

U.S. COMMISSION OF FISH AND FISHERIES  
STEAMER ALBATROSS

CHART  
of the  
EASTERN PORTION of BERING SEA  
SHOWING

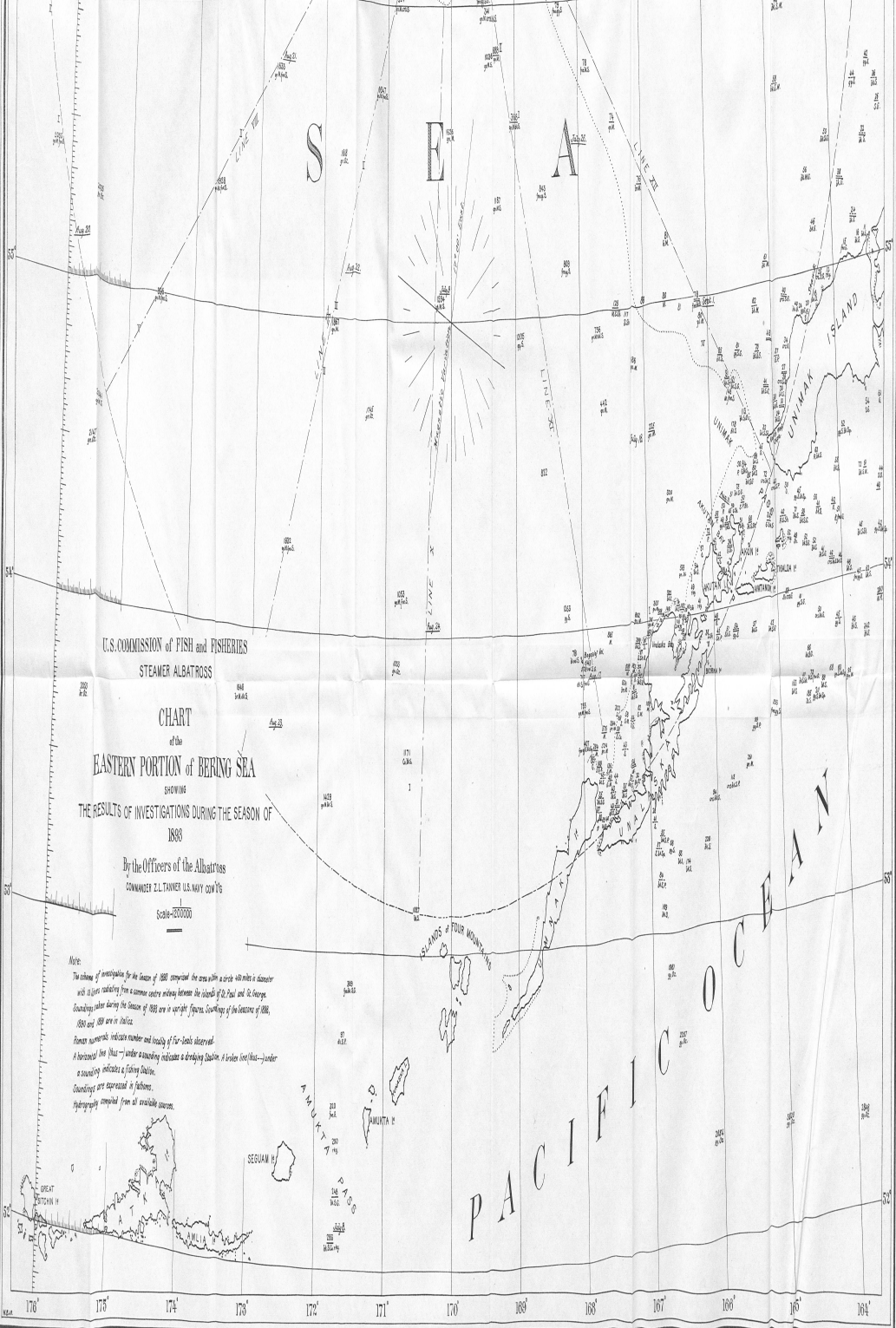
THE RESULTS OF INVESTIGATIONS DURING THE SEASON OF  
1893

By the Officers of the Albatross  
COMMANDER E. L. TANNER U.S. NAVY COM'D'R

Scale—1:100,000

Note:

The extent of investigations for the season of 1893 comprehended the area within a circle 400 miles in diameter with a center radiating from a common center midway between the islands of St. Paul and St. George. Soundings taken during the season of 1893 are in north-south coordinates of the base course of 1891. 1891 and 1892 are in fathoms. Roman numerals indicate number and locality of fish-tails observed. A horizontal line (---) under a sounding indicates a dredging station. A broken line (---) under a sounding indicates a fishing station. Soundings are expressed in fathoms. Hydrography compiled from all available sources.



## 2.—REPORT UPON THE OPERATIONS OF THE UNITED STATES FISH COMMISSION STEAMER ALBATROSS FOR THE YEAR ENDING JUNE 30, 1894.

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### OPERATIONS FROM JULY 1, 1893, TO MAY 1, 1894.

By Commander Z. L. TANNER, U. S. N., Commanding.

The *Albatross* was in latitude  $51^{\circ} 39'$  N., longitude  $172^{\circ} 22'$  W., at midnight June 30, 1893, en route from Unalaska to the Bay of Waterfalls, Adak Island, Aleutian Chain, where she arrived at 7.30 p. m. July 1.

We visited the bay under orders of the senior officer, commanding the United States naval force in Bering Sea, to ascertain if it was being used as a rendezvous by the sealing fleet. Its location on the Pacific side of the island, remote from the usual cruising grounds of the patrol fleet, its accessibility, ample supply of pure, fresh water from mountain streams, and driftwood conveniently strewn along the beaches made it the most desirable port for that purpose west of Sand Point (Humboldt Harbor), in the Shumagin group. There were no vessels in the bay at the time of our arrival, but recent beach fires, trampled grass, etc., plainly indicated the presence of visitors at no distant date. We subsequently boarded three schooners off the coast, all bound into the bay for water, and as they were among the last of the western-bound fleet it is highly probable that the harbor was visited by sealers earlier in the season.

