sent to St. Petersburg "as a delicacy to be enjoyed by their friends and relatives" (Cooley 1963). During the 1850s, the California gold rush opened a brief market opportunity, and the Russian American Company shipped salted Alaska salmon to San Francisco (Haycox 2002). These exports were modest and short-lived, however. Russia did not develop a significant salmon export industry.

ALASKA SALMON FISHERIES UNDER U.S. FEDERAL MANAGEMENT

American business operators were quick to recognize the value of the Alaska salmon, and the technology of canning allowed them to preserve the fish in large quantities for transport by ship to markets in the United States and Europe (Fig 2). The first two Southeast canneries were built in 1878 (Cooley 1963, Naske and Slotnick 1987). The North Pacific Trading and Packing Company built a cannery at Klawock, and

FIG 2. Salmon cannery at Sitkoh Bay on Chichagof Island circa 1900. Around the turn of the last century, canneries were scattered throughout much of southeastern Alaska. (Alaska State Library, W.H. Case, P39-0682)

the Cutting Packing Company constructed a cannery at Sitka (Moser 1899). By 1900, 30 canneries had been built in Southeast (Moser 1902). Cannery investors varied, but the facilities were owned almost exclusively by interests outside of Alaska in Portland, San Francisco, Seattle, and Boston (Rogers 1960, Cooley 1963, Moser 1902, Naske and Slotnick 1987). One firm in San Francisco controlled six canneries statewide by 1899. The 1900 salmon can pack in Southeast was 456,639 cases, with 48 1-lb (.5 kg) cans per case, for a total of 21,918,672 lb (9,942,142 kg) of canned fish. In addition to canneries, 27 salmon salteries operated that year and put up 21,121 barrels of salted chinook (Oncorhynchus tshawytscha) and sockeye (O. nerka) salmon with approximately 200 lb (91 kg) of fish per barrel, or 4,224,200 lb (1,916,065 kg) of product (Moser 1902).

The salmon canneries consolidated as their harvest and production expanded. In 1893, the Alaska Packers Association (APA) was organized for the purpose of leasing, operating, and controlling the member canneries. Another six canneries were owned by the Pacific Steam Whaling Company. By 1897, APA canneries contributed 74% of the statewide salmon pack (Moser 1899). In practice, APA effectively controlled 90% of the pack (Cooley 1963).

Salmon were harvested through a wide array of methods by cannery employees, Alaska Natives, and other independent fishermen who sold to the canneries. Gill nets and seine nets were employed, along with the traditional methods of spearing and trapping salmon in the stream. Streams were barricaded, in some instances according to traditional methods and in others to the extent that entire runs were decimated. Cannery operators began to construct large fish traps in salt water to take advantage of known schooling and migrating areas along the shore of the Inside Passage (Fig 3). Up to a mile (1.6 km) in length, the traps consisted of walls of netting attached to wooden pilings and float logs intended to divert migrating salmon into a net cage from which they could not escape. In 1907, the first floating fish trap was devised in Ketchikan, and such traps were deployed where fixed pilings were impractical. A cannery boat would periodically pull alongside the traps and load the fish into its hold to take them to the cannery. The traps were costly but efficient. After stream barricades and fixed-net fishing in rivers were outlawed in 1889, the salmon traps played a dominant role in harvest operations (Browning 1974; Moser 1899, 1902).

The transition from a subsistence-and-barter salmon economy to industrial salmon canning marked the end of Native Tlingit and Haida ownership of the salmon streams. Without treaties and any formal transfer of ownership, the packing companies took over.

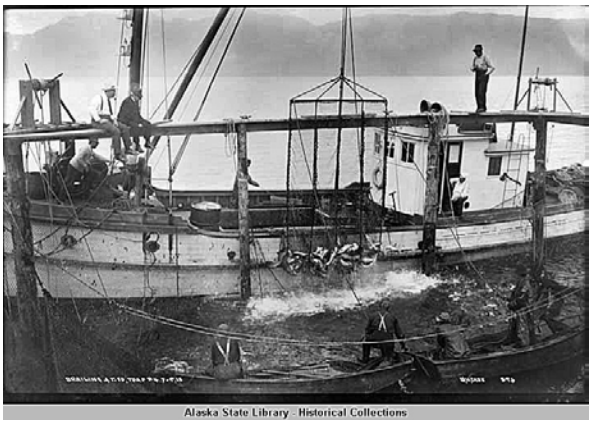


FIG 3. Brailing salmon from a fish trap at Gambier Bay on southern Admiralty Is. circa l910-20. Fish traps were the standard means of harvesting salmon throughout much of Southeast during the first half of the 20th century. (Alaska State Library, Case & Draper, P39-0712)

According to Moser (1899):

> These streams, under their own administration, for centuries have belonged to certain families or clans settled in the vicinity, and their rights in these streams have never been infringed upon until the advent of the whites. No Indians would fish in a stream not their own except by invitation, and they cannot understand how those of a higher civilization should be less honorable—as they regard it—than their own savage

> kind. They claim that the white man is crowding them from their homes, robbing them of their ancestral rights, taking away their fish by the shiploads; that their streams must soon become exhausted; that the Indian will have no supply to maintain himself and family, and that starvation must follow.
>
> Many disputes arise concerning the fisheries... The result is over fishing, complaints, bad feeling, blows, and threats of bloodshed. So far as can be learned, there are now no legal rights or title to any fishing-grounds in Alaska except what force or strategy furnish.

Although the first Alaska "Organic Act," passed by Congress in 1884, stated "Indians… shall not be disturbed in the possession of any lands actually in their use or occupation or now claimed by them," no federal action was initiated to implement or enforce that intent.

