

# The Steamer *Albatross* and Early Pacific Salmon, *Oncorhynchus* spp., Research in Alaska

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The building in 1882 of the *Albatross* (Allard, 1978, 1988, 1999; Anonymous, 1881; Tanner, 1885, 1897), a deep-sea oceanographic research steamer thoroughly equipped for the purposes of the U.S. Commission of Fish and Fisheries<sup>1</sup>, produced the means for U.S. marine science and fisheries studies ranging from coastal shallows to the abyssal depths (Fig. 1, 2). First used on the Atlantic coast, then transferred to the Pacific in 1888, the *Albatross* made annual trips to Alaska for nearly 20 years (Fig. 3) (Dunbar, 1997; Dunbar and Friday, 1994). These trips were interspersed with cruises off California (Moring, 1999), Hawaii (Dunn, 1996b),

to more southerly waters of the Pacific (Summers et al., 1996), to the Philippines and Japan (Dunn, 1996b; Smith and Williams, 1999), and to the South Pacific (Agassiz, 1913; Hedgpeth, 1945). Most of the marine surveys were exploratory, with goals of determining the location of fisheries and fishing grounds (Hedgpeth, 1945; Dunn, 1996b, 1996c), though they also produced important ichthyological and oceanographic studies.

Alaska's greatest fish wealth in the 1800's lay in its abundance of Pacific salmon—the five species of *Oncorhynchus* thrived: chinook, *O. tshawytscha*; chum, *O. keta*; sockeye, *O. nerka*; coho, *O. kisutch*; and pink, *O. gorbuscha*. However, the location of harvestable salmon was fairly well-known, and exploration was unnecessary to further encourage those fisheries. Alaska's salmon resources had long since been discovered. Exploitation of Alaska's salmon by non-Native Americans began under Russian rule and advanced quickly after 1867 when Alaska became a U.S. possession. *Albatross* naturalists were not immediately assigned to investigate this already developed and lucrative fishery.

In addition, limited research into the biology of salmon had previously begun (Gard and Bottorff, In press). Systematic research on Alaska's salmon had started in 1879 and 1880 before the *Albatross* arrived on the Pacific Coast. This research was conducted by Tarleton H. Bean<sup>2</sup>, who produced the earliest

studies of Alaska salmon (Bean, 1887, 1891, 1894).

But Bean was hampered in his studies because most salmon fishing took place in largely unexplored Alaska waters. With no vessel at his disposal, Bean's work was chiefly limited to collecting and studying the fishes obtained along the shores and from the fishermen (Rathbun, 1894).

In addition to his own observations on various species of fish, Bean gathered information about the behavior and harvest of the various salmon species from people who traveled or lived in Alaska such as William Healy Dall<sup>3</sup>, U.S. Revenue Service cutter captains, 1880 census-taker Ivan Petroff<sup>4</sup>, Alaska Commercial Company employees, and other entrepreneurs. From Bean's visit and compilations came the first publication by the U.S. Commission of Fish and Fisheries concerning Alaska's salmon (Goode et al., 1887).

For a number of years, Bean's work stood as the main reference on Alaska's Pacific salmon. Other examinations were cursory and ancillary to studies of other

<sup>1</sup>Often referred to as the U.S. Fish Commission (USFC) or just the Fish Commission. For general accounts of the Fish Commission see Allard (1978) and Galtsoff (1962).

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**ABSTRACT**—*The U.S. Fish Commission Steamer Albatross made its first cruise to Alaska in 1888 primarily to research the Pacific cod, Gadus macrocephalus; however, Pacific salmon Oncorhynchus spp., was also to be studied, if time permitted. In 1889, concern for salmon overharvesting prompted Congress to authorize an investigation into the habits, abundance, and distribution of Alaska's salmon, and in 1890 the Albatross returned to Alaska. Over the next 20+ years the Albatross made many other productive and pioneering research voyages to Alaska, the last in 1914.*

<sup>2</sup>Bean (1846–1916) served as curator of fishes at the U.S. National Museum [Smithsonian Institution] (1880–1895) and as director of the New York Aquarium (1895–1898). He served as ichthyologist as well as in other capacities for the U.S. Fish Commission during those years.

<sup>3</sup>Dall (1845–1927) served in the U.S. Coast and Geodetic Survey and for the Commissioner of Agriculture before joining the staff at the U.S. National Museum in 1880. He wrote "Alaska and Its Resources" (1870) and numerous technical and scientific papers, many on Alaska topics. Primarily an authority on mollusks, Dall also wrote the official biography "Spencer Fullerton Baird" (1915).

<sup>4</sup>Petroff (b. 1842), author of "Report on the Population, Industries, and Resources of Alaska" (1884), compiled the 1880 census data and wrote a report on Alaska. However, he tended to exaggerate and even fabricate where he could not get adequate information. He apparently did not visit a number of places he easily could have. However, the maps he published in 1880 and 1882 were very accurate.

