Among Alaskan wildlife controversies, only the salmon generated as much heat as the fur seal did. Its mysterious life at sea confounded attempts to manage the salmon, yet its value led men to fight ceaselessly over it. Conflict over the salmon altered Native culture, strained relations between the territorial and federal governments, and even contributed to tensions that exploded into World War II.

Salmon ranked first among economically valuable resources in Alaska nearly every year from the 1880s until oil took the lead in 1969. As elsewhere, people viewed fish in utilitarian terms, as a resource to be eaten by humans or perhaps by other animals. Salmon underwent some of Alaska’s most blatant episodes of misuse in the pre-statehood period, suffering damage to or destruction of numerous populations. Both federal government overseers and Alaskans who wanted local control of the fisheries invoked conservation to justify their positions. But the high monetary value of the salmon, the remote settings of the fisheries, and the lack of information on salmon ecology combined to undermine rational control of the harvest.
Salmon in the eastern Pacific spawned in rivers from Kotzebue Sound to the Monterey Peninsula. Five species swam in Alaskan waters. Pinks or humpbacks, the most numerous, averaged 4 pounds and emerged from streams north of Washington. Sockeyes or reds, cumulatively the most commercially valuable because of their numbers, reddish flesh, and oil content, ranged from Washington to the Bering Sea. They averaged 6 or 7 pounds, lived four to eight years, and preferred rivers connected to lakes. Chums or dogs, the least valuable, came from rivers between California and the Arctic. They weighed 8 to 15 pounds and lived three to five years. Cohos or silvers ranged from central California to Kotzebue Sound. They averaged 7 pounds and lived only about two years. Kings or chinooks, the largest and individually most valuable, averaged 20 pounds and could reach 100 pounds or more. They originated in rivers from California to the Arctic and lived three to five years. Commercial fishers caught all species as they returned to the rivers and streams where they had been hatched. Canneries might use all species, but sport fishers favored kings, cohos, and pinks. Kings and cohos supplied the bulk of the cured, frozen, and fresh salmon market.

Aboriginal Alaskans depended heavily on salmon, catching them by hand, in traps, or with spears or sinew nets and drying them for year-round consumption. They built dams across streams but are said to have let fish continue upstream after catching enough. Russians opened a saltery the year after they built their first permanent settlement on Kodiak Island in 1784. Dried or salted salmon fed Native sea otter hunters, Russians, and their servants. An attempt to export salmon to California and the Sandwich (Hawaiian) Islands failed economically. After 1867 the Alaska Commercial Company bought salmon for sea otter hunters. Limited sales to the West Coast began in the early 1870s. Canneries, to preserve salmon flesh in cans as opposed to packing in salt, first appeared at Sitka and Klawock in 1878. This signaled the commencement of a highly intensified and politically contentious period in the exploitation of salmon in the eastern North Pacific.

CANNERY OPERATIONS

Success in a salmon cannery called for a supply of fish of desirable quality and sufficient quantity to keep production lines going day and night as long as the salmon run lasted. Four methods of fishing accounted for the vast bulk of cannery salmon in pre-statehood Alaska: (1) beach seines (nets tied by one end to the beach, the other end paid out offshore in a loop and pulled back by hand or winch); (2) traps (on piles driven into the bay floor or floating and anchored offshore) into which salmon funneled as they migrated along the shore; (3) gillnets (supported by floats and either tied at one end to the shore of a lake
or estuary and extending offshore or free-floating in the ocean; fish swam into the net and became entangled, often by the gills); and (4) purse seines (pulled by boats in a circle, to be closed at the ends and bottom). Methods depended on local conditions, but all could be very effective: in the early years at Karluk River on Kodiak Island a 40-fathom beach seine could yield 100,000 salmon in a single haul. One trap in Southeast Alaska captured over a million in a season. Purse seiners made lucrative hauls by intercepting offshore schools before they could enter rivers.4

Trolling, or fishing with lines and hooks from moving boats, provided salmon for the salted, cured, frozen, and fresh fish markets. Trolling for chinooks and cohos took place mainly in Southeast Alaska, although most of the fish returned to rivers in British Columbia, Washington, and Oregon. The practice originated at the turn of the century in small boats powered by oars, a method called hand trolling. By the 1920s it had evolved into a mechanized operation. A motorboat crewed by one to three people dragged steel lines and multiple baited hooks or lures, to be retrieved by power winches. Catches by all methods topped out in the late 1930s and dropped by more than half before statehood. Dams, pollution, irrigation diversions, and overfishing in the home rivers hastened the downward trend.5
As soon as feasible after capture of the cannery salmon, independently or company-owned boats transported them to the factory. Workers removed the heads, entrails, and tails and packed the bodies in cans for sealing and cooking. English officer Claude Cane, visiting the Kasilof cannery in 1902, observed that of the five Alaska salmon species, canners normally used only two: “The rejected fish are not let loose to swim away, but every fish in the trap is killed and carried off to the cannery, where the selection is made, those for which they have no use being simply thrown over the side of the staging into the river to lay there and rot.” Before the turn of the century, canners in central and western Alaska often treated chums and humpbacks as commercially worthless. Discarded humpbacks could be seen piled knee-deep on Kodiak beaches. By 1901 they sold for 50 cents per dozen cans, half the price of sockeyes. Government purchases in World War I to feed troops elevated the less desired fish to general acceptance.

Packing companies sent vessels to Alaska to prepare for the fishing season. The ships delivered supplies, small boats, cannery workers, and fishers; waited out the fishing and canning; and loaded the crews and canned salmon for return. Companies chose old sailing vessels because of low cost and no need for tight scheduling. This gave the great oceangoing ships their last role in American commerce, keeping some in service into the 1930s. Sailor Harold Gill related his experiences in the square-rigger Berlin on a six-month round-
trip voyage between Astoria and the Nushagak River in 1912. The ship arrived in time to witness the Katmai eruption in June: “burning jewels of fire . . . great glowing rubies dripping fire for an instant and then snuffed out.” Loud booms and earthquakes shook the buildings 100 miles from the volcano, and a change of wind brought “showers of ashes, as fine as flour.”

Summer storms drowned several men off the mouth of the Nushagak River and kept crews busy repairing damage. After loading, the *Berlin* departed in late August. On a rare warm and sunny day as the vessel passed Amak Island east of Unimak Pass, Gill and his friends climbed to the fore topgallant yardarm:

It was glorious to sit there on the sharply braced yard, leaning against the backstays, with our legs lying out on the swelling cheeks of the to’gan’sl. The sky was blue above us and the sea was blue beneath, and all around us wheeled the screaming white seagulls. At the foot of the weather-beaten cliffs the swells broke in foamy surges, and we could dimly hear their roar. Close to the lee-beam was a large outlying rock where some walrus had crawled up to take a sun bath. Looking down we could see the sailors walking deck.

Normally, though, fog and cold predominated: “Nothing on earth can you imagine more lonely than those Aleutian Islands, with their sheer brown lava cliffs towering above the sea and capped with snow.” Returning home, Gill
allowed that “there is not a man but would give a hundred Alaskas for one Oregon.”