The Bay of Waterfalls takes its name from a number of mountain streams which fall into it from the surrounding heights. It is 4 miles wide at the entrance, and penetrates the island in a northerly direction about 8 miles. Chapel Cove lies on the east side, 2 miles from the entrance. It was examined by the officers of this vessel, and found to afford fairly good anchorage for vessels of all classes in the outer bay in about 20 fathoms, while the inner cove furnishes almost perfect protection to small craft, such as hunters and sealers. Water could be procured early in the season, but the streams were dry at the time of our visit.

Cataract Bight was examined also. It lies on the east side of the bay, about 4 miles from the entrance, and affords good anchorage—the best in the Bay of Waterfalls—in from 15 to 20 fathoms. There is quite a large stream falling into the head of the bight, affording the most convenient watering-place in the vicinity. Anchorage may be found

at the head of the bay, and water procured from any of the numerous streams. The beaches were lined with driftwood.

We remained at anchor until the morning of July 5, under bright, clear skies and pleasant weather during the daytime, but the nights were misty, and an impenetrable wall of fog surrounded the island without a break, totally obscuring everything seaward.

Adak Island, like most of the Aleutian Chain, is mountainous and wholly devoid of timber; even the stunted growth of alder and willow found on some of the islands is lacking, at least in the region contiguous to the Bay of Waterfalls. The valleys and foothills are covered with a rank growth of grass and wild flowers, which extend high up the mountain sides wherever there is a handful of soil, mosses occurring on the barren heights.

The naturalists examined the region with the assistance of volunteers from the officers and crew, trawl-lines were set without result, and the seine was used wherever suitable beaches could be found, but the waters of the bay were nearly barren of fish, except in the immediate vicinity of fresh-water streams, where trout were plentiful and taken in large numbers. A few cod, chicken halibut, flounders, and a single Atka mackerel were caught by persistent fishing with hook and line from the ship's rail, and large numbers of fine trout were taken from the streams and lakes by fly fishermen. Land birds were extremely scarce, particularly ptarmigan, which are so plentiful on some of the other islands. The only apparent cause is lack of food in winter when the ground is covered with snow, for here the fresh buds of alder and willow which supply their wants in more favored localities are entirely lacking. The scarcity can hardly be attributed to foxes, for there were few, if any, on that part of the island visited by the collectors.

Remnants of a copper-fastened boat were found on the shore of a large lake lying about 2 miles northeast of the bay.

The fog broke at intervals on the morning of July 5, and at 8.40 a. m. we got under way and patrolled off the heads, boarding two sealers, taking several soundings, and finally anchoring in Chapel Cove for the night. A haul of the seine brought in a number of trout and young cod.

We were under way again at 2.30 a. m., on the 6th, and availed ourselves of the opportunity to further develop the great submarine trough lying south of the Aleutian Chain. Commencing a line of soundings near the entrance of the Bay of Waterfalls, it was carried in a southeasterly direction to  $50^{\circ} 03' N.$ ,  $174^{\circ} 30' W.$ , in 2,802 fathoms, the maximum depth of 4,002 fathoms having been found in latitude  $50^{\circ} 28' N.$ , longitude  $175^{\circ} 10' W.$  From the former position the line was extended in a northeasterly direction, recrossing the depression in 3,794 fathoms.

Two hauls of the beam-trawl were made in Amukta Pass on the 8th in 283 and 248 fathoms, respectively, the former proving quite rich in branching coral, sponges, hydroids, etc., while the latter was almost barren of life, the net being loaded with volcanic sand and gravel, very light and apparently subject to frequent shifting from the effect of currents.

Soundings were continued to the island of St. George, which we passed at 10 p. m. July 9, during a southerly gale with rain, fog, and short, chopping swell, peculiar to Bering Sea. Low speed during the remainder of the night brought us to St. Paul at 6.38 on the morning of the 10th. A landing was effected a few hours later at East Anchorage, and Mr. C. H. Townsend went to confer with the chief Treasury agent, Mr. J. B. Crowley, regarding a photographic survey of the seal rookeries on St. Paul and St. George.

While at the Bay of Waterfalls Mr. Townsend suggested planting a quantity of trout in the lakes of St. Paul Island, which heretofore have been entirely without edible fish, and, with this object in view, a number of fine adult specimens were taken and transported to the islands, where 20 were deposited in good condition in two of the most promising lakes.

Having secured the cooperation of the chief Treasury agent and procured from him necessary instructions to his subordinates on St. George, we steamed over to the latter island and landed Messrs. C. H. Townsend and N. B. Miller with apparatus for the prosecution of their photographic work and the platting of the outlines of the fur-seal rookeries in accordance with the plan previously inaugurated by Mr. J. Stanley-Brown.

While at St. Paul Island Mr. Adams, Treasury agent, visited the ship and reported that a schooner had been seen off Northeast Point on the 4th, sealing, and a brig had five boats out for seals on the 7th. As none of the patrol fleet was at the islands at the time, we proceeded to the locality mentioned, and, early on the morning of the 12th, boarded two whaling barks which were on a favorite cruising-ground, north and east of St. Paul; one of them reported a whaling schooner cruising in the vicinity, but we did not meet her. The east and north shores were examined during the morning, but we saw no vessels.

It was arranged before leaving St. George that we should return on the 15th to transfer Messrs. Townsend and Miller to St. Paul, hence our operations in the meantime were prosecuted with this end in view.

A line of soundings commencing north of St. Paul on the parallel of  $57^{\circ} 18' N.$  was carried due west to the meridian of  $173^{\circ} 53' W.$ , in 150 fathoms. Beam-trawl and hand-lines were used frequently, special care having been given to serial temperature observations. Depths varied but little from 60 fathoms, with bottom of green mud, until, in  $172^{\circ} 43' W.$ , specimens of branching coral were brought up, and in  $173^{\circ} 18' W.$ , rocky bottom was first struck and carried to the next station, about 5 miles. The 100-fathom curve was then followed in a southerly and easterly direction, with frequent sounding, dredging, and temperature stations to the parallel of  $56^{\circ} 30' N.$ , thence due east to the vicinity of St. George, where we arrived at 8.40 a. m. July 14.