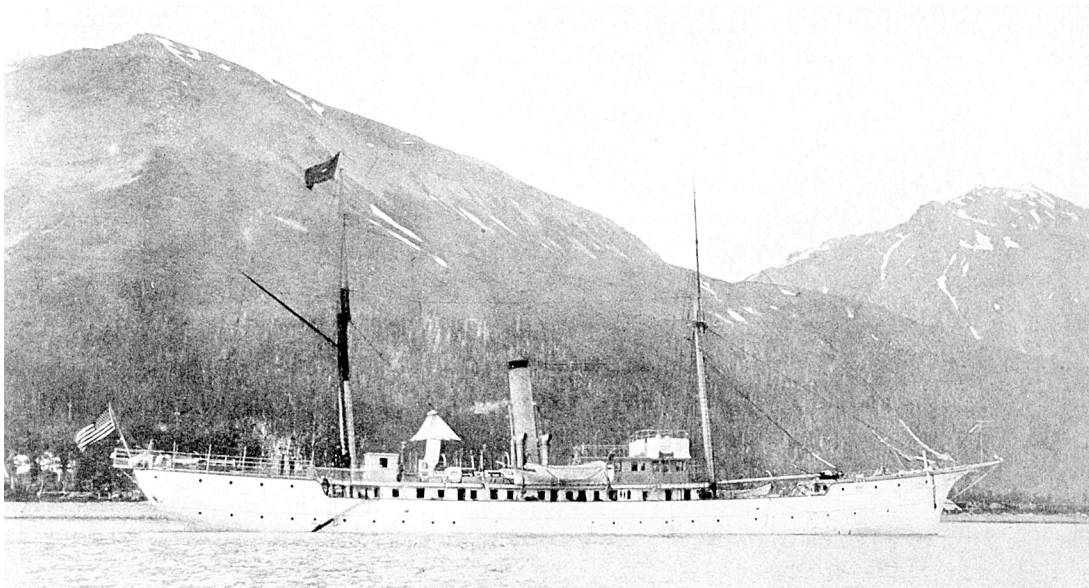
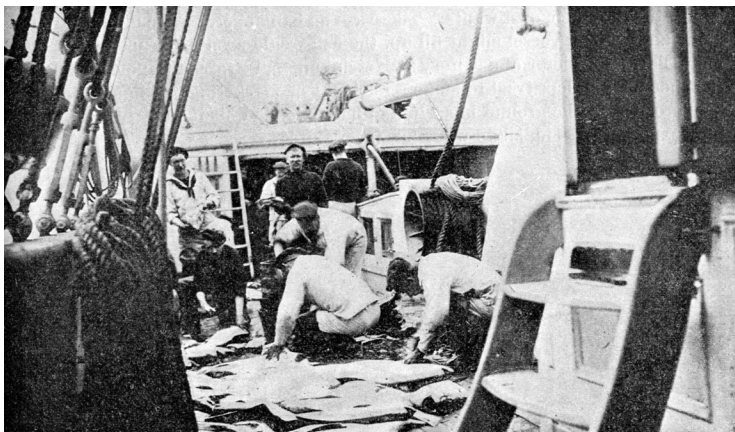


Figure 1.—U.S. Fish Commission Steamer *Albatross* anchored in Resurrection Bay in 1914 (Jones, 1915).



Figure 2.—Coal sacks were stacked in the gangways on the deck of the *Albatross* in 1914. E. Lester Jones wrote "...the *Albatross* is a coal burner [which] makes her expensive to operate and lessens her efficiency, particularly on account of a reduced steaming radius." (Jones, 1915).



In the 1890's, steamers regularly stopped so excursionists could spend a few hours halibut fishing in Chatham Strait near Killisnoo, southeastern Alaska. In 1898, the men on the *Albatross* fished with 21 handlines in the area and in this photograph display the catch (Moser, 1899).

The Navy crew and naturalists cleaned the halibut caught in the Killisnoo area. In 1.5 h, 143 halibut, average weight 22 lb, were caught. The largest was 165 lb (Moser, 1899).



Figure 3.—Map of Alaska with some of the locations mentioned in the text.



Figure 4—Lieutenant Commander Zera Luther Tanner of the *Albatross*, courtesy of the NOAA Central Library.

marine life. This was also true of the first trip of the *Albatross* to Alaska waters.

This cruise took place in 1888 under command of Lieutenant Commander Zera Luther Tanner, USN (Fig. 4).<sup>5</sup> Tanner was ordered to head for Alaska with the focus "...to stimulate fishing interests of the North Pacific Ocean" (Tanner, 1890). The emphasis was on Pacific cod, *Gadus macrocephalus*, and was to determine the extent, character, and resources offshore in the region most used by the American fleet of cod fishermen.

Tanner's instructions regarding salmon stated: "The Alaska fishery was quite fully covered by the fishery census of 1880 and the vessels, boats and fishing gear known at that time are well represented in the fishery collection at the National Museum in Washington. It is desirable, however, to ascertain what changes may have taken place since then; what new styles of boats or gear have been introduced, and to what extent the

Natives have adopted the appliances and methods of the white man."<sup>6</sup> Further, his instructions stated that "The fresh waters may also be examined, should the time permit, with special reference to salmon...."<sup>6,7</sup> Tanner's scientific staff included Charles H. Gilbert, Naturalist-in-Charge<sup>8</sup> (Fig. 5), and his assistants Leslie A. Lee, Charles H. Townsend, and A. B. Alexander.

In final reports for the 1888 cruise, there are very few descriptions of salmon. The *Albatross* stopped occasionally at places where salmon were being

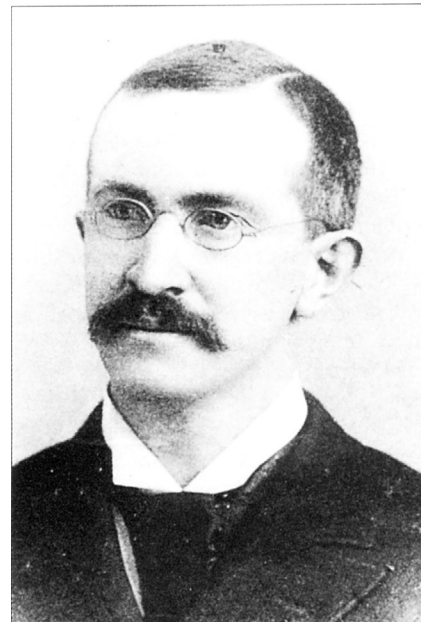


Figure 5.—Charles Henry Gilbert, Naturalist-in-Charge on the *Albatross*, ca. 1903, courtesy of Linda Long and the Stanford University Archives.

<sup>5</sup>Lieutenant Commander Zera Luther Tanner (1835–1906) commanded the *Albatross* from its construction in 1882 until 1894.

<sup>6</sup>Tanner, Z. L., "Albatross Report, San Francisco to Alaska and Aleutian Islands, 1888," Record Group (RG) 22, Records of the U.S. Fish and Wildlife Service, Entry (E) 63, General, Records of the U.S. Fish Commission and Bureau of Fisheries, National Archives, Silver Spring, Md., NA.