Between 1872 and 1903 Alaska fisheries came under the jurisdiction of the Treasury Department’s Commission of Fish and Fisheries, best known as the Fish Commission. An era of aggressive profit seeking got under way as the canneries multiplied in the 1880s. Competition waxed fierce: companies sometimes sabotaged others’ catches to reduce their profits. Greed ran free: fishers dammed or blocked off streams and caught every salmon. Regulation treaded lightly: weak laws went unenforced. Complaints by government inspectors roused Congress to action in 1889. It outlawed damming and blocking streams or placing weirs in them and appropriated money for salmon-related research. It authorized the Fish Commission to enforce the law, but lack of funding limited the commission to a staff of two enforcement agents. As a result, fishers continued their underhanded tactics. One cannery supervisor ordered his men to illegally net the spawning grounds of a nearby river; they pulled out 225,000 salmon. Men openly violated the ban on fishing in the Afognak reserve.
In his official report on the Fish Commission’s 1889 survey, ichthyologist Tarleton H. Bean had predicted that, in the absence of effective federal regulation,

we shall have repeated in Alaska Rivers the story of the Sacramento and the Columbia; and the destruction in Alaska will be more rapid because of the small size of the rivers and the ease with which salmon can be prevented from ascending them. For a few years there will be wanton waste of that marvelous abundance, which the fishermen—concerned only for immediate profit and utterly improvident of the future—declare to be inexhaustible. This season of prosperity will be followed by a rapid decline in the value and productivity of these fisheries, and a point will eventually be reached where the salmon-canning industry will no longer be profitable.¹²

Bean’s prophecy rested on common experience in the nation’s treatment of natural resources. In part it came true, although it took longer than Bean probably expected.

Marine scientist William H. Dall repeated the warnings of Bean and others that “unless more effectively supervised the [salmon] will meet with the
same fate as the fisheries of California and the Columbia River.” Noting the northward progression of the fisheries, he worried that “the natives of the upper Yukon will go hungry.”13 George Bird Grinnell, who observed the canning industry during the 1899 Harriman Expedition, commented, “The salmon of Alaska, numerous as they have been and still are, are being destroyed at so wholesale a rate that before long the canning industry must cease to be profitable, and the capital put into the canneries must cease to yield any return.” The practice of salting the bellies of some species and throwing away the remaining 80 to 90 percent reminded him of his experiences in the West: “This practice may fairly be compared with the old time method of killing buffalo for their tongues alone, and the more recent one of killing elk and deer for their hides or heads or hams.” A 1909 law banned discarding salmon backs.14

Laws enacted between 1896 and 1903 mandated weekly closed periods for traps and prohibited all commercial fishing above tidewater in streams less than 500 feet wide and setting nets more than one-third of the way across tidewater streams or within 100 yards of another net. The 1896 act authorized the hiring of three inspectors. In practice, until 1912 two agents shared responsibility for policing the far-flung fishing sites. Territorial governor John G. Brady branded the fishing regulations “a farce.” Hearing that lack of funds forced federal inspectors to rely on the canneries for transportation, he quipped, “As well send a man to the front without arms and ammunition.”15

Congress transferred Alaska fish management from the Department of the Treasury to the Bureau of Fisheries, Department of Commerce and Labor, in 1903. This move strengthened regulatory sympathy for the packing companies because of the agency’s close ties to business interests. An inspection of 34 fish traps in the Southeast in 1908 showed 29 in violation of the weekly closed period. A second check a week later disclosed 24 still in violation. Courts levied fines in 54 convictions that year, and some supervisors lost their jobs.16 Dependent on the companies for transportation and sometimes for food, the inspecting agents found it next to impossible to enforce the law. The boats they employed in 1912 lacked the necessary speed to catch violators. Stream guards, introduced in 1918, could be subject to bribery. Should violators be caught, prosecution would be uncertain given the cost, difficulty of showing proof, and lack of will within elements of the judicial system.17

SALMON AND ALASKA NATIVES

The salmon business in some respects detrimentally affected Alaska Natives, as did other forms of commercialization of Alaskan resources. Treated as wards of the government, Natives could not stake natural resource claims under U.S. laws. Tlingits and Aleuts honored family rights to fishing grounds and hoped
these rights would be respected. At first, canneries in Southeast Alaska recognized Tlingit claims; some bought construction sites from the Natives or paid them royalties based on the number of fish taken. When competition intensified, canneries ceased the practice. In a reversal of the usual cultural clash, the Southeastern Indians tried to defend what they regarded as private rights against the European concept of fish as common property and available to everyone.

By prohibiting dams and weirs, the 1889 law overrode Native claims to stream ownership and measurably increased the difficulty of their catching fish to supply canneries. Minimum distances between traps and nets mandated by the 1896 amendments further disadvantaged Natives and benefited trap owners. Natives lacked the capital, technical skills, and heavy equipment necessary to build stationary pile traps or the more versatile floating traps that came into use in 1907. Natives able to purchase or lease boats could engage in purse seining that began shortly after the turn of the century.

Governor Lyman Knapp, attempting to curb the canneries’ behavior, drafted a document for use by the Tlingits. One, circulated in Juneau in 1891, read,

This is to notify all persons interested, that . . . Suk-ta-han and his father Kitch-noch claim exclusive right of possession of river at Sitkok bay for fishing purposes. . . . Any white persons desiring to negotiate for privileges there must either satisfy ALL CLAIMANTS or have the matter of controversy settled by getting the parties claiming the rights together before me or some magistrate and have a hearing and determination of the questions at issue.

The Juneau Mining Record ridiculed the “valuable document” of the “noble siwash” as “worthy of preservation in a museum for rare curiosities” and accused the “heap big governor” of attempting to “create a small sized siwash land office as well as a sort of court for the adjudication of siwash difficulties.” Governor James Sheakley, who held office from 1893 to 1897, did not sustain Knapp’s efforts.

Chief Johnson of the Taku wrote to a Treasury Department official, “This is the country of my people, who must have salmon to live. Five cannery companies catch salmon last summer in Takou River, and will take all the salmon from my people. . . . The book you gave me when I last saw you . . . you marked the page where the law say no man can catch fish with net in the river. . . . The canneries do not keep that law, they fish in river and fish all the time.” Lt. Cmdr. Jefferson Moser, a Naval officer who investigated the salmon fishery for the Fish Commission, explained in 1898 that

a native, whose ancestors have lived on a certain stream for generations, and whose rights are respected by other natives, supplies a certain cannery with his catch, as possibly he has been doing for years. A rival cannery tells the
native he must sell his catch to it, and that otherwise the men will fish the native’s stream. The result is overfishing, bad feeling, complaints, 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.23

Some cannery operators, Moser stated, paid chiefs a fee for the use of streams, whereas others reneged on payments. Tlingits resented the appropriation of their resources by others to make a profit and could not understand why the whites, whose culture they admitted to be superior, would not respect traditional Native rights. They pointed out the irony of Natives being forbidden to stake mineral claims. Moser, sympathetic toward their plight, felt that little would be done to correct the situation. Natives had lost the contest over fishing territories.24 A legal opinion issued by the Interior Department in 1942 upheld the validity of aboriginal Native fishing rights, but officials refused to act.25