The results of fishing trials will be found in the report of the fishery expert; the contents of trawl, intermediate tow net, soundings, temperatures, etc., are tabulated for the sake of brevity, and will be referred to only incidentally in this report. Strict attention was given to the study

of the pelagic life and aquatic habits of the fur seal in so far as it could be done without serious interference with the work of deep-sea exploration. The numbers of seals seen, with dates, localities, etc., have been tabulated, and are shown in roman numerals on the appended chart. Fishing stations are indicated by a broken line (. . . . .) and dredging stations by a horizontal line (——) drawn under soundings on the same chart.

Messrs. Townsend and Miller came on board at 11.30 a. m. on the 15th, having completed the primary photographic survey of the rookeries, and we were under way fifteen minutes later for St. Paul, arriving at 5.10 p. m. The flagship *Mohican* anchored near us two hours later. Arrangements having been completed, Messrs. Townsend and Miller were landed at 3.30 p. m. July 16, with photographic apparatus and other equipment, for the prosecution of their work on the rookeries.

Treasury Agent J. B. Crowley, having requested transportation to St. George, we left our anchorage at 4.30 p. m. and landed him at his destination five hours later. At daylight next morning we examined the north and west shores of the island, in compliance with verbal instructions of the senior officer; then started a line of investigations in a southerly and easterly direction, intending to extend it to Cape Maku-shin, but a gale sprung up during the night, forcing us to discontinue it and make the best of our way to Unalaska, where we arrived at 5.50 p. m. July 18. Several of the Arctic whaling fleet—transports, and other vessels—were found at anchor in the harbor.

Our movements to this time were governed, first by patrol duty, and later in attendance upon Mr. Townsend in his special work on the seal islands; but subsequently we were practically free to prosecute the work of the Fish Commission, and preparations were made accordingly.

Unexpected losses of dredging gear on the preliminary trips forced us to the conclusion that the older portion of the steel-wire rope had reached its limit of usefulness, and as it would be in constant use the remainder of the season we carefully overhauled the whole 3,600 fathoms on the reeling engine, and finally condemned 750 fathoms, replacing it by 1,000 fathoms of new rope. The deep-sea sounding reel having shown signs of distress after the 4,002-fathom sounding made early in the month, the wire was run off and a careful examination made, which showed it to be in good order in every respect, except that the flange of the drum opposite the friction groove was distorted by the great pressure of wire, giving it an irregular, wavy appearance. Fortunately, the metal was not fractured; so, after overhauling the wire, it was replaced, and the reel continued to do good service, although it would not be reliable in heavy work.

The plan for carrying out the explorations contemplated in the instructions of the Commissioner for the season of 1893 may be stated in a general way as follows: Taking into consideration the probable delays incident to the peculiar climatic conditions of Bering Sea, and the time consumed in coaling, it was considered probable that we would

have but 30 working days to cover the broad area under investigation, and the scheme finally adopted was based on the amount of work we could do within that limit of time.

The initial point, latitude  $56^{\circ} 51' 30''$  N., longitude  $170^{\circ}$  W., lies midway between the islands of St. Paul and St. George, and from this point as a center a circle was described 450 miles in diameter, and 13 radii were drawn to the circumference, at angles of about  $28^{\circ}$ . They were numbered from right to left for convenience of reference, No. 1 ending in latitude  $57^{\circ} 46' 20''$  N., the total length of lines aggregating about 3,700 miles.

We sailed at 5 p. m. July 25, towed the whaling bark *Stamboul* out of the harbor, then steamed direct to St. George with mail for the island, but rough weather prevented a landing, so we ran on to St. Paul and delivered it to the *Mohican*. A quantity of trout, starry flounders, and clams, brought from Unalaska to stock the waters of St. Paul, were landed and properly distributed immediately after our arrival.

Having communicated with Mr. Townsend and ascertained that his work was progressing satisfactorily, we got under way at 10.20 a. m. July 28, and commenced explorations in accordance with the plan before described. Line I was first developed until its intersection with a previous line from Cape Newenham, and was completed on the evening of the 29th, when we started for the eastern extremity of line II. A gale sprang up, however, which caused a dangerous sea and forced us to haul off to the northward and westward until we deepened our water and the swell became more regular. We reached the line on the morning of the 30th, and continued work during the day and following night under great difficulties and no little discomfort from a heavy, vicious sea; it moderated, however, during the morning of the 31st and the work progressed more rapidly. We reached the vicinity of St. Paul about noon. Mr. N. B. Miller returned on board during the afternoon, and took charge of the scientific department, which had been ably conducted by Passed Assistant Surgeon T. A. Berryhill, U. S. Navy, during the absence of the naturalists.

Leaving the anchorage at 3.40 a. m. August 1, we commenced the development of line III, which ran in a northerly direction; made the island of Nunivak at 10 a. m. on the 2d, passing about 15 miles to the westward of it in from 14 to 19 fathoms, and reached the northern extremity of the line, in latitude  $60^{\circ} 28' 30''$  N., longitude  $168^{\circ} 08' 30''$  W., at 4.33 p. m. Then, turning sharply to the westward, investigations were extended toward the most northern station of radial line IV, which was occupied at 6.40 a. m. August 3. It is 11 miles ENE. (mag.) from Cape Upright, St. Matthew Island, and, the weather being clear at the time, the headland was plainly visible; Pinnacle Rock and Hall Island could be seen also.

Extending the line in the direction of the initial point, excellent progress was made, the weather being exceptionally favorable; made the high land of St. Paul at 4 p. m. August 4, and at 7.44 anchored for

the night off the north shore of the island in 9 fathoms. We were under way at 2.45 a. m. next morning, and commenced the development of line V, which was completed on the 6th, in latitude  $59^{\circ} 54' N.$ , longitude  $174^{\circ} 17' W.$  A marked feature of this line was the uniformity in depth of water, 10 fathoms being the maximum variation, while for over 100 miles it did not exceed 2 fathoms.