In 1907, 22 canneries were operating in Southeast. Salmon harvest methods included seine and gill nets and 40 of the large salmon traps. A new federal law in 1906 gave the Secretary of Commerce only minimal authority to regulate Alaska salmon harvests; the canned salmon lobby blocked any major reforms. By 1924, 65 canneries were operating in Southeast using 351 salmon traps (Thorsteinson 1950). That same year, Congress passed the White Act, the major, although unsuccessful, effort of the federal government to reform the Alaska salmon industry.

Between 1906 and 1923, 42 pieces of federal legislation addressing the Alaska salmon fisheries were introduced in Congress, and a dozen in-depth hearings were held on the subject. In spite of mounting evidence of the need for stronger conservation measures, not a single piece of legislation passed, largely because of opposition by the canned salmon industry to additional federal regulation. It wasn't until after the First World War that canned salmon prices declined, supply outpaced demand, and cannery company profits took a tumble. For the first time, the canned salmon lobby became receptive to regulations that might limit the salmon harvest as long as the overall interests of the cannery investors were protected (Cooley 1963).

Opposition to Fish Traps Builds

During those same years, the nature of the debate over Alaska salmon was changing. In 1921, William Paul, co-founder of the Alaska Native Brotherhood and the leading Tlingit spokesperson for Native rights, testified to Congress on the negative impacts of fish traps and the absentee salmon industry on Alaska Natives. Paul stated that he spoke on behalf of both Native and Caucasian fishermen who opposed the use of fish traps. A salmon fishermen himself, Paul explained that the cannery-owned fish traps had displaced the livelihoods of both white and Indian fishermen with corresponding hardships for their families. He also alleged that the fish traps were the primary cause of the depletion of salmon runs, in a speech that emphasized conservation and the social and economic needs of Alaska residents (Price 1990).

Alaska opposition to fish traps was building. Traps were the dominant force in the depletion of salmon runs, although weak enforcement of fishing rules also played a part. The strong anti-trap sentiment in Alaska had an economic and social basis. Cooley (1963) and Rogers (1960) explained that, for the salmon canning companies, traps were the most efficient way to obtain the resource in a quantity large enough to ensure steady operation of the canneries. Supplies were supplemented through purchases from fishermen. Some canneries brought their own hired fishermen to Alaska along with their Chinese cannery crews. Some purchased salmon from independent Alaska fishermen. Ownership of traps allowed canneries to set the price for salmon purchased from fishermen. The traps put the squeeze on fishermen, limiting both employment and compensation for their work. Consequently, strong opposition to traps developed among boat fishermen (Browning 1974).

Through time, fish traps became the symbol for "Outside" domination of the Territory to the detriment of Alaskans. Traps were owned almost exclusively by companies headquartered outside of Alaska. The traps were "looked upon by most Alaskans as the dipper with which the large absentee owner appeared to skim with relative ease the cream of one of the Region's most valuable natural resources, and then carried away to the Outside the fullest part of the wealth so garnered" (Rogers 1960). The failure of the federal government to rectify the perceived injustice reinforced a strong anti-federal spirit. In later years, outside domination of Alaska's fisheries became a rallying issue for Alaska statehood advocates.

The White Act

Cannery owners and their detractors locked horns in the debates leading to passage of the White Act in

1924. In 1923, the salmon packers supported the establishment of fishery reserves, large coastal areas wherein specific canneries would be awarded exclusive fishing rights. Billed as conservation, this protectionist measure was designed to block new competitors from entering the canning business and keep Native fishing rights advocates at bay. In contrast, the Alaska delegate to Congress called for stricter regulation of salmon fishing, abolition of fish traps near bays and streams, and a provision that there be "no exclusive right of fishery" for the canneries, Tlingit and Haida, or any other interest (Cooley 1963).

The compromise reached did not restrict fish traps, but did grant the Secretary of Commerce the authority to regulate salmon fishing, including gear and harvest timing. The White Act included a statement of intent that 50% of all salmon runs be allowed to pass upriver to spawn and sustain the runs. It did not restrict the ability of the Territory of Alaska to tax the salmon pack, and the legislation prohibited any exclusive right of fishery (Cooley 1963).

Implementation of the White Act was a failure in terms of resource conservation. Inadequate research and management funds and insufficient enforcement personnel were limiting factors. In addition, salmon prices rebounded after the Great Depression. Higher prices combined with an emphasis on increased canned production during the war years resulted in a steady increase in the salmon pack. The salmon pack peaked in 1947 at 4.3 million cases and began a steady decline. The market had become established, however. Prices remained strong and rose in response to reduced supply through the 1940s and 1950s. The result was intensified harvest in the face of declining salmon populations, with passive federal management and anemic enforcement. In 1953, President Dwight Eisenhower declared the Alaska salmon fishery a federal disaster and called for a major rebuilding effort, but the pack continued to decline, reaching an all-time low in 1959, the year Alaska became a state (Cooley 1963).

Tlingit and Haida Claims to Salmon Fisheries

During the forties, Alaska Natives asserted their rights to land and fisheries, supported by the activist policies of Interior Secretary Harold Ickes and the advocacy work of Interior Solicitor Felix Cohen, both individuals serving in the administration under President Franklin Roosevelt (Rogers 1960, Haycox 1990, Mitchell 1997). The Interior Department hired anthropologist Walter Goldschmidt and attorney Ted Haas to evaluate Native claims and produce maps of traditional salmon fishing places (Haycox 1990, Mitchell 1997, Goldschmidt and Haas 1998).

The canned salmon lobby responded by promoting a bill "…designed specifically to divest the Indians … claims to special rights and privileges in the fishery" (Cooley 1963). Specifically, the bill included language affirming the salmon fishery was open to all U.S. citizens "free of all exclusive or several rights of fishery under any claim of occupancy, aboriginal or otherwise" (Cooley 1963). This language constituted a strengthening of the White Act that prohibited exclusive fishing rights in general. The Territory of Alaska and the federal government were momentarily aligned and the bill died under fire from Alaska and the Interior Department (Cooley 1963).