Appropriation of salmon streams by whites may have jeopardized Natives’ cash income rather than food supply per se. Fisheries agent George R. Tingle reasoned that even if whites fished a river to commercial exhaustion, enough salmon would return to the numerous tributaries to feed the Natives. When questioned, he said Tlingits objected to loss of the right to sell fish to the canneries and no longer wanted to catch and dry fish for food. They showed little concern for their food supply, Tingle added, when they slaughtered large numbers of deer merely to sell the hides.26 Laws banning commercial fishing in streams benefited Natives who fished for subsistence. In the Yukon and Kuskokwim rivers the government heavily restricted commercial fishing beginning in the 1920s. This helped guarantee a reliable supply of salmon for Native consumption.27

Canning companies sometimes directly assisted the Natives. On Kodiak Island in 1922, Alaska Packers Association set up housing and commercial fishing facilities for the Aleuts at Karluk River. In 1944 the Aleuts won reserve status for 35,000 acres embracing the river, one of the most productive salmon waters in Alaska, thereby securing an economic base. The reserve boundaries extended 3,000 feet offshore.28 Canning companies challenged the Aleuts’ exclusive right to fish in reservation waters and won in a close 1949 Supreme Court decision. For their part, Metlakatla Indians on Annette Island in the Southeast started a community-owned cannery in 1890 and established a reserve in 1891, both ultimately upheld by the courts.29

In the 1940s and 1950s the Bureau of Indian Affairs provided loans to Natives for purchase of boats and canneries. It advocated recognition of Native rights to traditional fishing territories. By contrast, the Fish and Wildlife Service, in control of Alaska salmon fisheries from 1940 to 1960, resisted Native land

As soon as Alaska became a state, it abolished all commercial fish traps. The federal government took the position that Natives had the right to build traps on territory belonging to them. A 1962 Supreme Court decision upheld only the traps in the Annette Island Fishery Reserve authorized by executive order in 1916.31

Salmon fisheries benefited Alaska Natives by offering an opportunity to earn cash (Table 15.1). Indians worked at American-owned salteries in the Southeast in the 1870s. As soon as the first canneries opened in the region, Indians sold them salmon and provided cannery labor thereafter.32 At Karluk some Aleuts fished commercially and used equipment provided by canneries. Nonetheless, they felt ambivalent about wage work. Moser observed that “the complaint is made everywhere that Indian labor—that is, the labor of men—is uncertain. After making sufficient wages to supply their personal wants and getting a few dollars ahead, the desire for hunting and fishing seizes them and they are apt to leave when they are most wanted.”33
To the extent that Alaska Natives worked in the salmon industry, conversion to a cash economy hastened the dissolution of their subsistence culture. Rather than drying enough salmon for a winter food supply or for barter, they sold the fish to canneries. Unless they carefully managed their money, a practice not part of their tradition, they risked hardship. They craved Western goods, not least the ingredients for brewing liquor, which sold briskly. At the same time, many took pride in their aboriginal culture. Lack of industrially efficient behavior by the Indians and rapid growth of canning operations resulted in the importation of Chinese workers. A turn-of-the-century visitor noted, “In the skillful manipulation of the cans and machines within doors, neither [the Indian] nor the white man can approach the automatic dexterity of the Chinese, who, being paid by the piece, take no account of a day’s working hours, and keep the machinery moving as long as there are fish in the cannery.” Exclusionary laws forced the departure of most Chinese from Alaska by 1906, and workers of Japanese, Filipino, and Mexican origin replaced them in some canneries.
During World War I most Tlingit men worked seasonally on fishing boats, and women and children labored in the canneries. A 1935 survey in northern Southeast Alaska showed that of a total of 2,444 Tlingit residents, 862 worked on seine boats and 795 in canneries. By the 1940s many operated their own boats. Tlingits resented the competition from cannery-owned fish traps and imported labor. They continued to practice subsistence hunting and fishing, typically in the vicinity of the canneries, where they lived seasonally.37

HATCHERIES

Concern for sustainability of the salmon fishery implied a need for more constricted fishing zones or periods, limits on the amount or type of gear employed, or means of increasing the numbers of salmon. Upon its inception in 1871, the U.S. Commission on Fish and Fisheries adopted fish propagation technology as its main conservation mechanism. Livingston Stone, director of hatcheries in California and Oregon, accompanied a Fish Commission team surveying Alaska for possible hatchery sites. He recommended upon returning that Afognak Island be made a “Salmon National Park.” He presented his idea to the American Fisheries Society and in George Bird Grinnell’s *Forest and Stream*. The Afognak Forest and Fish Culture Reserve came into being on December 24, 1892.

Hatcheries might be owned by cannery companies, other private concerns, or the federal government. Companies, hoping to head off government restriction, built and briefly operated a hatchery at Karluk River in 1891. Four others went into operation, one at Karluk and three in the Southeast, during the late 1890s.38 At his own expense, trader John C. Callbreath ran a hatchery operation on Etolin Island in Southeast Alaska from 1892 through 1907. He used methods as natural as feasible, penning the salmon in the stream. He did not succeed in getting return runs of fish, possibly because of overfishing near his stream. His request for protection went unanswered, and the reasons his experiment failed could not be determined.

Prompted by warnings of fish scarcity and recommendations that hatcheries be government operated, Congress acted in 1900 to require packing companies to maintain hatcheries. Some compliance ensued, but costs and inexperience yielded avoidance and poor results. Congress repealed the requirement in 1906.39

Fish culture experts who dominated the Fish Commission and its successor Bureau of Fisheries emphasized fish propagation rather than regulation as the way to maintain stocks. Canners also preferred weak regulations and wanted to gain title to their cannery and trap sites. The Fish Commission resisted private ownership of sites and hoped to lease them and set catch quotas for each. It of-
舒心政府的孵化场和没有捕鱼配额作为妥协，捕捞者接受了。在1905年，国会授权阿拉斯加的第一个联邦孵化场，于当年在东南的Yes Bay开业。第二家于1908年在Afognak Island上的Litnik Lake投入运营。

在阿拉斯加，典型的孵化场收集回溯到繁殖河的鱼，并且移除卵子和精子。在孵化场内，受精卵在受保护的容器中孵化。孵化幼苗留在流动的水中，直到足够大才被释放。银鱼和哲罗鱼回到海洋作为幼鱼，而红鲑、大马哈鱼和王鲑则在围栏或湖泊中生活大约一年后被释放，直到达到成熟期。在海洋中成长后，鲑鱼返回孵化场溪流，但不属于孵化场的主人。