We reached line VI at 5 a. m. August 7, in  $58^{\circ} 10' N.$  and  $176^{\circ} 40' W.$ , the depth having increased from 71 to 1,744 fathoms in 35 miles. No attempt was made at dredging or trawling in such great depths, from a lack of time, investigations being confined to sounding, temperatures, and seal observations until we were within the 100-fathom curve. An increasing breeze from the northward and westward gave us a leading wind, with which excellent time was made between stations, but a heavy sea interrupted our work to some extent. The line was completed about noon August 8, and we came to an hour later at East Anchorage, St. Paul, to communicate with Mr. Townsend and insure his transportation to St. George at the proper time for a second series of rookery views at that place.

This matter having been satisfactorily arranged, we left the island at 1.15 a. m. August 9, and commenced the development of line XIII, which ran in an easterly direction. Fog prevailed during the morning, but commenced breaking away at 8 a. m., and it finally proved one of the most pleasant days of the season. The line was developed rapidly under favorable conditions of weather, and the last station, which lies in latitude  $56^{\circ} 10' N.$ , longitude  $163^{\circ} 25' W.$ , near the northern limits of Slime Bank, was occupied at 9.46 a. m. August 10. The snow-covered peaks of Pavlof and Shishaldin were seen at daylight, and a little later Aghileen Pinnacles and Amak Island came into view, the weather still remaining remarkably clear.

As soon as the line was completed we started for Unalaska for coal, but early in the afternoon the wind increased rapidly from the southwest, and the evidences of approaching bad weather were so apparent that we ran into Shaw Bay and passed a quiet night, although it was blowing a strong gale at midnight, with furious squalls. This bay is easy of approach, has no outlying dangers, water shoals gradually from 20 fathoms, and it affords good protection with winds from southwest to southeast. It was still blowing a fresh gale at 5.20 next morning when we got under way, but by hugging the land we kept in comparatively smooth water until we reached the vicinity of the Northwest Cape of Unimak, when the wind died out and fog set in which lasted with occasional intervals until our arrival at Dutch Harbor at 5.35 p. m.

We commenced coaling at 10 a. m. August 14, and finished at 11.12 a. m. on the 16th. Ten minutes later we cast off from the wharf, hoisted boats, and proceeded to sea, anxious, if possible, to make up for a part at least of our unexpected detention in port. It was our intention to resume work at the southern extremity of radial line XI, near Chernofski; and, starting out with light winds and pleasant weather, we



anticipated a speedy and interesting trip while skirting the northern shores of Unalaska; but off Cape Cheerful a dense fog rolled down from the heights of Makushin and shut out everything a ship's length from us; a breeze sprang up a few minutes later, light at first and variable in direction, but increasing rapidly, until within a short time we were driving into the teeth of a southwest gale—a typical illustration of the rapid atmospheric changes experienced in Bering Sea. The conditions were so unfavorable for the prosecution of our work that we ran into Chernofski for the night, anchoring at 8.30.

Chernofski Bay is the most secure harbor near the western extremity of Unalaska, if not in the whole of Bering Sea. The inner basin is perfectly landlocked, and being surrounded by low land or moderate elevations it is not subject to the much-dreaded "woollies," as the furious mountain-bred squalls of northern regions are called. The *Albatross* visited the harbor in August, 1890, and by careful observations with artificial horizon determined the position of the southwest point of the entrance to the inner basin to be in latitude  $53^{\circ} 23' 06.5''$  N., longitude  $167^{\circ} 30' 33.8''$  W., the Greek church in the village bearing N.  $5^{\circ} 30'$  W., true, 0.64 mile. The longitude depends upon that of the point opposite the wharf in Iliuliuk Harbor, being in  $166^{\circ} 31' 44.2''$  W., as shown on Coast Survey chart No. 821. Information concerning the observations above mentioned will be found in my report for the fiscal year ending June 30, 1891.

The wind subsided during the night, and at 6.30 the following morning we left the harbor and commenced work on line XI, making corrections in the coast line of the northeastern extremity of Umnak Island in passing. A line of soundings was run from the latter point to Bogoslof over the line where a reef was shown on the older charts, and which looked so formidable that for many years vessels avoided the passage. Seven hundred fathoms was the least water found, and we saw no indications of foul ground, yet a subsequent experience while passing the volcano in a gale readily accounted for the natural belief in its existence. We were running before a heavy, regular sea until abreast of Bogoslof, when suddenly it lost all semblance of regularity as far as the eye could reach in the direction of Umnak, high combers running apparently in every direction in a remarkable manner, giving the impression of breakers, and had we not recently sounded over the region we also would have looked with suspicion upon it and perpetuated its bad name. The phenomenon was doubtless caused by a strong current setting against the wind.

Bogoslof Volcano was in active eruption, as usual. We made a partial examination of it in 1890, which was verified and extended during our late visit. The latitude of the cone of Old Bogoslof was, by good observations, sea horizon, found to be  $53^{\circ} 54'$  N.

Having developed line XI to the vicinity of St. George, we called at that island in the afternoon of the 18th to communicate with Mr. Town-

send, and upon his reporting the completion of the special work to which he had been assigned on the islands, he was taken on board and resumed his duties in charge of the scientific department.

We were detained about an hour at St. George, then took up the development of line VII, and carried it to its western extremity in latitude  $56^{\circ} 21' N.$ , longitude  $176^{\circ} 45' W.$ , where the depth of water reached 2,049 fathoms. The station was occupied at 2.11 a. m. August 20; then, changing direction to the southward, we reached the terminus of radial VIII at 4.21 the same day, in latitude  $54^{\circ} 38' N.$ , longitude  $175^{\circ} 25' W.$ , with a depth of 2,041 fathoms. We followed line VIII to the 100-fathom curve, then took up radial IX, and developed it to latitude  $53^{\circ} 48' N.$ , longitude  $173^{\circ} 11' W.$ , in 1,948 fathoms.