<sup>7</sup>The "fishery census of 1880" was an exceptionally large and thorough review of all U.S. fisheries made in concert with the U.S. census that year. It was published in six large volumes (Goode et al., 1887).

<sup>8</sup>As Naturalist-in-Charge, Gilbert (Dunn, 1996a) was likely an "independent" scientist and not part of Tanner's command. Pietsch and Anderson (1997) provide more information on some of the scientists mentioned in this paper.

taken and processed. At Ivan Pavloff's saltery 15 miles from Coal Bay, Alexander learned that Pavloff had been fishing for 3 weeks. Eighteen white men and a few Native Americans caught enough

salmon for 400 barrels from a small lake where salmon came in incredible numbers to spawn.<sup>9</sup>

Tanner described a visit to a fishing station built in 1887 at Humboldt Harbor in the Shumagin Islands. Here he questioned local people about salmon run timing, but he included no details in his report. He also described the process used by the Aleuts to catch and dry salmon at Unalaska Bay.<sup>6</sup>

While anchored in Unalaska Bay, the *Albatross* crew seined half a boat load of pink salmon or “humpies” and chum salmon. The crew salted two-thirds of a barrel for use to replace clams as bait for the cod trawl lines.<sup>6</sup>

The following year, 1889, the *Albatross* and its naturalists did not intend to return to Alaska. Still under the command of Tanner, the *Albatross* was assigned to investigations off the shores of Washington and Oregon. However, she was interrupted for a trip to Alaska by the Bureau of Indian Affairs for ethnological surveys.

Four members of the Senate Committee on Indian Affairs, headed by Senator Henry L. Dawes (R., Mass.), boarded the ship to sail to Alaska to inspect the principal Indian settlements. The vessel stopped at Fort Tongass, Port Chester (later known as Metlakatla), Karta Bay, Fort Wrangell, Sitka, Pavloff Harbor, Hoonah Bay, Portage Bay, Chilkat, and Juneau. A number of these places were sites of significant salmon fisheries and canneries or salteries.

What did the scientific staff of Gilbert, Townsend, and Alexander do during these 3 weeks? Local newspapers interviewed the Senators whom they undoubtedly found more prestigious than the naturalists (*The Alaskan*, 1889). Subsequent official reports from the U.S. Fish Commission include only the statement that “Several important fishing stations and canneries were visited, and some investigations were also made by means of the beam trawl and other kinds of fishing apparatus” (Rathbun, 1894).

It was about this time, the end of the 1880’s, that a mission for salmon

research in Alaska developed: conservation of the resource. Overharvest, by any means and method, was the norm, especially in the very productive Kodiak–Karluk region. Many cannery owners from Washington, Oregon, and California had headed north to Alaska, and by 1888, Alaska streams furnished much of America’s canned Pacific salmon. Concerns that the salmon runs could not continue with such pressure were intensified by destruction of salmon on the Sacramento River and reduction of the harvests on the Columbia River (Bean, 1891).

How could conservation be effective if no one knew the current extent of the resource? Government officials agreed that more knowledge of Alaska’s salmon resources was necessary before regulations could be promulgated.

The first Federal legislation involving Alaska’s salmon fisheries was an attempt to rectify this lack of knowledge. Congress in 1889 authorized an investigation into the habits, abundance, and distribution of Alaska’s salmon. This also included an examination of the conditions and methods of the fisheries.

Even in those days, scientists and government officials discussed the role of conservation in offsetting the dangers to supply that are inherent in technological advances. But in reality, the only regulatory inclusion in this first legislation outlawed the obstruction of a salmon stream by artificial means (Roppel, 1982). This concern about Alaska’s salmon fisheries looked good on paper, but Congress failed to appropriate the funds needed to cover the expenses of such an investigation or to enforce the law on stream barricades.

Bean took matters in his own hands and arranged to take money from the U.S. Fish Commission’s general appropriation for fish propagation and use it to place a team of investigators in the field. He chose Livingston Stone<sup>10</sup>, superintendent of salmon hatcheries in California and Oregon, and Franklin

Booth, of the University of California, to study topographical and physical features of different river basins of Alaska (Bean, 1891).

The geographical dimensions of the Alaska salmon fisheries are overwhelming. They extend over 2,000 miles along the entire coast from southeastern Alaska to the Bering Sea. Bean’s instructions from U.S. Fish Commissioner Marshall McDonald were to limit work to Kodiak and Afognak Islands, Cook Inlet, and Bristol Bay (Bean, 1891).

At that time, the *Albatross* was engaged in fishery and deep-sea investigations off lower California, and Bean and his party apparently had no access to the vessel. Perhaps Commissioner McDonald continued his philosophy expressed during the first cod survey in 1888. At that time he said “. . . this branch of [salmon] inquiry, however, can be as well undertaken by a party moving by ordinary conveyance from Sitka or San Francisco. . . .”<sup>6</sup>

But by the end of the season of 1889, Bean wrote in his transmittal letter for his final report: “There is practically no communication in Alaska except by water. There are no lines of vessels running regularly from place to place, and whenever it is desirable to cover an extended field of investigation it is essential to provide a vessel to carry the party to the places to be investigated” (Bean, 1891).

Bean’s final report gives an understanding of why he made this plea. His investigative party left San Francisco on a Karluk Packing Company steamer that proceeded directly to the cannery headquarters on the Karluk River. From there, the men relied on the canning companies for transportation and hospitality. As a consequence, the investigations were limited to Kodiak and Afognak Islands, although two Cook Inlet canneries were apparently visited. This left the fisheries of Bristol Bay, Prince William Sound, and southeastern Alaska unexplored.

The scientists studied physical characteristics of the environment and of salmon; natural history; methods, conditions, and statistics of the fisheries; and the possibilities of artificial propagation of salmon in Alaska. Stone expressed the

<sup>9</sup>Alexander, A. B., “Narrative of the voyage of the Steamer *Albatross*, 1888,” RG 22, E 91, NA.

<sup>10</sup>Livingston Stone, a New Hampshire fish culturist, established the first USFC fish hatchery on the Pacific Coast in 1872 on California’s McCloud River and investigated other potential West Coast fish culture sites for the Fish Commission.

opinion that such propagation posed no difficulties (Bean, 1891).