捕捞场继续在20世纪运营少数孵化场，获得了理论上等同于其生产幼鱼成本的税收减免。然而，检查人员指出，将幼鱼直接投入湖泊是孵化场方法之一的弱点。在被Dolly Varden char等鱼类侵扰的湖泊中直接释放幼鱼，暴露了幼鱼被过高的捕食水平所捕杀。孵化场操作员往往缺乏技术培训，犯下许多错误。捕捞场官员和政府及私人孵化场经营者都声称取得了成功。1906年至1920年，政府在孵化场上的支出远超过在渔业管理和鲑鱼研究上的支出。然而，没有孵化场有效性的确凿证据，且鲑鱼种群继续减少。

联邦孵化场一直持续到1933年，当新的渔业专员Frank T. Bell访问并下令关闭它们。Bell认为它们是不正当和慷慨的补贴给渔业。唯一的私人孵化场，位于东南的Boca de Quadra Bay，在1936年关闭。孵化场在前40年可能充当政府逃避不愉快监管的借口，以及捕捞商忽略保护措施的借口。

在1950年代之前，孵化场取得了最佳的成果。1919年至1927年，阿拉斯加领地运营了四个孵化场，但不确定性导致他们收入程序被取消。在1940年代，渔业局在Baranof Island的Little Port Walter建立了一个实验红鲑孵化场。它未能产生有用的数据，以评估孵化场鲑鱼对自然红鲑种群的影响。从1950年开始，新的领地渔业部门试图在阿拉斯加溪流中建立大马哈鱼种群，通过从华盛顿种植卵。实验彻底失败，但该部门成功地启动了红鲑种群。该部门在Afognak Island的Kitoi Bay建立了一个研究站来研究红鲑和哲罗鱼，从1954年到1964年。研究结果丢失。在Ketchikan附近的Deer Mountain开始的孵化场，于1955年开始，再次尝试创建大马哈鱼种群。
without significant results. It had mixed success in generating coho runs in lakes and streams. Pre-statehood experiments supplied vital knowledge of salmon ecology but could not compensate for the losses of salmon.

**LAW ENFORCEMENT AFTER WORLD WAR I**

Application of effective fishing methods by competing parties threatened to erode salmon runs and generated conflict and temptation to fish illegally. Almost any government attempt to regulate gear drew fire from one or more of the interested groups. Ongoing complaints and projections of a salmon industry collapse created a widely shared consensus on the need for protective action. Sales dropped from the high of World War I, and companies shut down numerous canneries. The companies maintained a strong presence in Bureau of Fisheries deliberations, and the agency lacked the power to regulate fishing beyond the low-tide line.

Disaster along the Yukon River forced action by the federal government. A very low harvest of salmon in 1919 followed the introduction of commercial fishing in 1918. Many Yup’ik Eskimos and Athabaskan Indians died of starvation. All parties including the canning companies agreed on the need for conservation to be overseen by the federal government. But they disagreed on the meaning of “conservation” as it applied to fisheries. In congressional hearings Dan Sutherland, representing Alaska’s small fishermen, interpreted “conservation” to mean open and equitable access for all citizens to natural resources and government regulation to ensure access. In effect, Sutherland’s conservation would call for abolition of permits, reserves, private ownership of sites, and fish traps, all of which disadvantaged small fishers. By contrast, Secretary of Commerce Herbert Hoover and the canning companies with which he empathized defined “conservation” in terms of efficiency. The companies wanted to own the trap sites and be subject to weak regulation. The most economically and technically efficient means of stopping the falloff of salmon runs implied traps and permits and thus favored the companies. The technology of fisheries led to a split between “equity” conservation and “efficiency” conservation, and the latter won out in the 1920s.

To conserve fisheries the bureau revived the 1892 Afognak Island precedent of salmon reserves to safeguard important spawning rivers. According to this plan the government would set aside a series of reserves in which leases for exclusive harvest could be granted. The plan would advance conservation of fish but would benefit the large companies who could afford the leases.

In 1922 President Warren Harding designated fishing reserves (by permit only) on Bristol Bay, Kodiak Island, Cook Inlet, and the Alaska Peninsula and Aleutians. The battle between Alaska fishers and the canning companies con-
continued. Criticism of the reserves led to a compromise in the 1924 White Act. It empowered the national government, specifically the secretary of commerce, to bring Alaska fisheries under more complete control. It ended exclusive fishing rights, thereby abolishing the reserves. It set regulations on nearly all aspects of fishing and specified that 50 percent of the fish entering each stream must be allowed upstream. It extended Bureau of Fisheries jurisdiction to the three-mile limit. Canning company lobbyists tried in vain to kill the 50 percent escape-provision but managed to stop Sutherland’s amendment to abolish fish traps. Alaskans had objected to fish reserves, favored by the large canning companies, and they won stiffer restrictions on fish traps. Enforcement capacity improved from eight boats and 50 stream guards in 1923 to ten boats and 103 guards after passage of the act.

Regulations pursuant to the White Act aimed to achieve sustainable harvesting of salmon. By its nature, the fierce competition among fishers and canneries during the short spring and summer seasons led to excesses and would eventually exhaust the salmon runs if not curbed. Rules stipulated, among other provisions: (1) no wasting of salmon, (2) processing of salmon within 48 hours of death, (3) no driving of salmon from protected to unprotected areas, (3) no fishing during a specified period in each week, and (5) limits on the type, size, and placement of fishing gear; for example, traps in different regions had to be 0.5 to 1.5 miles apart. Restrictions varied for each district, based on different salmon species and environmental conditions.

After a post–World War I recession, the industry again grew rapidly. Debate ensued as to whether the increase in harvest could be credited to conservation measures or to advancing technology and exploitation of new locations in Alaska. Writer-conservationist Stewart Edward White, depicting fisheries in the late 1920s, subscribed to the latter thesis:

I have seen every regulation on the list flagrantly and repeatedly violated. Seine boats fish the mouths of streams whenever they get a chance. This is obviated to a certain extent by the recent installation of stream watchers. But sometimes one man must look after several widely scattered streams, and a lively seine-boat skipper is quick to seize the absence. And, though most watchmen are honest, there are some willing to wink the other eye, either through friendship or because they sympathize with the poor devil who has had a lean season, or, quite simply, because they are bribed. . . . No one who has not seen it can realize the intensity of the scramble for fish in the brief season. . . . [T]hose bringing in the salmon are quite aware of the fact that any salmon are more than welcome.