Indications of bad weather were unmistakable on the morning of the 22d; a brisk breeze from the southward and eastward sprung up during the afternoon, and at midnight it was blowing a fresh gale from E. by S., with rapidly falling barometer. At 11.50 p. m. stopped the engines, set fore storm staysail, and hove to with wind on port quarter. The gale having moderated to a strong breeze, we started ahead at 7.30 a. m. August 23, and reached the outer extreme of line X at 10.25 p. m., in 1,027 fathoms, latitude  $53^{\circ} 09' N.$ , longitude  $170^{\circ} 31' W.$  The wind backed to the northward during the day, and at 10 p. m. was blowing a moderate gale from northwest, with rough cross sea, yet work was continued under low speed and at the expense of great wear and tear until 6.30 p. m. August 24, when the line was practically completed.

Radial line XII and a considerable area about the Pribilofs still remained unexplored, and we were anxious to finish it before going into port, but the gale was still blowing, with no immediate prospect of improvement, and as our fuel was nearly exhausted we concluded to return to Unalaska and procure a fresh supply. We passed Bogoslof at 5.45 a. m. and anchored in Dutch Harbor at 11 a. m. The flagship *Mohican*, *Ranger*, *Rush*, and H. B. M. S. *Champion* were found in port.

At the request of Captain Ludlow I called on the chief engineer of this vessel, A. M. Hunt, passed assistant engineer, U. S. N., for a report on the comparative merits of the best varieties of steaming coal used during the season, and received the following reply:

On May 31 we coaled ship at Union Bay with coal fresh from the Comox mines. It was washed coal, very clean, and free from slack, and probably of the finest quality that the mines furnish. It proved very satisfactory in every respect. It is a little slower in igniting than the Wellington or Nanaimo coals, and gives a good body of clear fire, with very light smoke as compared with other coast coals. Such clinker as forms breaks away from the bars readily, and does not form so close a blanket as to deaden the fires by preventing the passage of air through them. The soot formed does not adhere to the tubes, is granular rather than flaky, and is easily blown out with the steam tube sweeper. There was no difficulty in burning as many pounds of it per square foot of grate surface as of any other coal we have used.

The only coals with which I am able to make a comparison are the Welch Brymbo coal we received at the Mare Island Navy-Yard in May, 1893, and Wellington coal received from the North American Commercial Company at Dutch Harbor during July and August, 1893. The Brymbo coal was taken from a pile that had been

exposed for about a year, but was in fairly good condition. The Wellington coal was fresh from the mines and of good quality. The figures are from data taken from the steam log of this vessel and can not be considered as more than approximate, owing to the difficulty of getting runs with the different coals under the same conditions.

	Percentage of ash.
Comox .....	13½
Brymbo .....	10½
Wellington .....	15

The distance that can be steamed at economical speed by this vessel with equal amounts of coal is as follows: With Comox, about 6 per cent more than with Wellington and 3 per cent less than with Brymbo. From my experience with the Comox coal I do not hesitate to pronounce it superior for our purposes to any coast coal on the market.

Getting under way at 4.55 a. m. August 31, we examined the area embraced between Akutan and Akun islands, commonly called Akutan Bay, and looked into Akutan Harbor and other coves to ascertain whether any of the small sealers had taken refuge there. The beam trawl and hand-lines were used at several stations to determine the character of bottom and its fauna, thinking we might possibly find codfish or halibut. On the contrary, the bottom was composed largely of glacial mud and almost barren of life.

Arriving off the north head of Akun at 1.50 p. m., a vessel was reported from the masthead, standing to the southward through Unimak Pass. Gave chase, and at 3.50 boarded the American schooner *Letitia*, from Sulima River for San Francisco with a cargo of salt salmon. As soon as the boarding officer returned, we steamed to the southward and westward, and at 6.30 p. m. anchored in Akun Cove for the night.

Getting under way at 4.15 the following morning, September 1, we took up radial line XII, the last of the series, in latitude 54° 36' N., longitude 165° 27' W., depth 113 fathoms, and developed it to the initial point. A northeasterly wind sprang up soon after we reached the line, and increased in force during the day until it became exceedingly difficult to carry on the work; yet we persevered until the evening of the 2d, and succeeded in covering a large portion of the unexplored ground in the region of the Pribilofs.

When in the vicinity of Otter Island a heavy break was seen over a reef which extends at least half a mile off its western extremity, as shown on canceled Coast Survey chart No. 886, but not charted on later issues. The charts of the Pribilof Islands have "breakers" marked about 2 miles N. by E. (magnetic) from Otter Island, directly between it and St. Paul, and while the existence of concealed dangers in the assigned position has been generally doubted, the spot has been given a wide berth in clear weather, and has proved the source of much anxiety to navigators during the almost constant summer fogs. The absence of breakers with the heavy swell then rolling in seemed to confirm their nonexistence, but to settle the question beyond doubt we steamed to the spot and sounded in 26 fathoms, sand and stones, then

dragged the beam-trawl nearly half a mile in the direction of St. Paul without changing the character of bottom or shoaling the water. Strong currents and tide rips are not infrequent near the islands, and under favoring conditions overfalls might occur bearing the general appearance of breakers.

An anchorage was found for the night in Village Cove, St. Paul Island.

A moderate to strong northeast wind was blowing on the morning of September 3, the weather overcast with drizzling rain and heavy sea, conditions most unfavorable for our work. As there was no immediate prospect of improvement, and we could not afford delay, we got under way at 5.20 a. m., and occupied the last few stations required to complete our scheme of exploration; then, at 3.15 p. m., started for Unalaska. The run was made under steam and sail with fresh, following wind, and at 12.55 p. m. September 4 we arrived at Dutch Harbor.

Our season's work in Bering Sea was completed under difficulties and at considerable expense of wear and tear. Our instructions contemplated a line of soundings and observation of seal life between the Pribilofs and the Commander Islands, providing it was found practicable, after the completion of the more important work in southeastern Bering Sea; and we looked forward to it as a satisfactory winding up of the season's exploration until the rapid succession of September gales put a stop to further operations.

Voluminous reports relative to patrol duty were made periodically to the senior officer commanding United States naval force in Bering Sea, and incidents connected with that service have been mentioned only where they have a bearing on the narrative of exploration.