The social advocacy of the Interior Department on behalf of Tlingit and Haida land and resource claims continued through the war years, but lost momentum in 1946 when Secretary Ickes resigned from the Truman administration. The next year Congress rejected the Native claims documented by Goldschmidt and Haas, passing legislation promoting timber sales over the objections of Tlingit and Haida Indians who claimed title to much of the acreage and in spite of evidence in the Goldschmidt and Haas report supporting the aboriginal claims (Haycox 1990, Mitchell 1997). In 1949, the U.S. Fish and Wildlife Service, a bureau in the Department of the Interior, testified before Congress that it was no longer concerned with who conducts or benefits from the salmon harvest as long as adherence to conservation goals was achieved. A brief period of federal advocacy for territorial and Native interests in the salmon fishery was over (Cooley 1963).

SUCCESSFUL SALMON MANAGEMENT IN ALASKA

Statehood

Alaskans continued to press their interests in responsible salmon management. The biological agenda was conservation and sustained yield; the social and economic agenda was to provide jobs and livelihoods for Alaskans, not for "Outside Fish Trusts" (Rogers 1960). In 1948, about 88% of territorial voters cast their ballots for a referendum to ban salmon traps from Alaska waters. Although nonbinding, the referendum was a clear harbinger of the future. In a similar 1952 referendum, 85% of voters called for transfer of fishery management authority from the

federal government to the Territory, anticipating and advocating for statehood (Rogers 1960, Cooley 1963).

The Constitution of the State of Alaska took effect in 1959 when President Dwight Eisenhower signed the Alaska Statehood Act. In contrast to federal management, the Alaska constitution reflected a commitment to sustaining abundant salmon harvests for the benefit of Alaskans. The constitution includes an entire title (section) on natural resources. Provisions of this title formed the basis for natural resource management generally, and for the salmon rebuilding effort by the State of Alaska in particular (Harrison 1986).

Under the Alaska constitution, natural resources are to be managed on the sustained yield principle, providing their utilization, development, and conservation for the maximum benefit of the people, subject to preferences among beneficial uses. Fish, wildlife, and waters are reserved to the people for common use. Contained in the constitution was an ordinance, easily ratified by the voters the following year, that prohibited the use of fish traps for the harvest of salmon for commercial purposes (Harrison 1986).

The new State of Alaska immediately began managing the salmon fishery for recovery of the runs and maximum benefit of Alaskans. The Alaska Department of Fish and Game (ADF&G) implemented a comprehensive salmon management strategy with an objective of restoring runs and matching harvest opportunity to the actual abundance of the returning salmon runs. This latter goal was pursued by delegating authority to local managers to open and close fishing based on actual returns to the spawning streams, to ensure sustainability of the runs (Krasnowski 1997).

The State of Alaska manages all fisheries within state waters and manages the salmon fishery into ocean waters under authority delegated by the federal government. State salmon management is conducted through institutions. The ADF&G is responsible for the biological sustainability of the runs and implementation of fishing regulations. The Board of Fisheries, appointed by the Governor and confirmed by the Legislature, addresses the allocation of harvest opportunities among different user groups. Enforcement of applicable laws is carried out by the Alaska Department of Public Safety, which maintains a special fish and wildlife law enforcement capacity (Krasnowski 1997).

With both returns and harvests increasing from their 1959 nadir, Alaska salmon management appeared to be successful in the 1960s. Other factors worked against run restoration, however. Information on salmon biology, particularly during the ocean phase of life, was lacking. Off the Alaska coast, foreign fishing fleets continued to escalate their harvests of salmon produced in Alaska streams (Cooley 1963).

FIG 4. Salmon troller fishing in Sitka Sound (above). Purse seiner hauling in seine in Chatham Strait (below). Trollers, seiners, and gill netters are the standard commercial gear types used in the Southeast salmon fishery today. (John Schoen photos)

The Rebounding Salmon Industry

As anticipated, the removal of the fish traps opened up harvest opportunities for Alaskans and many people entered the fishery (Cooley 1963). Within 5 years, the number of purse seine boats increased by 45% and the number of fishermen increased by 55%. From before the ban on fish traps to 1970, the number of salmon fishermen had roughly doubled (Colt 2000) (Fig 4).

As runs rebounded, the open fishery became a lucrative venture and contributed to employment and general welfare throughout Southeast. However, the increasing numbers of fishermen increased the challenge of sustaining and restoring the runs. In the early seventies, salmon runs again declined to low levels, sending a shock wave through the region and

driving home the magnitude of the salmon conservation challenge.

In 1972, the state constitution was amended by popular vote to authorize the limitation of new entrants into the salmon fisheries and any other fisheries under state jurisdiction. The limited-entry amendment affirmed the longstanding constitutional mandate that "No exclusive right or special privilege of fishery shall be created or authorized…" but added language allowing the State of Alaska to "limit entry into any fishery for the purposes of resource conservation, to prevent economic distress among fishermen and those dependent upon them for a livelihood and to promote the efficient development of aquaculture in the state."

Subsequent legislation, known as the Limited Entry Act, established that a fishing permit can be held only by an individual fisherman, not by boats or corporations. The law also allowed for permits to be transferable from one fisherman to another by sale, gift, or inheritance. Therefore, fishermen holding permits gained equity value and protection from corporate accumulation of salmon fishing privileges. Salmon fishery managers were able to manage a fishing fleet that was finite rather than expanding continuously.

After 1974, salmon runs in Alaska increased steadily. Some scientific evidence indicates that improved survival conditions in the ocean may have played a part in this renewal; however, implementation of limited entry, and the set of other management and policy changes adopted by the state, formed the foundation of salmon restoration.