White considered the weekend no-fishing period to be discriminatory against the relatively visible seine boats and in favor of trap operators, who often left the gate open unless a patrol boat happened along.
Enforcement, however inadequate, tightened in the mid-1920s. Using ten Bureau of Fisheries vessels and chartering eleven others, agents reduced the incidence of trap robbery. Most violations involved fishing in closed waters, fishing out of season, or improper use of gear. Officers seized, for example, four traps for illegal fishing in the Southeast in 1925; the court ordered two sold, fined a watchman $100, and sent him to jail for 30 days. The Coast Guard seized two Canadian vessels for fishing in U.S. waters; the court released them after levying $100 fines.\(^{50}\)

Aircraft, first employed in 1929, multiplied the range of agents’ surveillance and gave them an additional measure of surprise. By 1935 the bureau fielded faster boats and a total of 170 stream guards. One trap owner paid a $750 fine for operating a trap during the weekly closed period; another paid $500 for using traps postseason. Two beach seiners paid $50 fines and forfeited the salmon they had caught in Petersburg Creek.\(^{51}\)

Salmon scarcity in the 1940s and 1950s heightened fishing competition and the frequency of law violations. Alaska Game Commission agents and pi-
lots assisted the Bureau of Commercial Fisheries in law enforcement. Of 50 cases before U.S. Commissioner courts in 1945, 44 resulted in convictions. Normally, violators paid $100 fines and gave up their catches. In 1955 the commissioner courts pronounced 218 of 244 defendants guilty in 125 cases. Compared with 1945, fines increased for larger operators, but the small man usually paid $50 or $100 or won acquittal.52

**TERRITORIAL-FEDERAL ANIMOSITY**

Management of the salmon fisheries stirred virulent resentment among Alaskans during the entire territorial period. Alaskans believed the canning industry, concentrated largely in San Francisco, Seattle, and Astoria, had been instrumental in shaping the 1912 Alaska Territorial Act that created the territory but denied the legislature managerial control over fish and wildlife. The legislature retained the power to impose limited licensing and property taxes on fisheries, providing the bulk of the territory’s revenue for decades. The fishing industry lobbied Congress unsuccessfully for bills removing the territory’s right to tax but succeeded in forestalling the territory’s repeated attempts to gain management powers.53

Local feelings toward stateside fishermen and the federal government ran high. After passage of the 1924 White Act, fishermen complained that their boats and gear could be seized upon suspicion of their location, whereas most fish traps could not. For many years residents in some districts had difficulty being hired to fish for or work in the canneries, even if they joined an outside-based union.54 Between 1927 and 1938 the Seattle-based Alaska Fishermen’s Union maintained a contract clause obligating some canneries to pay a four-cent penalty (one-third of the value) for each fish purchased from an Alaska resident. Another contract set a ratio of thirteen nonresidents for each Alaska resident fisherman allowed to sell to the canneries.55

Researchers Homer F. Gregory and Kathleen Barnes of the Institute of Pacific Relations examined claims that canning companies exercised monopolistic control. They pointed out that large companies could better afford the modern vessels increasingly employed to transport workers and fish over long distances; could more effectively bargain with unions, influence policy, and market their products; and possessed the breadth and stability to survive downturns in prices or salmon runs. Moreover, the conservation regulations incidentally favored them by spreading fish traps over a wider range, giving larger operators a relative advantage.56

Alaska Packers Association, a San Francisco–based group formed in 1893, put up as much as 80 percent of the salmon pack for most of the 1890s. By declining percentages it headed the Alaska industry until World War I.57 By the
1930s, however, no company dominated. In 1937, near the all-time peak of production, 113 canneries operated in Alaska, owned by 75 companies. Most companies had 1 or 2 canning factories. In the Pacific Northwest as a whole, the largest company ran 11 factories and the 9 largest had a total of 52. Of 453 traps in Alaska, the 5 largest companies controlled 171 and the 9 largest companies 214. Traps in Alaska caught 46.4 percent of the salmon, seines (mostly owned by small concerns) 27.7 percent, gillnets 24.3 percent, trollers (for fresh or cured salmon) 1.4 percent, and fish wheels (used by Natives only) 0.3 percent. Alaska Packers Association put up 11.5 percent of the canned salmon in 1937 and the leader, Pacific American Fisheries, Inc., somewhat more. Gregory and Barnes concluded that competition among the companies and the variety and mobility of gear prevented formation of a monopoly. Working together, however, the companies exercised a powerful effect on regulatory policy.

Salmon Traps

Probably nothing more clearly focused local resentment of federal control than salmon traps. Alaska Natives had devised various means of trapping salmon, and the Russians built traps for the salted salmon trade. Americans followed suit, improving on the designs to supply large numbers of salmon to the canneries. The two most common forms, stationary and floating, ultimately caught more fish than any other type of gear. Fishers placed these devices in streams and estuaries until the 1889 law banned the practice, and they continued to do so until law enforcement tightened up. By 1901, 57 stationary traps existed: 6 in Bristol Bay, 21 near Chignik on the Alaska Peninsula, 1 at Kodiak, 20 in Cook Inlet, and 9 in Southeast Alaska. Floating traps appeared in 1907 and proved cheaper to operate than stationary traps, which had to be pulled up after every season to reduce navigation hazards. Floating traps could be towed into a harbor for the winter.

A strike by fishers in 1912 caused the canners to increase their reliance on fish traps. Traps enabled companies to reduce labor costs, gain greater control over the fishing and transportation process, and obtain fresher fish to can. The number of traps peaked at 799 in 1927. Required minimum distances between traps cut the numbers steadily. Traps caught more salmon in times of plenty, but purse seines got more in times of scarcity.

Fish traps sat strategically in the pathways of salmon returning to their spawning rivers. Fish swam into a pen from which they could not escape. Traps could be brailed (emptied) at leisure and the fish delivered to a cannery in relatively unspoiled condition. Occupiers of a trap site held an exclusive right to that site by tradition and might sell the lease for a large sum. Those who fished
by other means strongly resented the fish traps, accusing the owners of putting them out of business by overexploiting the fish supply. Industry representatives interpreted the dispute as largely a labor issue in that fish traps required few workers. Government fisheries officials defended the traps as a legal and efficient means of harvesting fish.\textsuperscript{60}

Between 1915 and 1958 more than 40 percent of the salmon catch came from fish traps, 75 to 90 percent outside-owned. In a 1948 nonbinding referendum Alaskans voted by more than seven to one to abolish fish traps. Federal officials contended they could not legally discriminate in favor of local residents and that, compared to other methods, fish traps wasted less salmon.\textsuperscript{61} In any case, the secretaries of Commerce and Interior lacked the authority to abolish traps until 1949. Thereafter, federal reluctance to abolish salmon traps further convinced Alaskans that Washington overrode their wishes for the benefit of powerful outside interests. Critics cited the salmon decline as the outstanding proof of federal mismanagement of natural resources and called for territorial control of resources, or for statehood, as a remedy.