After Bean's survey, salmon again became an adjunct to other investigations. In 1890, the *Albatross*, with Tanner still in command and Charles H. Gilbert as chief naturalist, returned to the Alaska waters of Bristol Bay and the waters near the Aleutian Islands. Again, the cod banks were sought out.

During that season, the ship stopped at the Naknek River, considered the head of deep-water navigation in Bristol Bay (Fig. 6). With any normal-draft ocean vessel, such as the *Albatross*, it was difficult to explore the Bristol Bay fisheries because of the shallow waters at the mouths of the rivers.

Before leaving for Alaska, Tanner had been instructed by the U.S. Fish Commissioner Marshall McDonald to stop at the Nushagak River to see if the cannerymen were building a trap or dam completely across the Wood River, a tributary of the Nushagak River (Fig. 7).<sup>11</sup> The *Albatross* anchored near the mouth of the river and, while Alexander went upriver in a small boat, triangulation and astronomical observations were made. Alexander collected information on the four salmon canneries, recording the number of men and boats, the method of fishing adopted by all the canneries, the timing of the salmon runs, and fish size at time of harvest (Tanner, 1891). He found no traps in place and was told traps were not sufficiently effective to offset the cost of maintaining them in the swift river. Since Alexander was at the mercy of the cannerymen for his information, it is possible that traps may have been removed for his visit.

After exploration of the cod grounds, the *Albatross* scientists turned their attentions to northern fur seals, *Callorhinus ursinus*. The Bering Sea was the focus of international attention on the exploitation and threat of extermination of this marine mammal. The *Albatross* was also used in connection with Naval patrols

<sup>11</sup> Marshall McDonald to Z. L. Tanner, April 23, 1890. File "Albatross, Correspondence Covering Seal, Sea Otters, and Fisheries 1890-1895." RG 22, E 91, Division of Alaska Fisheries Correspondence, Reports and Other Records, NA.



Figure 6.—Arctic Packing Company cannery on the Naknek River. The small, double-ended dories were used by fishermen who rowed or sailed to the fishing grounds because motorized vessels were prohibited. Steamers carried supplies between Bristol Bay's rivers and, at the end of the season, carried the canned salmon south (Moser, 1902).



Figure 7.—Salmon trap on the Nushagak River (Moser, 1902).

during the Bering Sea controversy over fur seal issues.<sup>12</sup>

For some of this period, 1891-94, the original reports of the *Albatross* commander are missing from the National Archives records, so it is unknown if any mention of salmon is included. However, in 1895, the *Albatross* captain, Lieutenant Commander F. J. Drake, USN, was instructed that the naturalists should not neglect to check fisheries in relation to the fur seals.<sup>13</sup>

The subsequent report contains much the same references to salmon as those in

<sup>12</sup>In 1881 the price of fur seal pelts trebled, and seal hunters began pelagic sealing—taking of the animals at sea. Females, as well as males, were taken, and many seals sank after being killed, causing fears that the seals would be hunted to extinction. The United States considered the Bering Sea its waters. The *Corwin*, a U.S. Revenue Cutter Service vessel, seized one American ship and three Canadian ships for illegal sealing activities and precipitated the long controversy between the United States and Great Britain that nearly led to armed conflict between the two nations. Eventually, in July 1911, Japan, Great Britain, Russia, and the United States passed a treaty concerning the seals (Strobridge and Noble, 1999).

<sup>13</sup>"Instructions to *Albatross*, April 22, 1895" and "Notes concerning Fur Seal Investigations, 1893-94", RG 22, E 91, NA.

1888. At a village in Ikatan Bay, fishing, hunting, and seining parties were sent out. Flounders (Pleuronectidae), sculpins (Cottidae), small Pacific cod, young and large Pacific salmon, salmon trout (possibly *O. mykiss*), “sea trout” or cutthroat trout, *O. clarkii*; and various species of clams were found.<sup>14</sup>

In keeping with instructions to report on Native fishing methods, Alexander wrote: “On certain week days during the salmon season, the seine was hauled by Native women who waded into the water up to their shoulders while the men stood on the shore and directed their movements. The work is looked upon by the former as a privilege rather than a hardship. If a Native woman should allow her husband to perform this work for her, he would be looked down upon by all the other women of the village. The so-called privilege has been in vogue so long that it would be hard to change the custom.”<sup>14</sup> Intensive salmon research was not yet a high priority.

Fishing in Alaska, however, had boomed since Bean’s first report when 16 canneries packed about a half million cases (Bean, 1887). By 1896, 29 canneries packed nearly one million cases (Tingle, 1897). New canneries and salteries sprang up yearly (Freeburn, 1976).

Because of this dramatic increase over a decade, conservation again surfaced as a pressing mission for the U.S. Fish Commission. For years, U.S. Treasury agents had emphasized the need for regulating the harvest. In 1892, the Treasury Department, the regulatory agency for Alaska’s fisheries, had appointed an agent and an assistant to gather fishery statistics and publish them in an annual report. Both agencies were also to enforce the laws, which were limited and inadequate.

Thus, in 1897, Alaska salmon research finally came to the forefront. The *Albatross*, under the command of Lieutenant Commander Jefferson Moser, USN,<sup>15</sup> played an integral part in the investigations.

<sup>14</sup>Drake, F. J., General report of the movements and operations of the U.S. Fish Commission Steamer *Albatross* for the first half of the fiscal year of 1895, RG 22, E 91, NA.



Figure 8.—This view of Yakutat’s cannery in 1914 is typical of the illustrations in the reports of Moser and Jones. Often these U.S. Fish Commission photographs are the only historical record of what these canneries looked like (Jones, 1915).

The object of the renewed investigations was to determine the conditions of salmon in the different and widespread regions of Alaska. This was again thought to be necessary so that suitable laws for the protection of the fishery might be framed (Moser, 1899). The U.S. Fish Commission developed a plan of work to provide data to manage the different stocks in the diverse areas of Alaska. This outline became the basis for the investigation of the Alaska salmon streams and its industry for many years.