Beginning in the seventies, the State of Alaska bolstered the salmon enhancement program, including use of the salmon hatchery or "ocean ranching." The goal of that effort was to enhance natural runs, not to replace wild-spawning salmon. As the program developed, measures were put in place to protect wild salmon populations from risks associated with hatchery operations. For example, a strict policy designed to protect the genetic integrity of individual salmon populations requires that hatchery-raised salmon cannot be moved more than 50 mi (80.5 km) from their native stream. Hatchery production made a large contribution to harvests, particularly for chum (O. keta) and pink *(O. gorbuscha)* salmon. The hatchery bonus notwithstanding, wild salmon harvests increased more or less steadily from approximately 25 million fish in 1972 to some 185 million fish in 1991 (Burger and Wertheimer 2004). A number of important changes contributed to this success.

In 1976, the federal Magnuson Fishery Conservation and Management Act (Public Law 94-265) became law, establishing U.S. fishery management out to 200 mi (320 km) offshore. In 1983, President Ronald Reagan declared by proclamation a U.S. exclusive economic zone (EEZ) extending to 200 mi (320 km) offshore (Knecht and Cicin-Sain 1999). In 1989 and 1991, the United Nations adopted a general moratorium on all high-seas drift net fishing (United Nations 1989, 1991), which was followed in 1992 by the Convention for the Conservation of Anadromous Fish Stocks in the North Pacific Ocean (North Pacific Anadromous Fish Commission 1992). This convention led to the establishment of the North Pacific Anadromous Fish Commission, which commits the nations of Canada, the United States, Russia, Japan, and Korea to a cooperative program of research and conservation of salmon in the North Pacific Ocean. The overall effect of these measures was a steady decline in ocean interception of Alaska salmon, coincident with dramatic stock-rebuilding success.

From the 1970s through the 1990s, the State of Alaska intensified its commitment to biological research, monitoring, and enforcement. The productivity of spawning habitat in Alaska salmon streams, largely undisturbed before 1960, came under question as federal logging activity in the Tongass National Forest increased dramatically. As concern from fishermen and the general public increased, so did the need for better scientific understanding of the relationships among salmon, watersheds, and forests. Through time, solid biological research began to reveal the importance of intact riparian, or streamside habitat, and water quality, for salmon production. The science also indicated that limitations and standards were needed to prevent logging and logging roads from affecting salmon production.

In response to pressure from fishermen, seafood processors, and conservationists, state and federal officials took action aimed at conservation of salmon habitat. The State of Alaska prohibited blockage of salmon streams and required a permit be obtained from the state for any activity that might damage salmon waters (Alaska Department of Natural Resources 2004). In 1980, Congress passed the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96-487), protecting salmon watersheds in 5.4 million acres (2.9 million hectares) of designated

wilderness areas in the Tongass National Forest. In 1990, the Tongass Timber Reform Act amended ANILCA and added protection from logging and road building to watersheds in an additional 1 million acres (0.4 million hectares) of the Tongass. The same year, the Alaska Legislature passed the Alaska Forest Resources Practices Act (Alaska Statute 41.17), which regulated forestry activities that could impair salmon production.

Protecting Habitat

The Tongass National Forest encompasses approximately 45,000 mi (72,000 km) of known streams and more than 20,000 lakes and ponds, more streams, lakes, and ponds than are found in any other national forest (U.S. Forest Service [USFS] 1997). The abundance of these freshwater systems supports some of the most important anadromous fish habitat in the nation. Anadromous fish habitat in the Tongass includes 10,800 mi (17,280 km) of streams and 4,100 lakes and ponds (USFS 1997). Because of the significance of anadromous fish in the forest, the USFS selected pink and coho *(O. kisutch)* salmon as Management Indicator Species (MISs) in the revision of the Tongass Land Management Plan (TLMP) (USFS 1997).

The ADF&G maintains an atlas mapping the location of salmon streams throughout Alaska. This Anadromous Stream Catalog forms the basis for the Tongass National Forest inventory of streams by channel type and class. Class I streams are anadromous and high-value resident fish streams; Class II streams are other resident fish streams. Under the 1997 TLMP, no commercial timber harvest is allowed within a 100-ft (30-m) horizontal distance on either side of Class I streams and Class II streams that flow directly into Class I streams (USFS 1997). Additional standards and guidelines apply to the Riparian Management Area, including a buffer up to 500 ft (152 m) in some areas.

A panel of fisheries experts assessed the levels of risk to fish habitat from timber harvest and related activities associated with management alternatives in the TLMP revision. The panel expressed five primary issues of concern (Dunlap 1997):

- Roads may cause negative effects on fish habitat.
- The amount of timber harvested may have an effect on fish habitat.
- Reserves protecting entire watersheds are likely the most effective protection of fish habitat.
- Watershed analyses should be conducted before decisions are made on how management activities would be applied on the ground.
- Timber harvest activities in the upper reaches of watersheds where fish do not occur may have impacts on fish in lower stream reaches.

Sharing The Salmon Resource

As Alaska's wild salmon populations approached record levels of abundance, the fisheries were confronted by two new challenges: allocation disputes and declines in salmon prices. The largest allocation issue involved the sharing of salmon harvests among Alaska, British Columbia, and the Pacific Northwest states, as well as with the Northwest and Columbia River Indian Tribes. The Pacific Salmon Treaty was adopted in 1984, but major issues were left unresolved. The issues were significant because salmon that spawn in one political jurisdiction mix in the ocean and return to their natal streams through other jurisdictions. The most dramatic examples are the far-north-migrating stocks of the Snake River and Columbia River chinook salmon. These fish migrate from freshwater to the sea at Astoria, Oregon, travel in the Pacific Ocean as far north as the Kenai Peninsula of the Southcentral Alaska coast and as far west as the Alaska Peninsula. They return to the Columbia Basin through Southeast Alaska, British Columbia, and the Washington coast, where some fish are caught in commercial and recreational fisheries (Groot and Margolis 1991).