Salmon Decline and Statehood

A long and deep depression in salmon harvests began in the late 1930s (Table 15.2), intensifying mutual recriminations and resentment of federal management. At maximum in 1929 the canneries numbered 160, in the 1930s and 1940s about 110–115, and by 1960 about 50. The number of traps stayed at about 400 from the mid-1930s to the mid-1950s. But gillnet boats increased from 3,000 to 7,500 and seine boats from 700 to 1,500 during the period. Average annual catches declined about 50 percent for traps, 80 percent for purse seiners, and 90 percent for gillnetters. Between the peak harvest year of 1936 and 1959, the total catch fell from 8.5 million to 1.6 million cases, prompting President Dwight Eisenhower to declare Alaska fisheries a disaster area in 1953 and 1954.\textsuperscript{62} The emergency resulted in increased federal enforcement and research funds, scarce prior to the mid-1950s. Higher salmon prices, however, tempted more people to fish and inspired more illegal fishing.\textsuperscript{63}

The Interior Department’s Fish and Wildlife Service had assumed jurisdiction over Alaskan inshore fisheries in 1940. As a wildlife management agency the service saw its main responsibility as maintaining a sustainable supply of salmon and not involving itself in questions of who should get the fish. In effect, this policy favored the large companies who possessed financial and technical advantages in access to salmon. It reinforced Alaskans’ impressions that the federal government favored the outside companies. Within the context of tightening competition for fewer salmon, federal-territorial relations worsened in the 1940s and 1950s.
The service held annual hearings in Seattle and Alaskan fishing ports to discuss status of the stocks, report on research results, and hear comments before drafting regulations for the following year. But the meetings did not result in a mutual effort to conserve fish stocks. Despite annual decreases in salmon catches, the canning companies and labor unions united to demand weaker regulations. Fish and Wildlife director Ira Gabrielson confronted industry representatives at a 1941 hearing, castigating them for their greed: “One is therefore to conclude that the governing motive is the desire to take as many fish as possible now without any regard to the future supply. No industry, no matter how potentially profitable it may be, can long endure if the partners engage in indiscriminate looting.” After each Seattle meeting the industry lobby went to Washington to seek more receptive ears. During the war they argued for relaxed regulations to feed the troops, and after the war they contended that restrictions prevented rebuilding the fishing fleet. Meanwhile, in most years the salmon harvest continued to go down.64

In 1949 the Alaska legislature created a Department of Fisheries in preparation for eventual statehood. Members of its governing board included three fishermen, a canning industry representative, and a member of the public at

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**Table 15.2. Commercial Salmon Catches in Alaska (thousands of fish), 1878–1982**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Year</th>
<th>Total</th>
<th>Year</th>
<th>Total</th>
<th>Year</th>
<th>Total</th>
<th>Year</th>
<th>Total</th>
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<tr>
<td>1878</td>
<td>56</td>
<td>1899</td>
<td>14,358</td>
<td>1920</td>
<td>64,066</td>
<td>1941</td>
<td>103,608</td>
<td>1962</td>
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<td>1879</td>
<td>69</td>
<td>1900</td>
<td>21,546</td>
<td>1921</td>
<td>38,568</td>
<td>1942</td>
<td>80,844</td>
<td>1963</td>
<td>47,471</td>
</tr>
<tr>
<td>1880</td>
<td>68</td>
<td>1901</td>
<td>27,165</td>
<td>1922</td>
<td>72,273</td>
<td>1943</td>
<td>86,717</td>
<td>1964</td>
<td>65,717</td>
</tr>
<tr>
<td>1881</td>
<td>91</td>
<td>1902</td>
<td>31,794</td>
<td>1923</td>
<td>77,789</td>
<td>1944</td>
<td>70,128</td>
<td>1965</td>
<td>56,331</td>
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<tr>
<td>1882</td>
<td>177</td>
<td>1903</td>
<td>30,095</td>
<td>1924</td>
<td>82,181</td>
<td>1945</td>
<td>74,867</td>
<td>1966</td>
<td>64,033</td>
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<td>1883</td>
<td>295</td>
<td>1904</td>
<td>28,631</td>
<td>1925</td>
<td>64,163</td>
<td>1946</td>
<td>72,454</td>
<td>1967</td>
<td>20,881</td>
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<td>429</td>
<td>1905</td>
<td>27,257</td>
<td>1926</td>
<td>96,785</td>
<td>1947</td>
<td>69,859</td>
<td>1968</td>
<td>62,292</td>
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<tr>
<td>1885</td>
<td>640</td>
<td>1906</td>
<td>31,312</td>
<td>1927</td>
<td>47,517</td>
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<td>34,643</td>
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<td>1908</td>
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<td>1929</td>
<td>71,107</td>
<td>1950</td>
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<td>1971</td>
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<td>1909</td>
<td>34,938</td>
<td>1930</td>
<td>80,076</td>
<td>1951</td>
<td>49,503</td>
<td>1972</td>
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<tr>
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<td>6,605</td>
<td>1910</td>
<td>33,365</td>
<td>1931</td>
<td>69,629</td>
<td>1952</td>
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<td>1973</td>
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<tr>
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<td>6,625</td>
<td>1911</td>
<td>44,307</td>
<td>1932</td>
<td>72,196</td>
<td>1953</td>
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<td>1974</td>
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<td>1912</td>
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<td>1954</td>
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<td>1975</td>
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<td>7,266</td>
<td>1914</td>
<td>54,975</td>
<td>1935</td>
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<td>1956</td>
<td>50,591</td>
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<td>8,506</td>
<td>1915</td>
<td>63,655</td>
<td>1936</td>
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<td>1957</td>
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<td>1978</td>
<td>82,281</td>
</tr>
<tr>
<td>1895</td>
<td>7,586</td>
<td>1916</td>
<td>69,742</td>
<td>1937</td>
<td>108,687</td>
<td>1958</td>
<td>41,000</td>
<td>1979</td>
<td>88,754</td>
</tr>
<tr>
<td>1896</td>
<td>11,536</td>
<td>1917</td>
<td>91,565</td>
<td>1938</td>
<td>100,710</td>
<td>1959</td>
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<td>1980</td>
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<tr>
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<td>13,025</td>
<td>1918</td>
<td>102,041</td>
<td>1939</td>
<td>78,341</td>
<td>1960</td>
<td>42,484</td>
<td>1981</td>
<td>113,325</td>
</tr>
<tr>
<td>1898</td>
<td>12,898</td>
<td>1919</td>
<td>57,367</td>
<td>1940</td>
<td>84,800</td>
<td>1961</td>
<td>45,026</td>
<td>1982</td>
<td>111,572</td>
</tr>
</tbody>
</table>

large, to be nominated by the governor and confirmed by the legislature. The department assisted the Bureau of Commercial Fisheries by fielding additional stream guards, improving spawning beds, and conducting research. The dominant responsibility for salmon management, however, remained with the federal government until after statehood. Secretary of the Interior Fred Seaton abolished fish traps effective in 1959, the last year of federal control.

During and after his 1939–1953 tenure as territorial governor, Ernest Gruening kept up a steady criticism of federal jurisdiction over fisheries. The steep reduction in harvest reinforced his argument that territorial or state control would be better for conservation. In 1954 he wrote that

forty-two years ago, the Territory of Alaska, deprived as no other territory had been, of the control and management of its fisheries, through the intrigue and political manipulations of the same forces that have helped destroy the resources, began to plead for that right of self-government. . . . But an absentee industry, wealthy and politically potent, little concerned with the morrow of Alaska’s resources, has been able to thwart this logical aspiration and long-overdue change, abetted by a bureaucracy equally unwilling to yield an iota of its perquisites.

Gruening charged that in addition to jeopardizing a vital natural resource, the canning industry used its clout to oppose statehood because it would mean Alaskan control over the fisheries.