Since fishermen concentrated on sockeye salmon, *O. nerka*, which dominated the canned pack, Moser’s party was instructed to explore and study sockeye streams and lakes including spawning grounds, nature of the water, characteristics of the vegetation, species of salmon entering streams, their movements, timing, and length of run; size of fish, signs and causes of depletion, natural and artificial obstructions, and fishing methods and their relationship to the maintenance of supply. In addition, statistics were to be collected from the canneries about streams fished and the catch from each (Moser, 1899).

Moser’s staff consisted of U.S. Navy officers except for A. B. Alexander, H. C. Fassett, and F. M. Chamberlain (Moser, 1899). Lieutenant L. M. Gar-

<sup>15</sup>Moser (1848–1934), a U.S. Naval Academy graduate, was attached to the Hydrographic Division of the U.S. Coast and Geodetic Survey before taking command of the *Albatross*. He captained the ship for nearly 6 years. He retired as a Rear Admiral in 1904 and then became vice-president and general manager for Alaska Packers Association.

rett, executive officer of the *Albatross*, took observations for geographical positions. H. E. Parmenter, in addition to his duties as chief engineer, conducted the field work for nearly all the surveys, and he plotted the work. Lieutenant J. P. McGuinness conducted the field work of several surveys but was mostly engaged in examining salmon streams and lakes. Ensigns Yakes Stirling, Jr., and S. V. Graham assisted Parmenter and Alexander. Stirling conducted the hydrographic work. Chamberlain and Fassett assisted, and both took glass-plate photographs (Fig. 8).<sup>16</sup>

Thus, began a systematic examination of the salmon streams of Alaska, the likes of which had never been done before. The *Albatross* became the base of operations, and the men used a steam cutter, a steam gig, and rowboats in shallow waters.<sup>17</sup>

From Moser’s explorations came “Alaska Salmon and Salmon Industries” (Moser, 1899), an authoritative work published by the U.S. Commission of Fish and Fisheries. In one short season, his Naval officers and the three naturalists had produced a prodigious amount of information about Alaska’s salmon, especially in southeastern Alaska.

One season, however, was not enough to finish a salmon survey of all Alaska.

<sup>16</sup>The extensive collection of photographic prints taken by Chamberlain and Fassett are available at the National Archives, Still Picture Branch, Record Group (RG) 22.1.

<sup>17</sup>Moser, Jefferson F., “Report of U.S. Fish Commission Steamer *Albatross* from 1st July 1897 to 31st December 1897, Part 1.” RG 22, E 63, NA.



Bering Sea district:

Left Unalaska July 3.  
Bristol Bay, July 5-19.  
Unalaska, July 21-24.

Kadiak and Chignik district:

Chignik Bay, July 28-29.  
Alitak Bay, July 30-August 7.  
Karluk, August 7-9.  
Uyak, August 9-11.  
Afognak, August 11-16.

Southeast Alaska district:

Sitka, August 19-21.  
Killisnoo, August 21-22.  
Pyramid Harbor, August 22-23.  
Chilkoot Inlet, August 23-25.  
Taku Inlet, August 25-26.  
Taku Harbor, August 26-27.  
Port Snettisham, August 27.  
South Bay of Pillars, August 28-September 2.  
Shipley Bay, September 2-4.

Southeast Alaska district—Continued.

Duncan Canal, September 5-8.  
Point Highfield, September 8-10.  
McHenry Inlet, September 10-12.  
Zimovia Strait, September 12-13.  
Union Bay, September 13-14.  
Ward Cove, September 14-15.  
Loring, September 15-17.  
Yes Bay, September 17-21.  
Karta Bay, September 21-23.  
Loring, September 23-24.  
Ketchikan, September 24.  
Boca de Quadra, September 24-25.  
Metlakahtla, September 25-27.  
Comox, British Columbia, October 2-3.  
Tacoma, Washington, October 4-17.  
Quartermaster Harbor, Washington, October 17-21.  
Comox, British Columbia, October 24-26.  
Sausalito, Cal., October 30.

Figure 9.—The *Albatross* cruise itinerary, summer 1900 (Moser, 1902).

Moser wrote to the Commissioner of Fisheries saying, in part, "...in my opinion there is no work on the coast upon which the *Albatross* could be employed that will bring a better return of the money expended. The seal question is a small one compared to the salmon interests of the country and unless the authorities take proper steps to enforce the law, the time is not far distant when the canneries will gradually have to be abandoned."<sup>18</sup> But Moser's opinion was ignored, and he and the *Albatross* were soon headed to the South Pacific for 2 years on a charter to study its sea life.<sup>19</sup>

The *Albatross*, still under Moser's command, returned to Alaska for the season of 1900 and arrived in Unalaska on 29 June. Due to the rush to the gold fields at Cape Nome, the ship had to wait her turn to load coal and didn't get underway until the evening of 3 July (Fig. 9,



Figure 10.—As a coal burner, the *Albatross*, to extend her range, carried a load of sacked and loose coal on the forward deck (Jones, 1915).

<sup>18</sup>Moser, Jefferson F., to Commissioner of Fisheries, dated 4 September 1897, "*Albatross*, Correspondence and Reports, 1897," RG 22, E 63, NA.

<sup>19</sup>Alexander Agassiz's first two research expeditions on the *Albatross* were in 1891 (Panama-Galapagos region) and during 1899-1900, his longest expedition, through the South Seas islands and ending in Yokohama, Japan.

10). Moser's work continued during the following season of 1901 (Fig. 11). His staff in both years again consisted of Naval officers augmented by Fassett and Chamberlain.

Most of the three seasons were spent in southeastern Alaska where there is

a preponderance of sockeye salmon streams. In addition, Moser visited several previously unsurveyed regions to document salmon resources. His visit to the Alsek River and Yakutat Bay was the most comprehensive fisheries exploration of that area (Moser, 1902).