Adding to the complexity, federal courts ruled that the Columbia River Indian Tribes have treaty rights to Columbia basin salmon, along with the right to 50% of the harvest of these salmon stocks (United States v. Washington 1969, United States v. Oregon 1974). The final amplification of conflict emerged when the populations of the fall run of chinook salmon from the Snake River, a far-north-migrating stock, were listed as "endangered" under provisions of the Endangered Species Act (Waples et al. 1991). Although the most significant impact on the fish was from four specific dams on the Snake River, the Endangered Species Act listing touched off a debate over which interests should bear the "burden of conservation," those that destroy spawning habitat and disrupt river migration or those that catch the fish for food and business.

Other migration and jurisdictional disputes are no less controversial. During the past two decades, international and interstate "salmon wars" were waged, involving intense and highly complex negotiation, litigation, deliberate violation of fishing rules, and even

the seizure of an Alaska passenger ferry by angry Canadian fishermen (Caldwell 1999).

The Pacific Salmon Treaty was amended in 1999. The new fishing arrangements have thus far proved to be fairly successful. Management featuring the "abundance-based" principles, pioneered in Alaska, are now used throughout the treaty regions, from Oregon through Washington and British Columbia to Alaska. The abundance-based management approach places a premium on the conservation of individual salmon populations, not just aggregate harvests, and satisfies the requirements of the Endangered Species Act. Notable among the agreements was the transmittal statement by U.S. and Canadian negotiators that "conservation-based harvesting regimes must be implemented" across all jurisdictions and "freshwater habitat must be protected or restored to allow for successful salmon migration, spawning and juvenile rearing." A special treaty provision addresses stream habitat and watershed restoration, calling on parties to protect and restore salmon habitat, provide safe passage of salmon to and from their natal streams, and maintain adequate water quality and flows (Pacific Salmon Commission 1999).

The Contemporary Salmon Industry

Between statehood in 1959 and the turn of the century, Alaska wild salmon underwent a dramatic transformation from a depleted resource managed and controlled by interests outside of the state, to an abundant resource managed by Alaskans according to a suite of strong conservation principles. In the year 2000, the Alaska salmon fishery was the first major fishery in the world to be certified as sustainable by the international Marine Stewardship Council (2004). The MSC noted:

> The Alaska state constitution requires that the salmon habitat is conserved and protected. Today, this constitutional requirement as well as effective management has brought the salmon fishery to health. In 1959, statewide salmon harvests were about 25 million salmon a year. In 1999 (forty years later) Alaska's commercial salmon catch was 214 million fish, the second largest in the state's history [Fig 5]. The legislation includes establishing open and closed seasons; setting quotas, bag limits, harvest limits, sex and size limitations, establishing the methods and means employed in the pursuit, capture and transport of fish, watershed and habitat improvement, management, conservation, protection, use, disposal, propagation and stocking of fish, regulating commercial, sport, guided sport, subsistence, and personal use fishing as needed for the conservation, development and utilization [sic] of fisheries.

Without question, contemporary management of Alaska salmon is a conservation success story. It also is perhaps the world's best example of sustainable management of a living resource that supports jobs and prosperity for local residents.

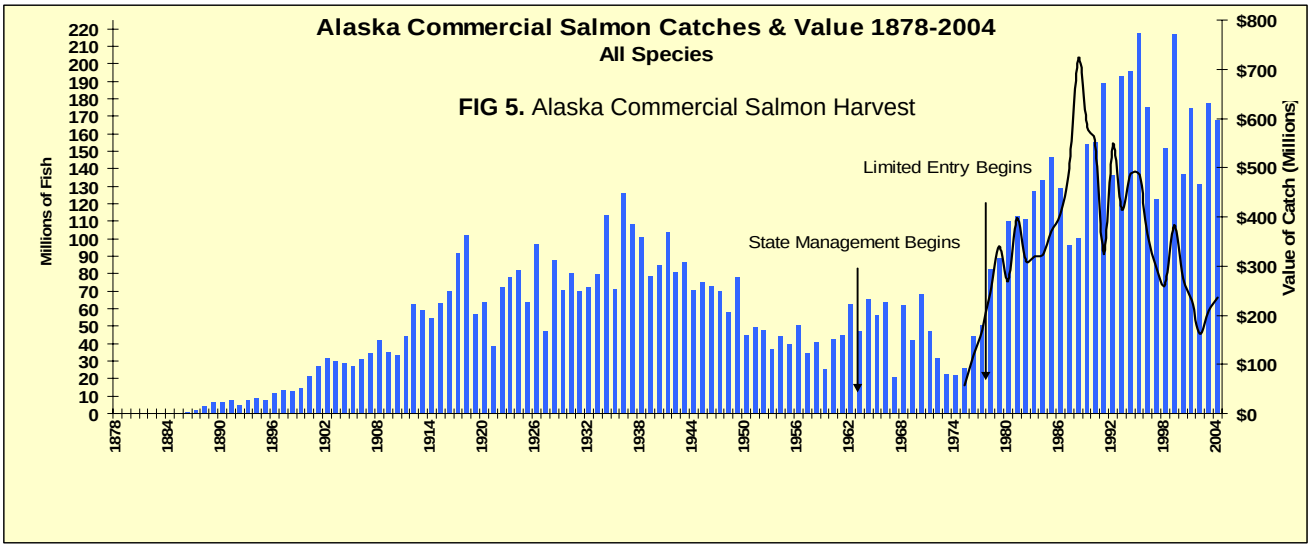


FIG 5. Alaska commercial salmon catches and value, 1878–2004 (ADF&G 2004c). Note: Black lines show the value of catch in units; blue bars show millions of fish.