Salmon symbolized the frustrations of Alaskan boosters, who strove to replicate the American experience of taming the frontier and converting its natural resources into prosperous and self-governing communities. In the view of the business community, newspaper editors, and politicians, this normal and proper goal required that local citizens control the resources. That meant the settlers, not the Native Americans. Yet very little capital existed in Alaska. The salmon industry, like large-scale gold and copper extraction, necessitated investment from outside owners who did not fancy living in remote and primitive conditions. Managers and stockholders in faraway Seattle, New York, San Francisco, and other cities built and owned most of the canneries and the large vessels employed. Companies imported nearly all their supplies and many workers and needed very little from Alaskans. The territory functioned as an economic colony of the United States, its settler population sustained largely by federal expenditures.

Outsider control of natural resources and, to a high degree, of the governance system grated on the boosters. Rather than acknowledge the problem of remoteness, they blamed the canning companies’ political power for retarding the growth of their communities. They viewed federal conservation measures in the same light and labeled most such moves “federal mismanagement.” Opposition to the federal government, to environmental protection, and to
recognition of Native claims became ingrained in the settlers’ political culture. Boosters looked for salvation in statehood. Then, they believed, control over natural resources and over their political affairs would at long last enable them to achieve their destiny.68

JAPANESE-AMERICAN COMPETITION

An ongoing quarrel between the United States and Japan affected world affairs as well as Alaska salmon. A seafaring nation consuming a high quantity of fish, Japan turned its attention to North Pacific salmon. Victory in the Russo-Japanese War of 1904–1905 gave it access to sites on the Siberian coast for cannery locations. Forced out by the Soviets after 1918, the Japanese designed cannery ships, enabling them to operate offshore.69 The vessels first appeared in the Bering Sea in 1930 and processed king crabs, a fishery not yet exploited by the Americans. Diplomatic talks produced an informal understanding that Japan would not fish there for salmon and the United States would not encourage a domestic crab fishery. Under the influence of its fishing industry, the Japanese Diet funded a 1936–1939 “study” of the North Pacific salmon fishery. A mother (cannery) ship and six fishing boats appeared in the Bering Sea in 1936 and canned both crabs and salmon. At a meeting of fishery representatives in February 1937, a Japanese delegate proposed a joint venture to operate floating canneries in Bristol Bay. American representatives rejected the plan.70

Tensions rose when a Japanese fishing fleet visited Bristol Bay in June 1937. A State Department inquiry evoked Japanese assurances that the fleet had no license to fish salmon there and was “presumably engaged in crab fishing.” American fishery companies chartered a plane and photographed the vessels catching salmon. In its response to Japan, the State Department argued that “as a sound principle of justice” no nation should destroy a resource being conserved by another nation and that the United States had “the right or obligation to protect the salmon fisheries.” It did not claim legal jurisdiction over the fish as it had attempted to do in the case of fur seals. The Japanese government promised to discontinue the study after 1937.71

Japanese military advances in China and multiple indications of deteriorating U.S.-Japan relations transformed the salmon incident into a dramatic confrontation. A New York Daily News writer declared in August 1938:

Aside from commercial aspects, the plain implication of Japan’s position is a new definition of her sphere of influence in the Pacific, constituting a direct challenge to our sovereignty over waters hitherto considered exclusively within United States jurisdiction. It amounts also to a continuation of the aggressive policy of territorial expansion applied to Manchukuo and China, only this time by sea instead of land.
The writer charged that the Japanese operated more than 1,000 vessels along the eastern Pacific Coast, crewed by naval reservists rather than ordinary fishermen: “They not only chart the waters off our shores and the channels leading into our bays, inlets, and harbors, between Nome and San Diego; they possess accurate knowledge of our naval bases, our coast defenses, even our gasoline and oil stores.”

Rumors of a return of the Japanese fleet in spring 1938 prompted a Coast Guard investigation that found nothing. But the rumors inflamed fishermen and others suspicious of Japan. Newspaper and magazine articles, radio programs, and even movies magnified anti-Japanese sentiment and heightened demands on the government to take action. Bills introduced in Congress declared the salmon to be U.S. property and called for widening national jurisdiction to waters over continental shelves. Almost certainly, the angry mood contributed to American military defense buildup in the Pacific.

World War II interrupted Japanese fishing in subarctic waters. During the postwar occupation, General Douglas MacArthur placed severe restrictions on Japanese fisheries, excluding them from the Bering Sea and Aleutian Islands. The constraints remained in force until 1952 as a means of pressuring Japan to agree to boundaries favorable to the United States. Japan, Canada, and the United States signed a treaty in 1951, ratified in 1953, forming the North Pacific Fisheries Convention. Under its provisions Japan would refrain from catching salmon originating in North American rivers. Lacking certainty of where the fish went at sea, parties agreed that Japan could fish west of 175 degrees West Longitude, a line bisecting the central Aleutians. Meanwhile, research would be done to determine boundaries between eastern and western Pacific salmon so the jurisdictional line could be adjusted accordingly.

Japan stepped up its high seas fishing in 1954, and for the next three years sockeye salmon catches in Bristol Bay fell well below normal while Japan made record catches. As many as 20 percent of fish caught in Bristol Bay bore scars from small-mesh driftnets used by the Japanese. American researchers concluded that a majority of fish caught almost as far as 170 degrees East Longitude, near the tip of the Aleutians, came from North America. American and Canadian fishers, restricted to inshore fishing as a conservation measure, asked the Japanese to move their operations westward. At a 1957 meeting of the Fisheries Convention, the Japanese refused.

Differing interpretations of research results prevented resolution of the fishing boundary question for two decades. Effective in 1977 the United States and others adopted a 200-mile offshore zone for national jurisdiction over fishing rights. Japan and the United States then negotiated a treaty recognizing the new exclusion boundaries. In effect, the agreement moved Japanese fishing to 175 degrees East Longitude and 200 miles away from American-owned islands. In
the Bering Sea foreign vessels could fish without permission only in a zone in the center. Even then, high seas fishing by Japan, Taiwan, and Korea intercepted salmon from Alaskan waters.

Americans arrested vessels illegally fishing within the 200-mile limit. Pressured by environmentalists, the U.S. government prevailed upon Japan to stop the use of driftnets that stretched for several miles and captured a wide variety of fish, birds, and mammals. Japan halted the practice in 1991, and subsequent agreements limited the length of driftnets and prohibited all salmon fishing by gillnets on the high seas. In 1992 a North Pacific Anadromous Fisheries Commission, now including Russia, replaced the tripartite 1952 International North Pacific Fisheries Commission.

RESEARCH ON SALMON

Effective conservation and government regulation suffered acutely from a lack of accurate information. Evidence appeared to justify the widespread opinion that overfishing did long-term damage, but proof did not come easily. Without sound research data, congressional committees could not readily be induced to vote for restrictions. Moreover, Alaska’s isolation and the territorial government’s weak position and emotional stance precluded high visibility or sympathy in Congress or in stateside public opinion. Vocal Alaskans displayed much more interest in improving their own take of salmon than in conserving the stocks.