The general results in the several branches under investigation during the season may be summarized as follows:

*Seal life.*—The observation of seal life was conducted with the greatest care, but was subordinate to other duties in so far that we did not deviate from our course or delay operations for that special purpose. The small numbers observed may seem strange in view of the fact that many thousands were constantly afloat; yet it is not really so, for they have become wary since they have been hunted so persistently by pelagic sealers. I have been told by sealers that it was the exception when large numbers were seen from the deck, and that some of the best catches are made on days when there are none sighted from the vessel. It is a common saying that you will not see a moving seal if he sees you first, and this is largely true, although occasionally curiosity induces them to approach a vessel, especially if she is lying to. A larger number will be seen from a sailing vessel than from a steamer moving through the water at the same speed, the vibrations of the propeller being distinguished at a greater distance than the wash of the water about the hull of the former.

To find seals it is necessary to hunt them as other game is hunted, and as we were constantly moving in the prosecution of other work, it

is safe to assume that we passed in the immediate vicinity of large numbers which were not seen, and that where we saw one there were others near by.

Very few were seen within 10 miles of the Pribilofs, except close to land in the vicinity of the rookeries and on the direct route between the islands. Even there an average of only four were observed each trip, yet many thousands are constantly traversing the region day and night through the entire season; in fact, the waters surrounding the islands are, of all areas in Bering Sea, the most frequently traveled by the feeding portion of the herd.

Seals were seen in varying numbers on 11 of the 13 radii, exclusive of those encountered near the rookeries.

- On line I, 200 miles NE. by E. (mag.) of St. Paul Island.
- On line III, 40 to 70 miles N. by E. (mag.) of St. Paul Island.
- On line IV, 25 miles N. by W. (mag.) of St. Paul Island.
- On line V, 40 to 200 miles NW. by W. (mag.) of St. Paul Island.
- On line VI, 50 to 110 miles west (mag.) of St. Paul Island.
- On line VII, 120 miles WSW. (mag.) of St. George Island.
- On line VIII, 140 to 200 miles SW. (mag.) of St. George Island.
- On line IX, 85 to 130 miles SSW. (mag.) of St. George Island.
- On line X, 25 to 180 miles S.  $\frac{1}{2}$  E. (mag.) of St. George Island.
- On line XI, 40 to 60 miles SE. by S. (mag.) of St. George Island.
- On line XIII, 12 miles north (mag.) of St. George Island.

The 100-fathom curve from the 170th to the 174th meridian is a favorite feeding-ground, where scattered seals were frequently observed from the decks of the vessel, a sure indication that it would have been a prolific hunting-ground had we hove to and sent out boats. Next to this region, the largest numbers were observed near the northern extremity of radial No. V, and it soon became evident that the August feeding-grounds were to the westward of the meridian of the Pribilof Islands. Earlier in the season they would doubtless have been found in greater numbers east of that meridian, where their food, composed largely of codfish, would still abound in the shoaler waters of eastern Bering Sea.

*Soundings.*—Depths inside of the 100-fathom curve were found to be remarkably regular, shoaling gradually where land was approached. Off the Kuskokwim, and thence to Nunivak, shoal water extends farther from land than in any portion of Bering Sea, while off the Aleutian Archipelago deep water frequently approaches very near to the coast line.

Depths of 2,000 fathoms or more are found in central Bering Sea, the eastern part having less than 100 fathoms. The western section is still unexplored. The 100-fathom curve lies on the summit of a steep, irregular bank, extending from the vicinity of the Northwest Cape of Unimak in a WNW. (mag.) direction to the meridian of St. George, approaching within 18 miles of the island; thence, about W. by S. (mag.), for 140 miles to the meridian of  $173^{\circ} 25' W.$ , where it turns abruptly to NW. by N. (mag.) for 140 miles, then WSW. (mag.) along

the southeasterly coast of Kamchatka, where an immense area over 200 miles in width at its eastern extremity remains unexplored.

*Character of bottom.*—Black sand and gravel occur on Baird and Slime banks, in Bristol Bay; also in Unimak Pass and off the north shore of Unalaska Island. Spots of black and gray sand occur north of the Pribilofs, but a large proportion of the vast area within the 100-fathom curve is dominated by green mud, having usually a proportion of fine sand, although this is not invariably the case.

In the deeper waters, even to depths exceeding 2,000 fathoms, green mud occupies a prominent place, with a small percentage of fine, gray sand, which during the season of 1890 we mistook for foraminifera. Clay occurred once only in Bering Sea, in latitude  $55^{\circ} 38' N.$ , longitude  $170^{\circ} 39' W.$ , at 1,171 fathoms. Rocky bottom was found occasionally near the 100-fathom line west of the Pribilofs.

*Water Temperatures.*—The surface temperature of the Pacific Ocean, south of the Aleutian Islands, during July and August, was from  $48^{\circ}$  to  $50^{\circ} F.$ , while in Unimak and Amukta passes it was but  $40^{\circ}$ . Marked variations of temperatures have been noted in Bering Sea and commented upon by navigators, some of whom have ascribed the phenomenon to mysterious agencies. It can readily be accounted for, however, from natural causes. Inside of the 100-fathom line the surface temperatures were from  $44^{\circ}$  to  $46^{\circ}$ , while at the bottom they ranged from  $35^{\circ}$  to  $40^{\circ}$ , and between Nunivak and St. Matthew were as low as  $31^{\circ}$ . The temperatures at the surface fell with shoaling water, approximating to that of the bottom as the depths decreased, until in some instances both were the same. A fall of  $3^{\circ}$  to  $4^{\circ}$  was noted in approaching the Pribilof Islands.

Outside of the 100-fathom curve, and particularly between the seal islands and Amukta Pass, the surface temperature was about  $47^{\circ}$ , or  $4^{\circ}$  higher than inside of the curve and  $3^{\circ}$  lower than the Pacific outside of the pass. This condition is owing to natural causes also, as the weight of current is from the warmer waters of the Pacific through the archipelago into the colder region of Bering Sea.

The mean surface temperature in the harbor of Unalaska during July, August, and the first week of September was  $50^{\circ}$ .