Within Southeast, even with relative abundant natural production, allocation issues remain. The different commercial fishing vessel or gear types—seiners, gillnetters, and trollers—compete for their shares of the harvest. Recreational or sport fishermen catch only a small part of the Alaska harvest, but the catch has increased steadily since Alaska became a state. In 1961, the state sold about 55,000 sport fishing licenses; by 2002, almost 470,000 licenses were sold (ADF&G 2004b) (Fig 6).

FIG 6. Salmon sport fishing is a very popular activity throughout Southeast and has become an important contributor to local economies in the region. (John Schoen photo)

A 1993 study estimated the economic value of sport fishing in Southeast, citing a total employment contribution of more than 1,200 jobs with a payroll of $27 million (Haley et al 1999). Since 1993, recreational harvest of salmon in Southeast, by residents and visitors, has continued to grow, increasing 66% from 312,000 fish in 1994 to well above 500,000 fish in 2003 (Fig 7). The chinook salmon harvest increased 70%; the coho catch, 68%; and the chum catch 83% (ADF&G 2004a).

As tourism became a major economic force in Southeast, charter fishing became big business. Roughly 1,100 charter fishing boat licenses have operated in Southeast each year since 1993. Charter fishing occurs throughout the Inside Passage, with concentrations of effort in 2004 in Sitka (288 vessels), Ketchikan (211), Prince of Wales Island (154), Juneau (144), and the Icy Straits/Cross Sound area (129). Significant charter fishing also occurred in Yakutat (54 vessels), Petersburg (54), and Wrangell (36). Virtually all Southeast communities now have many charter and commercial fishing vessels in their harbors (Alaska Commercial Fisheries Entry Commission 2004a).

Allocation of the salmon harvest among commercial and recreational interests is set by the Alaska Board of Fish, whose members are appointed by the Governor and confirmed by the Legislature. This approach has proven to be a relatively successful way to resolve harvest sharing issues. However, differences over the subsistence fishing rights of Natives and rural Alaskans is a different and important story.

Subsistence Issues

In 1955, the U.S. Court of Claims ruled, and the Supreme Court concurred, that the Tlingit and Haida had no special legal rights to the salmon resource (Mitchell 1997, Price 1990). The court ruling in the Tee-Hit-Ton lawsuit was controversial because, in a legal "catch-22," the court based its decision on the absence of treaties, on the one hand, and the absence of congressional action granting fishing rights, on the other. Even though the traditional rights were well documented, and the de facto seizure of the resource by the early canneries was well known, the claims were terminated.

Native rights to salmon were void until the Alaska Native Claims Settlement Act of 1971 (ANCSA) (Public Law 92-203). The law provided for an aboriginal settlement with the federal government for land and monetary compensation. Although the law extinguished aboriginal claims other than those provided for specifically, Congress stated that the Secretary of Interior would "take any action necessary to protect the subsistence needs of the Natives." Alaska Natives collaborated with non-Native, rural Alaska residents to advocate for subsistence in the context of what became ANILCA. Title VIII of that law is dedicated to providing subsistence hunting, fishing, and other harvests for rural, Native and non-Native, Alaskans. ANILCA establishes that, during times of a shortage of game or fish, subsistence activities would be a priority on federal lands in Alaska. Subsistence fishing includes salmon fishing, therefore offering an

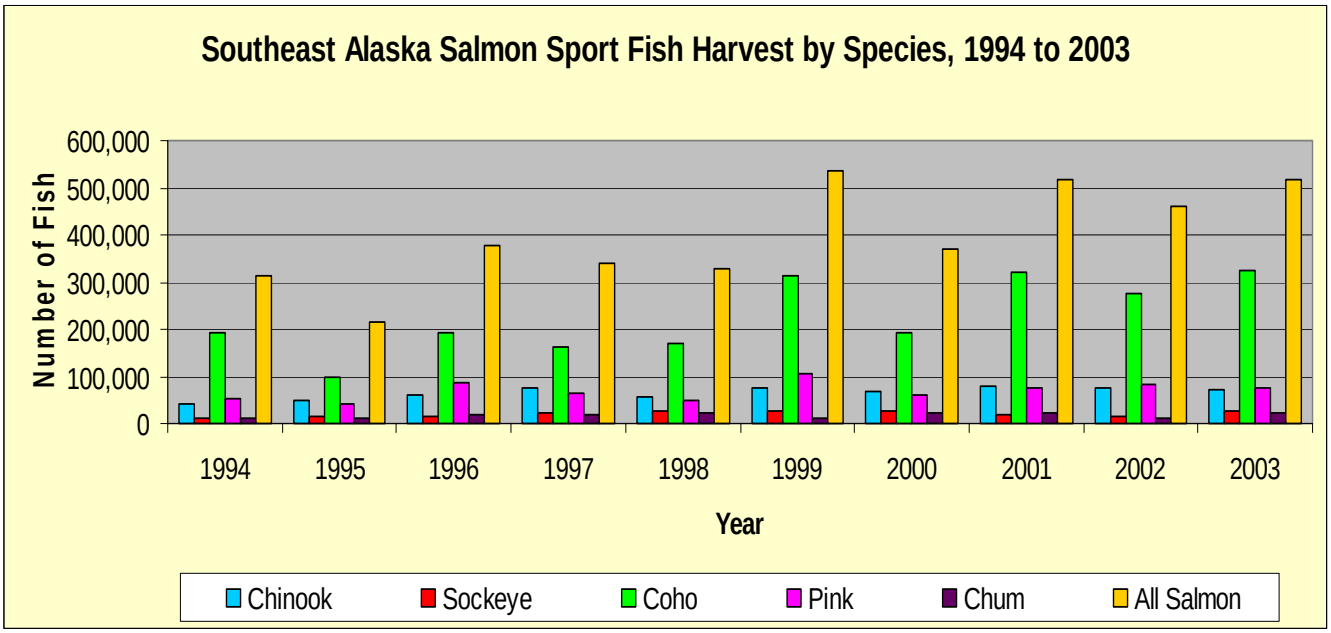


FIG 7. Southeast Salmon Sport Fish Harvest, 1994–2003 (ADF&G 2004a).

opportunity to redress some of the loss of salmon fishing rights by the Tlingit and Haida.