<i>Southeast Alaska:</i>		<i>Southeast Alaska—Continued.</i>	
Hunter Bay, Prince of Wales Island.....	May 29-31.	Kook (Basket) Bay, Chichagof Island....	June 19.
Niblack Anchorage, Prince of Wales		Pablof Harbor, Freshwater Bay.....	June 19-21.
Island .....	May 31-June 1.	Juneau.....	June 21-24.
Moira Sound, Prince of Wales Island.....	June 1.	Hunter Bay, Admiralty Island .....	June 24-25.
Tamgas Harbor, Annette Island.....	June 1-3.	Bartlett Bay, Icy Strait.....	June 25-27.
Metlakahtla, Annette Island .....	June 3.	Dundas Bay, Icy Strait .....	June 27-29.
Ketchikan, Tongass Narrows, Revilla-		Yakutat.....	June 30-July 7.
gigedo Island.....	June 3-5.	<i>Prince William Sound:</i>	
George Inlet, Revillagigedo Island.....	June 5.	Orca .....	July 8-10.
Mary Island Anchorage .....	June 5-6.	Port Gravina.....	July 10-11.
Kah-Shakes Cove, entrance to Boca de		Naked Island Anchorage.....	July 11.
Quadra .....	June 6.	Herring Bay, Knight Island.....	July 11-15.
Smeaton Bay, Behm Canal.....	June 6-7.	Naked Island Anchorage.....	July 15-18.
Checats Cove, Behm Canal.....	June 7.	Port Valdez.....	July 18-21.
Yes Bay, Cleveland Peninsula.....	June 7-8.	<i>Southeast Alaska:</i>	
Loring, Naha Bay.....	June 8-10.	Sitka.....	July 23-25.
Ketchikan, Tongass Narrows, Revilla-		Nakwashina Bay, Baranof Island.....	July 25-Aug. 3.
gigedo Is.and .....	June 10.	Schultze Cove, Baranof Island .....	Aug. 3-4.
Steamer Bay, Etolin Island.....	June 10-11.	Hanus Bay, Baranof Island .....	Aug. 4-5.
Kunk Creek, Etolin Island .....	June 11.	Sitkoh Bay, Chichagof Island .....	Aug. 5-6.
Wrangell, Wrangell Island .....	June 11-13.	Hoggatt Bay, Baranof Island.....	Aug. 6-7.
Salmon Bay, Prince of Wales Island.....	June 13.	Baht Harbor, Zarembo Island .....	Aug. 7-8.
Conclusion Island (off Kuiu Island) ....	June 13-14.	Steamer Bay, Etolin Island.....	Aug. 8-11.
Point Barrie, Kupreanof Island.....	June 14.	Ward Cove, Tongass Narrows, Revilla-	
Port Protection, Prince of Wales Island..	June 14-15.	gigedo Island .....	Aug. 11-12.
Shakan Bay, Kosciusko Island .....	June 15-17.	<i>Washington:</i>	
Kell Bay, Kuiu Island.....	June 17-18.	Port Discovery, Quarantine Station.....	Aug. 17.
Killisnoo Harbor, Kenasnow Island.....	June 18-19.		

Figure 11.—The *Albatross* cruise itinerary, summer 1901 (Moser, 1902).

During the summer of 1900, the *Albatross* party conducted the first comprehensive on-site examination of all of Bristol Bay's salmon fisheries. Up to that point, even the Treasury Department's agents had difficulty reaching this remote area. Most of the information the U.S. Fish Commission had about Bristol Bay, except that sent by salmon packers, came from Alexander's 1890 notes and Moser's 1897 report, with the latter coming from second-hand sources. In 1897, 28% of Alaska's pack came from Bristol Bay, 90% of that by the Alaska Packers Association, from whom Moser had collected his information.<sup>20</sup>

Exploration from the *Albatross* in 1900 into the vast unexplored interior was limited because of the size and length of the rivers, some of which were not explored to their headwaters

<sup>20</sup>Moser, Jefferson F., "Report of operations *Albatross* from 1st July 1897 to 31st December 1897, Part 3." RG 22, E 63, NA.

until 1908. However, as much information as possible was collected including interviews with local Natives and the salmon packers.

The salmon streams and canneries of Prince William Sound had been neglected and were unsurveyed prior to the *Albatross*' and Moser's arrival. "It is very difficult, in absence of charts and maps, to describe the fisheries of this section," he wrote in 1897 (Moser, 1899). In 1900 his information was second-hand, so in 1901, the Naval officers did the usual work-up on several streams and then collected cannery data (Fig. 12). However, this survey was more hit and miss than in other salmon regions (Moser, 1902).

Despite the new information available to the U.S. Fish Commission for use in drafting legislation to regulate Alaska's fisheries, it appears that little use was made of it. The prohibition against the use of barricades in streams, enacted in 1889, continued to be more or less enforced depending upon where the

two Treasury agents happened to be in Alaska. An act passed in 1896 prohibited fishing in the mouths of several salmon streams. The first time limitation on fishing was also introduced that year. Again, enforcement was hampered by the limited ability of the Treasury agents to patrol Alaska when they had no vessel dedicated to their use.

After the first season of Moser's work, the first legislation regarding Alaska's salmon came in 1900 when cannery owners were required to establish sockeye hatcheries (Roppel, 1982). In 1902, further regulations limited traps to covering no more than one-third of the stream mouth, defined prohibition of seining and gillnetting in mouths of streams, and prohibited wanton waste of salmon (Alaska Fish Commission, 1904).