Serial temperatures observed showed frequent mingling of warmer and colder waters.

*Currents.*—Regular tides were found inside of the 100-fathom curve, the flood strongest and setting to the northward, the ebb running in the opposite direction. They were greatly affected by winds and the proximity of land, and around the Pribilof group they were particularly strong and erratic. Outside of the 100-fathom curve there was a general northerly set, light, however, and greatly affected by prevailing winds.

*Intermediate tow-net.*—This apparatus was used frequently with good results between 25 and 250 fathoms.

*Codfish.*—The only known cod fishing-grounds of commercial value in Bering Sea are Baird and Slime banks, in Bristol Bay. They are

taken in other places, such as the Hospital Bank, an unimportant locality on the Kulukak ground, where fishing vessels from Baird Bank sometimes seek shelter during northerly and northeasterly storms; also along the shores of the Aleutian Islands, where a sufficient quantity are secured for local consumption. Banks have been reported in various parts of Bering Sea, but we have no data at present that would justify a fisherman in visiting them as a commercial venture.

A vessel can anchor anywhere inside of the 100-fathom line and by persistent fishing take enough to "fill the decks," to use a common expression, where a mess for all hands has been caught. The same may be done in calm, smooth weather, when the ship is lying dead in the water, yet the locality might be worthless commercially; and, in fact, such is the case over the greater portion of Bering Sea.

The search for cod in paying quantities would be confined to spots where the bottom is free from mud, and a glance at the chart will show the prescribed areas where success would be probable.

First, a stretch of 60 miles or more will be observed ESE. (mag.) of St. George Island, in from 70 to 80 fathoms, coarse sand and gravel, and fine dark sand near the 100-fathom curve. Another spot having favorable indications lies about 50 miles NE. by N. (mag.) from the island, in 40 fathoms, gray sand and rocky, and fine gray sand. A region of considerable area, having promising features, lies from 180 to 200 miles NE. (mag.) of St. Paul Island in from 20 to 30 fathoms, fine gray sand and shells. A spot about 42 miles N. by W.  $\frac{1}{2}$  W. (mag.) from northeast point of St. Paul Island has been reported as a bank, and has favorable indications, in about 40 fathoms, sand and gravel. There are other places between the above spot and Nunivak where a certain degree of success might be expected, although our examination did not develop a particularly rich fauna.

There is also a region near the 100-fathom curve, in from 70 to 90 fathoms, fine gray sand and rocky bottom, lying from W. by S. to SW. by W. (mag) of St. Paul Island, which promises well, although the depth is greater than fishermen are in the habit of resorting to in this region.

The report of the fishery expert, Mr. A. B. Alexander, gives the experience of this vessel in fishing with hand-lines from the rail, but in considering the results it must be remembered that the vessel was always under way, frequently drifting rapidly before boisterous winds and heavy seas. The duration of trials never exceeded twenty minutes, and other work was frequently carried on when line fishing was impracticable; hence some of the most favorable localities escaped a fair trial with hook and line.

It is reasonable to suppose that the presence of cod varies with the seasons in the shoal waters of Bering Sea as in other localities, and that they will be found in greater depths as summer approaches.

*Halibut.*—The *Albatross* has never taken halibut in any considerable quantities in Bering Sea, and none of large size. The conditions under

which trial lines have been used are particularly unfavorable for the capture of this slow-biting fish. Trawl lines set on favorable bottom near the 100-fathom line would be an interesting experiment, from which good results might be expected to follow.

*Fishing trials.*—It may be asked why we did not make more extended fishing experiments at the various stations. There are several reasons, among them the necessity of completing the lines as quickly as practicable in that region of fogs, to prevent the vessel from drifting out of her course, it being desirable to locate the stations as accurately as possible as bases for future exploration. Another and vital reason was the lack of time.

*Occupation of a station.*—The following details are given as an evidence of the time and labor required for the full occupation of a station:

When the vessel is under sail and steam, as often happens, the former is clewed up, and furled, if necessary, before the station is reached. Having arrived on the desired spot, a sounding is made, say, in 60 fathoms, surface and bottom temperatures being taken; time, 3 minutes. Serial temperatures are then observed in 5, 10, 20, 30, 40, and 50 fathoms; time, 10 minutes. As many fishing lines as the watch on deck can attend are put over for 15 minutes, followed by the beam-trawl with a scope of 150 fathoms on the dredge rope; time, 6 minutes. The trawl is then dragged 15 minutes, and hoisted aboard in 10 minutes, the haul having occupied 31 minutes. The surface tow-net was in operation while the trawl was on the bottom. The intermediate tow-net follows the beam-trawl, and is lowered to 50 fathoms in about 4 minutes, towed 10 minutes, messenger sent down to close the lower net; time, 3 minutes, and it is then hoisted on board in about 3 minutes, the haul having occupied 20 minutes. Thus 1 hour and 19 minutes are required for the full occupation of a station in 60 fathoms, under favorable conditions. A detention of 2 minutes would be about the average if we were simply running a line of soundings in the same depth.

It would require 3 hours at least to set a trawl line in addition to the operations detailed, and satisfactory trials with hand lines can only be made from boats. Further investigations in this direction are desirable, but they should be taken up when the vessel is not required to maintain her position on a line, and can afford to wait for favorable weather, as she will frequently find it necessary to do in Bering Sea.

On September 8, at 6 p. m., we left Dutch Harbor under the following orders from Commander Nicoll Ludlow, United States Navy, commanding the United States naval force in Bering Sea:

You will proceed to sea as soon as ready, and so far as possible complete your work in and about Bering Sea in connection with your investigations, under the instructions of the United States Commissioner of Fish and Fisheries, and your patrol work which is carried on at the same time. You will return to Dutch Harbor by the 10th of September, fill up with coal, and return to San Francisco via Sitka. Should the weather and other circumstances permit, you will take the route to the north of the Sannak, on your way to the eastward, and keep a sharp lookout en route for the British steamer *Warlock*, the British schooner *Diana*, and the American



schooner *Czarina*. The latter vessel is liable to seizure for receiving cargo from the schooner *C. G. Whiteat* Caton Harbor. The other two vessels are liable to seizure—the *Warlock* if found otter hunting, as it is suspected she is, or loitering in our harbors if not in distress, as she cleared for Petropaulovski August 2 from Sand Point, and the *Diana* (late *Sea Lion*) for escaping after seizure at Sand Point September 28, 1892. The schooner *Emma*, with Hansen, the rookery raider, on board, is probably in or about the Sannak otter hunting. She was enrolled at Juneau and licensed for coasting trade only, and if hunting is being run without proper clearance.