During the course of the ensuing decade, efforts to implement the federal subsistence priority were derailed in state court. The Alaska Supreme Court ruled in 1989 that the program Alaska implemented to comply with the ANILCA subsistence provisions violated the Alaska constitution (McDowell v. State 1990). The constitution reserves fish and other resources "to the people for common use" and requires that natural resource laws "shall apply equally to all persons similarly situated." In addition, the court noted the subsistence provisions conflict with the constitutional language prohibiting any "exclusive right or special privilege of fishery," a phrase echoing the language incorporated into the White Act in 1924. Some non-Native hunters and fishermen, concerned that Natives and rural residents would gain a harvest advantage at the expense of other Alaskans, tried unsuccessfully to persuade Congress to amend ANILCA to resolve the conflict. Repeated efforts by Alaska governors and legislators to place before the voters a constitutional amendment allowing a subsistence priority, similar to the amendment allowing limitation of entry into commercial fisheries, failed to get legislative approval. The conflict between federal law and the state constitution remained unresolved, and in 1990, the federal government unilaterally implemented the subsistence provisions of ANILCA on federal lands in Alaska.

That same year, an Alaska Athabaskan elder, Katie John, and others sued the federal government seeking a subsistence priority for John's salmon net site on federal land along the upper Copper River. A central issue was whether the Copper River fell under jurisdiction of the federal or state government. John and co-plaintiffs argued the river was part of the federal land estate and asked the federal government to allow continuation of a subsistence salmon fishery. The State of Alaska argued that, because the Copper River was a navigable waterway, its administration and fisheries management authority was reserved to the state. In 1994, federal courts ruled in favor of John and the State of Alaska appealed. In 2001, the U.S. 9th Circuit Court of Appeals again ruled in favor of John and the state declined to appeal to the U.S. Supreme Court. As a result, the federal government manages subsistence fisheries for Alaska rural residents on federal lands and the fresh waters adjacent and within them, according to the provisions of Title VIII of ANILCA (Norris 2002).

New Economic Challenges

The commercial salmon fisheries of Southeast entered the 1990s in a strong economic position. Regionwide in 1994, resident salmon fishermen earned $74 million and nonresident salmon fishermen realized another $46 million in ex-vessel sales (Hartman 2002). At this time, 78% of the 3,600 fishermen were Alaska residents (Alaska Commercial Fisheries Entry Commission 2004c). The salmon harvesting sector valued at $120 million was the largest component, by far, of a regional seafood processing sector that paid more than $10 million in local community salaries and

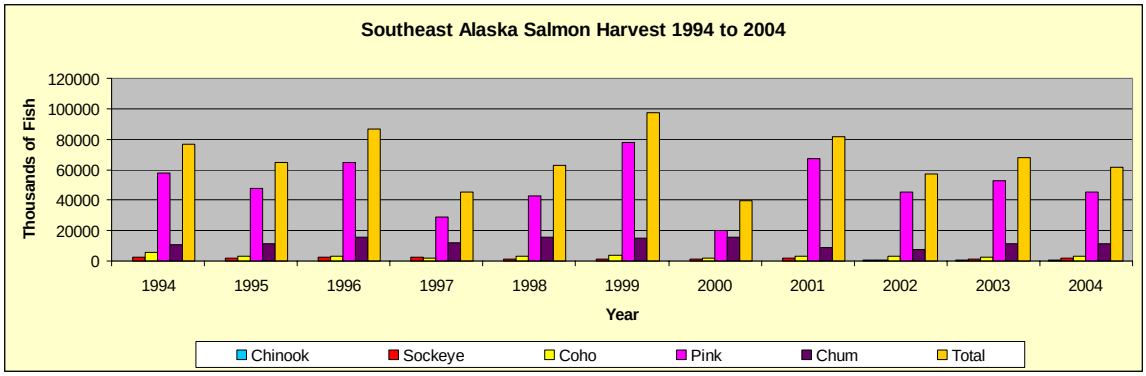
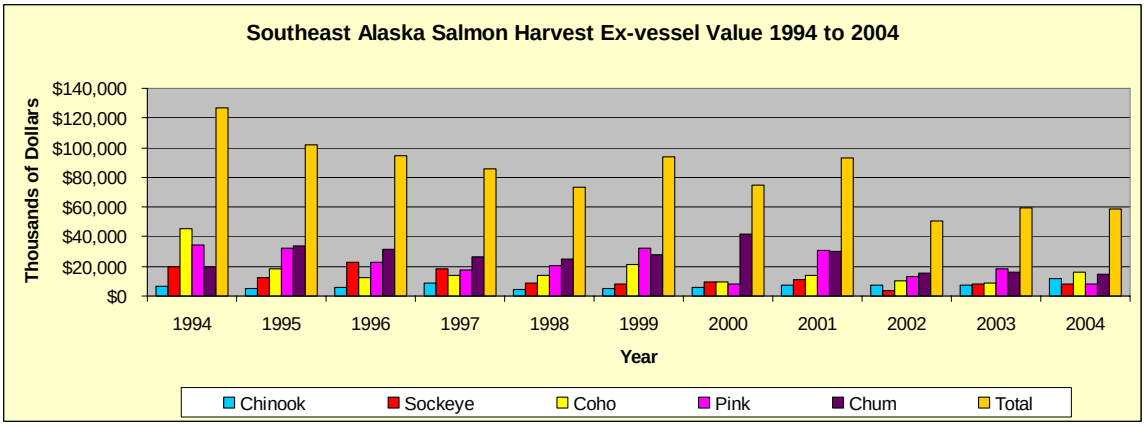


FIG 8. Southeast Commercial Salmon Harvest, 1994–2004 (ADF&G 2004d)
FIG 9. Southeast Commercial Salmon Ex-vessel Value, 1994–2004 (ADF&G 2004d)



wages and purchased $22 million in goods and services (Hartman 2002).