A further study of Alaska's salmon was sought 2 years after Moser completed his work. At the request of President Theodore Roosevelt, an Alaska Fish Commission was appointed early in 1903



to “submit a report embodying results of investigations covering all matters of importance in connection with salmon and capture, and deal fully with regulation and administration of fisheries” (Alaska Fish Commission, 1904). This took place just months before the 1 July 1903 transfer of responsibility for Alaska’s fisheries from the Treasury Department to the newly created Department of Commerce and Labor, Bureau of Fisheries.<sup>21</sup>

The *Albatross*, under command of Lieutenant Franklin Swift, USN, was assigned to support the Alaska Fish Commission party. This time, however, the research was under the control of naturalists and ichthyologists rather than Naval officers. This new study was headed by David Starr Jordan, noted ichthyologist and President of Stanford University, then known as Leland Stanford Junior University (Alaska Salmon Commission, 1904). Barton Warren Evermann took over during the latter part of the investigation when Jordan was absent. The party also included Charles H. Gilbert, assigned to study the fisheries of Bristol Bay while stationed at Nushagak; Harold Bowen Jordan, also of Stanford University, in charge of shore fishing and seining operations; Alexander, to gather data on run timing<sup>22</sup>; and Fassett, to gather data on methods used in the canneries and salteries. Chamberlain and his assistant were assigned shore studies at Loring in southeastern Alaska.<sup>23</sup> Albertus Baldwin was commissioned to paint illustrations of the five species of salmon. Cloudsley Rutter, naturalist for the *Albatross*, and an assistant were sent to the Karluk River on Kodiak Island to study the salmon at that much-fished site. J. Nelson Wisner would examine the compulsory hatcheries built in compliance with the 1900 act.<sup>24</sup>

<sup>21</sup> Originally an independent agency, the U.S. Fish Commission was renamed the U.S. Bureau of Fisheries in 1903 and placed in the new Department of Commerce and Labor.

<sup>22</sup> Alvin B. Alexander was assistant in charge of statistics and methods of fisheries in the U.S. Bureau of Fisheries in 1903.

<sup>23</sup> Loring was the site of an Alaska Packers Association (APA) cannery. A system of lakes feeding the Naha River supports a large sockeye population. APA operated a private hatchery on Heckman Lake, one of the lakes.

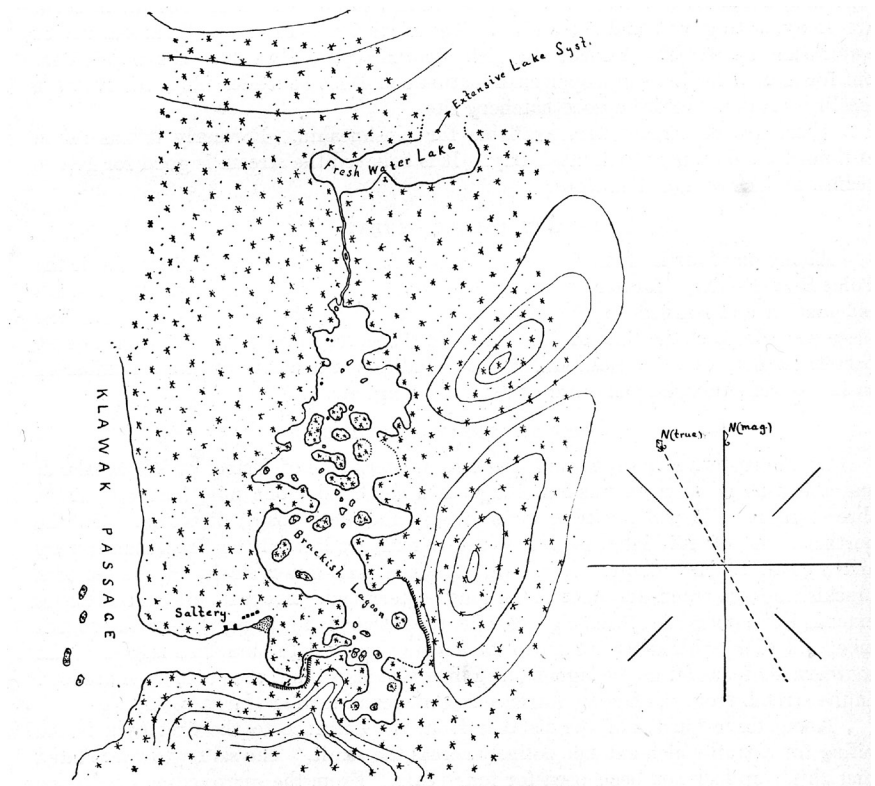


Figure 12.—The U.S. Navy officers sketched the terrain and outline of Alaska’s major sockeye systems. This sample of the Salku (correct spelling today) system shows what extensive explorations were undertaken, sometimes far inland, on geographic areas heretofore unrecorded (Moser, 1902).

The work plan for the Alaska Fish Commission is 52 pages long, 15 pages longer than the preliminary report that was published after the trip.<sup>25</sup> It not only outlined job descriptions for each of the scientists, but it outlined dredging, collecting, and hydrographic operations at specific locations in southern southeastern Alaska and Kodiak Island waters. Statistics for publication in Moser’s format were to be collected. The waters of Bristol Bay, Loring, San Alberto Bay, Klawock Lake, and Klawock River were to be included.<sup>26</sup> However, not all sites mentioned could be visited in one year.

The preliminary report, subtitled “Report Dealing with Legislative Protection of Fisheries,” was transmitted

<sup>24</sup> Wisner was the field superintendent of the Federal fish culture stations in Alaska in 1903.

<sup>25</sup> “*Albatross* Correspondence concerning Dr. Gilbert’s Work, 1888–1902,” RG 22, E 91, NA.

to President Theodore Roosevelt under Jordan’s and Evermann’s names. There was a strong push to abandon the mandatory hatchery legislation and place sockeye hatchery operation in the hands of the government (Alaska Fish Commission, 1904).

This was not unexpected, as the idea of putting fish propagation in the hands of the users had long been questioned. Alaska’s Governor John G. Brady stated in his annual report that “There seems to be a consensus of opinion that the government should take the salmon

<sup>26</sup> Loring, on Revillagigedo Island, was near the Alaska Packers Association’s mandatory sockeye salmon hatchery. San Alberto Bay is a body of water between Prince of Wales and San Fernando Islands and constitutes the outside waters through which sockeye salmon pass to Klawock Lake and Klawock River. The latter two are on Prince of Wales Island, and a mandatory sockeye hatchery operated on the lake at that time.

hatcheries in hand and be alone responsible for stocking the streams and keeping the salmon culture up to its highest efficiency and that the canneries should be taxed for the support of the work in proportion to the pack of each” (Brady, 1903).