Federal research on Alaskan salmon began in 1899 when the U.S. Fish Commission vessel Albatross identified species and their locations in the Southeast. A year later, the ship surveyed Bristol Bay. The Bureau of Fisheries opened an office in Seattle in 1914 and conducted summer studies of salmon life cycles in Alaska. On a small scale the bureau carried on research into the 1950s. The federal government transferred its research program to Southeast Alaska in 1956 and built the Auke Bay Laboratory near Juneau in 1960. The laboratory maintained stations at King Salmon, Brooks Lake, Karluk Lake, Kasitna Bay, Olsen Bay, Traitors Cove, and Little Port Walter. It concentrated mainly on pink, sockeye, and chum salmon. After the state gained control of inshore fisheries in 1960, the laboratory continued as a federal facility investigating the biology of high seas salmon and other organisms.

Shrinking harvests in the 1940s led the salmon industry to establish a Fisheries Research Institute. Located at the University of Washington, it began fieldwork in 1946. Increasingly through the 1950s, funding from the federal government supplemented that from private sources. The institute carried out thorough, long-term studies of salmon life cycles and focused on escapement as a key to biologically based salmon management. In the decades after state-
hood, fisheries scientists steadily improved their ability to predict and enhance salmon runs.

Accumulating knowledge of salmon life revealed a host of complexities. Stream water quality and quantity, forest cover, ocean currents and temperatures, weather patterns, hatchery production, escapement, fishing intensity, and other factors affected salmon abundance. Research on escapement showed each salmon run to be a distinct genetic unit, and thousands of such units existed in Alaska, intermingling in the ocean where most fishing took place. Earlier fishing practices had seriously damaged many genetic units. Under the White Act, regulators thought it sufficient to allow fishing for half the season and close it for the other half to achieve 50 percent escapement. Because different units ran upstream at different times, overescapement occurred for some units and underescapement for others. Underescapement could impair a unit by numerical loss, but overescapement could disrupt eggs and lower the survival rate, also weakening the unit. Perhaps for this reason, Tlingits sometimes faced starvation before the era of canneries.

Further reflection on the controversial fish traps yielded a broader perspective. Historian Robert DeArmond observed that in addition to keeping the fish fresher than those caught by other means,

the salmon trap was an efficient machine for harvesting a natural resource [and] in good part responsible for the low cost of canned salmon when compared to other sources of protein. During the years of the Great Depression, canned pink and chum salmon, No. 1 tall cans, commonly sold at a dollar a dozen wholesale, and in some years as low as 90 cents a dozen, and thousands of poor people depended on it for their protein.

“It is interesting to note,” added DeArmond, “that while all Alaskan fishermen—seiners, gillnetters, trolls—united in their efforts to abolish the traps, each now puts an approximately equal effort into fighting the others for a share of the total catch.”

Efficiency of the fishery did not concern the individual commercial fisher, who approached the business competitively. Between 1936 and statehood the average catch per operator continually fell, but high fish values balanced low harvests and kept fishermen afloat. Ever-more gear chasing ever-fewer fish meant a more rapid decrease of fish stocks and steadily lowered efficiency in the fishery as a whole. Advocates of statehood had chosen “federal mismanagement” of fisheries as their most potent rallying cry. At statehood Alaska acquired its own opportunity to tackle the increasingly complicated and politically loaded problem of who should have access to which fish under what conditions.

When the state assumed control of inshore fisheries on January 1, 1960, the salmon harvest had reached a low point. Yet the reviled traps had disappeared.
and advancing research laid an ever-stronger foundation for management. It soon became apparent, however, that competitive fishing by small companies and individual boat owners did not work well either. It multiplied the difficulties of regulation, wasted resources, and put excess pressure on fish stocks. Alaska changed its constitution effective in 1974 to restrict commercial salmon fishing by issuing permits for exclusive fishing rights at specific times and locations. This approach built conservation into the process rather than leaving it an external force pleading for regulation.85

Low salmon harvests moved the state to reinstitute public and private hatcheries in the 1970s. Accumulated experience in fish culture brought about success in propagation. Hatchery-nurtured salmon, mostly pinks and chums, eventually comprised 25 percent of the overall catch.86 But the ecological impact, if any, of large-scale hatchery salmon production had yet to be determined.

Research in the late 20th Century demonstrated a clear connection between Alaska salmon population levels and a cyclical weather pattern called the Pacific Decadal Oscillation (PDO). The PDO appeared to be connected to, but not necessarily caused by, the El Niño phenomenon. PDO periods tend to last two to three decades and are characterized by high or low sea surface temperature, sea level pressure, and precipitation. During “positive” PDO phases, higher winter precipitation along the Gulf of Alaska coast causes high spring runoff, favoring survival of salmon fingerlings. Warmer near-shore waters enhance the growth of plankton, food for the young salmon. Farther south, from British Columbia to California, this climate phase appeared to lower rather than increase salmon production. Positive PDO periods existed from 1925 to 1947 and after 1977, generally corresponding to high salmon catches (Table 15.2).87 Applying six other indexes of climate, researchers confirmed the change dates of 1925, 1947, and 1977. A century of data suggested that salmon populations probably have fluctuated for centuries, before the era of modern fishing.88 Ocean changes, therefore, rather than overfishing or mismanagement per se, may have been the primary cause of the salmon decline beginning in the 1940s. To what degree, if any, overfishing may have worsened the downward trend is not known.

By the 1980s Alaska salmon harvests rose in some years to record levels. But the industry encountered new challenges. World price competition drove down profits. Pen-raised salmon from Chile, Norway, Scotland, and Canada seized an increasing share of the market. Alaskans realized they might be forced to abandon their expensive chases at sea and follow suit.89 Meanwhile, logging in the Southeast threatened to reduce salmon runs by degrading freshwater habitat, and the possibility of oil tanker spills loomed. Pen-raised salmon might spread disease to wild populations or interbreed and genetically dilute them. Perhaps not least, global warming posed uncertainties for salmon habitat, both freshwater and marine. A study of sockeye salmon indicated that an ocean temperature
rise of a few degrees could greatly contract the range of sockeyes and perhaps other species.90

Conservation proved difficult to apply to Alaska salmon. Unlike charismatic mammals, salmon stood little chance of acquiring a public following. Isolation from public scrutiny, a politically powerful fishing industry, the widespread taste for salmon flesh, and the competitive nature of the industry invited excess in Alaskan commercial salmon fishing in the pre-statehood period. Federal enforcement agents attempted to curb aggressively exploitative behavior and achieve goals and objectives of sustainable harvest of salmon while being accused of favoring outside fishing interests. Although conservation goals usually required generous measures of ecosystem sustainability, science understood too little of salmon ecology in the years before statehood. Treaties and conventions introduced broader elements of stewardship, necessary for a fish traveling from international waters to inland destinations. A combination of tightening regulation, accumulating knowledge, and the uncertainty of annual fish hauls moved federal and state policy toward sustainable management of the salmon. Notwithstanding the achievements in salmon management, however, climatic warming might do more damage to salmon ecology and the salmon industry than all other negative factors combined.