As the decade progressed, however, the Alaska commercial salmon industry faced an unprecedented challenge: strong competition in the domestic and international seafood markets. The cause was the rapid increase in salmon aquaculture—fish farming—in countries such as Norway, Scotland, Canada, and Chile. Between 1990 and 2000, the world production of farmed Atlantic salmon increased more than 300% and invaded most of the domestic markets previously dominated by wild Pacific salmon. In Chile, farmed production of coho salmon and rainbow trout (O. mykiss) increased more than 700% during that decade, displacing 50% of Alaska's share of the critical Japanese market. In the United States, imports of Chilean salmon increased by 164 million lb (75 million kg), swamping another traditional market for Alaska salmon (Knapp 2003).

With expanding supply came contracting prices (Figs. 8 and 9). The wholesale price of farmed Atlantic salmon in the United States declined by more than half in a decade. In Alaska, the average ex-vessel price paid to fishermen fell to its lowest level in 20 years. As farmed salmon production increased, prices declined, accompanied by a downward trend in the values of Alaska salmon fishing permits (Knapp 2003). For example, a Southeast purse seine permit worth more than $100,000 in 1990 was trading for only about $30,000 in 2001 (Alaska Commercial Fisheries Entry Commission 2004b).

After a half-century of strong markets in which the challenge was conservation and sustainability of the resource, Alaska contended with abundant salmon in brutally competitive markets. The impact to personal incomes and livelihoods has been substantial. The impacts were mitigated somewhat for fishermen who harvested other species in addition to salmon, as well as by good prices for halibut and sablefish and by federal and state marketing assistance. Market trouble provided a push for some commercial salmon fishermen to move into recreational charter fishing or direct marketing of higher-value salmon products. Some left the fishery altogether.

Salmon Forums

Between 1997 and 2001, the State of Alaska held a series of salmon forums and marketing events to help fishermen address the changes in world salmon

markets. In 2002, the Governor and senior U.S. Senator of Alaska held a statewide salmon summit in Kodiak to address issues. The Alaska Legislature launched the Salmon Industry Task Force to identify measures to restore market competitiveness to Alaska salmon. Federal government funds bolstered marketing efforts, and the Legislature and Governor restructured state programs for seafood marketing. Fishermen participated in the comprehensive evaluation of the entire salmon production chain of custody, securing direct assistance through the federal Trade Adjustment Act to help fishermen plan for the future and navigate the transition.

By 2003, a comprehensive revitalization program featured the Alaska Wild Salmon Campaign "to inform Lower 48 consumers about the difference between farmed and wild Alaska salmon." (Alaska Office of the Governor 2003). The campaign emphasized the health benefits of eating wild Alaska salmon, emphasizing that "Alaska Seafood thrives in the world's most pristine and healthy environment," and featured slogans such as "Natural is healthiest." The health benefits of omega-3 fatty acids, abundant in salmon, were a centerpiece of the state's advertising effort.

Simultaneously, the public began hearing from research scientists about the difference between farmed and wild salmon. An analysis of wild and farmed salmon from around the world, purchased in Europe and North America, revealed significantly higher concentrations of contaminants such as PCBs (polychlorinated biphenyls), dioxins, and dieldrin in farmed salmon than in their wild counterparts (Hites et al. 2004a). A companion study found higher concentrations of polybrominated diphenyl ethers, a common fire retardant that concentrates and accumulates in predatory animals near the top of the food chain, in farmed salmon (Hite et al. 2004b). The researchers attributed the difference to the marine environment and nutrition. Wild salmon eat a large variety of aquatic organisms such as krill, zooplankton, and small fish throughout a natural life cycle in Alaska rivers and seas. Farmed salmon, however, are kept in net pens and fed high-fat feeds made from fish meal, fish oil, and additives. The Alaska Department of Environmental Conservation analyzed wild Alaska seafood with similar findings: "Organochlorine contaminant concentrations in Alaska fish are low, and are not expected to cause adverse health effects in even the most frequent fish consumers" (Alaska Department of Environmental Conservation 2004).

As the Alaska salmon revitalization effort unfolded, and consumer information favoring wild Alaska salmon received attention, evidence indicated the slide in prices had stopped. The trend in 2003 and 2004 was toward higher prices for Southeast chinook, sockeye, and coho salmon; the overall value to fishermen of the salmon catch was approximately $40 million each year, with harvests consistent with recent levels of abundance (ADF&G 2004d).

Competition in seafood markets will continue to strongly influence the price of wild Alaska salmon, and the economic fortunes of Southeast salmon fishermen are anything but certain. The continuing abundance of the salmon resource, the state management program for sustainable salmon, and the development of a market preference and a price premium for wild salmon are reasons for significant optimism about the future of the fishery. The value of sport and recreational salmon fishing in Southeast is almost certain to continue, with attendant economic contributions to communities from Ketchikan to Yakutat. Subsistence fishing will continue to be a cultural and economic pillar for Southeast Natives and a cornerstone of rural life throughout the region. The future for the Southeast salmon fishery and all the people who depend on it is inextricably linked with long-term habitat protection and the ecological integrity and health of the anadromous fish streams in the region.

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