As for regulations, the Alaska Fish Commission recommended putting the inspection of salmon fisheries and all other matters pertaining to Alaska fisheries in the hands of trained men under control of the U.S. Bureau of Fisheries. Jordan and Evermann considered the research of other investigators, including Moser, and in the preliminary report produced synopses of species, rivers, methods used in the fisheries, packers, and the 1902 salmon pack that had risen to 2.6 million cases by that time.

Further reports were forthcoming over the next few years after the scientists/naturalists had time to examine the data collected. Chamberlain extended his stay at Loring for another season (1904) and then spent the summer of 1905 at Yes Bay at the Bureau of Fisheries hatchery.<sup>27</sup> From this field work, Chamberlain analyzed his observations of young salmon, the specimens collected aboard the *Albatross* throughout Alaska, along with some of Moser’s data from southern southeastern Alaska and information from the Karluk system obtained by Rutter.<sup>28</sup> Chamberlain’s report discussed the known facts about the life of adult salmon, including the spawning period, detailed descriptions of adult and young salmon, and sea habits of young salmon from various places including the northern Pacific Ocean and Bering Sea (Chamberlain, 1907).

Evermann, with coauthor Edmund Lee Goldsborough, incorporated much of the data collected in 1903 in their publication “The Fishes of Alaska” (Evermann and Goldsborough, 1907). All Alaska specimens at the U.S. National Museum (Smithsonian Institution), many of which

<sup>27</sup>Yes Bay was the site of a cannery which started as a saltery in 1886. McDonald Lake, nearby, produces large runs of sockeye salmon. The U.S. Bureau of Fisheries built a hatchery at the head of the lake in 1906.

<sup>28</sup>Cloudsley Rutter died in 1903 before working up his data.

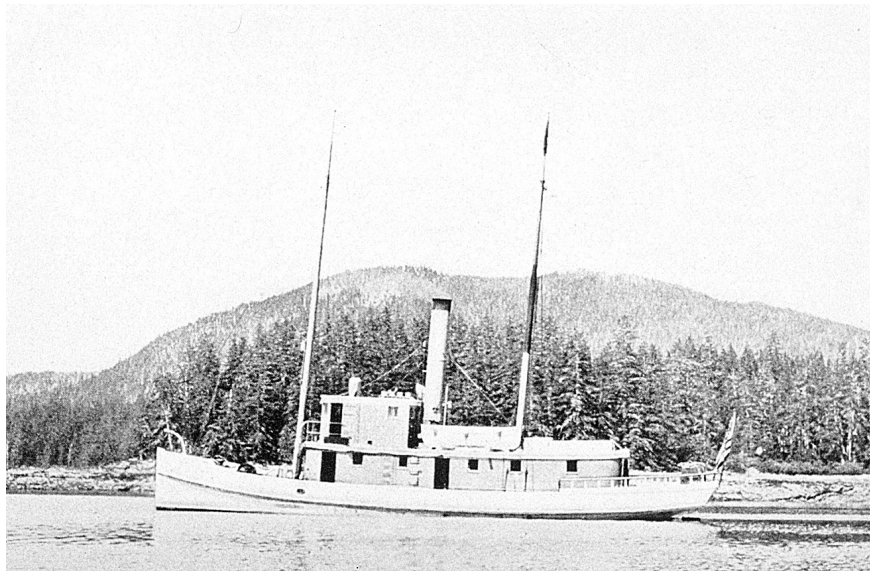


Figure 13.—The U.S. Bureau of Fisheries Steamer *Osprey* at Zarembo Island in 1914 (Jones, 1915).

were collected during *Albatross* voyages, were examined. This publication put on record the important information concerning the habits, abundance, and distribution of salmon and discussed some of the chief problems connected with the salmon fisheries.

One last trip was made by the *Albatross* in conjunction with Alaska’s salmon research. Perhaps this too was prompted by yet another change in the umbrella agency for Alaska’s fisheries. In 1913, the Department of Commerce and Labor was divided, and the Bureau of Fisheries stayed in the Department of Commerce. In 1914, William C. Redfield, the Secretary of Commerce, sent Deputy Commissioner of Fisheries E. Lester Jones to Alaska to make a thorough survey and investigation of the various fisheries industries and the fur seal operations. That summer, using the *Albatross*, commanded by Lieutenant L. B. Porterfield, USN, Jones visited canneries, mild-curing establishments, and salteries, as well as the fur seal operations in central and western Alaska.

When it came time to visit the processing plants in southeastern Alaska, Jones and his assistant transferred to another Bureau of Fisheries vessel, the *Osprey* (Fig. 13). After traveling aboard the *Albatross*, Jones was not impressed with

the 72-foot *Osprey* calling her “unseaworthy, top heavy, and quite unsuited to the needs of the service” (Jones, 1915). However, the local fisheries agents finally had access to their own mode of transportation and were no longer dependent upon commercial transports or those of the salmon processors.

Commissioner Marshall McDonald’s theory that salmon fisheries could be studied without the use of a vessel dedicated to that purpose was again proven wrong. Jones stated, “Without the *Albatross* this past season, the result of my trip would have been anything but satisfactory” (Jones, 1915).

After his investigations, Jones abandoned the publication format used by his predecessors, and his report is superficial in comparison. Much time was spent on the methods of catching salmon, and Jones wrote, “There is probably no part of this great industry that has created more controversy than the methods employed in catching the 60 million fish which are taken each year from the waters of Alaska” (Jones, 1915).

The *Albatross*, with its complement of scientists aboard, did not return to Alaska again to study salmon or any of the region’s other fishery resources. Approaching the end of its long and immensely productive marine science

career, the *Albatross* served on U.S. Navy patrol duty in the Caribbean Sea in World War I and was eventually retired from Federal service in 1921.

Today intelligent biological management of salmon populations continues to be a complex and diverse problem. Solid biological groundwork for the regulation of the Alaska salmon fishery continues. However, much of the base-line data about Alaska's salmon came from the meticulous early work of scientists aboard the *Albatross*.

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