This order is inserted to show that while we were accorded every practicable facility for the prosecution of our special work, it did not relieve us from patrol and other duties required of the vessels composing the Bering Sea fleet.

The navigation of Bering Sea is complicated during the summer season by almost constant fogs. It is difficult at all times in the vicinity of land, from lack of soundings and accurate surveys, and it has been our custom to do what we could for the improvement of charts by taking soundings, correcting coast lines, and giving reliable astronomical positions when it could be done without materially interfering with our legitimate work. Great difficulty has frequently been experienced in making Unalaska in thick weather in the absence of soundings, and we have from time to time run lines from the 100-fathom curve to Unalaska Bay, which were supplemented after our departure from Unalaska by a line from Priest Rock, off Kalekhta Point, to the north head of Akutan, and thence to Akun, the route usually followed by steamers between Unimak Pass and Unalaska. These soundings, with others we have made in the vicinity of the Fox Islands, will, when plotted on a chart of large scale, greatly assist the navigator, inasmuch as it will make the lead available.

We anchored in the south arm of Akun Cove at 1.27 p. m. September 8, for the double purpose of giving the naturalists an opportunity of exploring the region and to make an early start next morning for the inner passage to the eastward. Akun Cove affords convenient and safe anchorage with all winds except from SE. to NE. It has three arms, two of which, the middle and southern, have been surveyed. It has no permanent settlement, but during the fishing season temporary camps are formed by natives who resort to the place for the purpose of taking salmon. The fishing was closed during the season of 1893, however, from natural causes.

At the head of the cove, and separated from it by a narrow shingle beach, lies a beautiful lake of considerable size, which usually finds an outlet to the sea through a small creek; but the storms of the previous winter threw up stones and gravel until the mouth was completely blocked, thus effectually excluding the fish from their usual spawning grounds. Yet thousands of fine red salmon were seen patrolling the shores, vainly searching for an entrance to the lake, and the beach was lined with the carcasses of the many victims to the vital instinct of reproduction. When the tide was low, fresh water from the lake percolated through the obstruction at the mouth of the creek, forming a

small rivulet up which spirited dashes were frequently made by the more vigorous males, until, becoming exhausted, they rolled and floundered back into the waters of the bay.

At 1 o'clock next morning, September 9, we left our snug anchorage in a drizzling rain and fog, but it lighted up at intervals, giving us momentary sight of islands and headlands by which the course was checked, and during the forenoon occasional views of the snow-covered heights of Unimak were obtained.

At 5.10 a. m. Seal Cape, or Cape Khituk of the older charts, was abeam about  $1\frac{1}{2}$  miles distant, and, the fog having partially lifted, we could see the graceful slopes of Progromnia sweeping down from the lower snow line to the shores. The cape is a vertical rocky cliff 150 feet high, with grassy slopes on either hand, through which flow numerous mountain streams that finally fall into the sea from cascades, or over small shingle beaches; about a mile to the eastward rises a steep hill, 500 feet in height, with its sides extending to the water's edge.

The charts show an island off Seal Cape, but it does not exist. The cape itself seems to be detached when seen from a distance, but a nearer view shows it to be connected with the main island. Promontory Cape has a small off-lying rocky islet, and the error may have occurred from the latter cape being mistaken for the former.

The snow-covered peak of Shishaldin, 9,000 feet in height, is beautifully symmetrical when seen in a northerly direction, and while it was obscured most of the morning, we were able to get a good bearing of the summit, which seemed to verify the position assigned it on the older charts, where it was placed in latitude  $54^{\circ} 45' N.$ , longitude  $163^{\circ} 59' W.$  Two elevations rising above the snow line lie to the eastward of Shishaldin; the first is exceedingly rugged in outline, and has a double peak which is approximately in latitude  $54^{\circ} 45' 30'' N.$ , longitude  $163^{\circ} 44' W.$ ; the second peak, having a dome-shaped summit, is in  $54^{\circ} 45' 30'' N.$  and  $163^{\circ} 34' W.$  The relative positions were determined by cross bearings and a run of 15 miles, based on Cape Lazaref, being in latitude  $54^{\circ} 34' N.$  and longitude  $163^{\circ} 34' W.$  The elevated region west of Shishaldin was enveloped in clouds and fog.

Cape Lazaref is a bold rocky point, or, rather, three rocky points, all lying within a mile and a half, with small sand beaches intervening, and has a rocky ledge partly above water extending off in a southeast direction about a mile.

Cape Pankof has three rugged rocky points, and a reef partially above water extends about a quarter of a mile E. by S. from the middle one.

Having passed the latter cape, we laid a course for Umga Island, intending to verify its position by the run and bearings, but before reaching it the fog shut down and we saw nothing more until next morning, having anchored for the night to the westward of Deer Island. We were about 2 miles from Umga when it was shut out, and saw distinctly that there was but one island instead of two, as shown on some

charts; it was about 150 feet in height. The summit was in line with Cape Pankof at NE. by N. (mag.), as shown on United States Fish Commission charts and on Coast Survey chart No. 8800.

It is to be regretted that we were unable to examine the region more thoroughly, for the various charts show greater discrepancies than in any other locality on the Pacific side of the peninsula.

The fog partially lifted at daylight next morning, and at 5.35 we got under way and steamed to the eastward through the channel between North Cape and Deer Island. The *Rush* being observed at anchor near the head of King Cove, we steamed in and boarded her to ascertain if we could be of assistance; also to get the latest information concerning the vessels supposed to be still out sea-otter hunting. The commanding officer reported all well and that the last otter hunter had left the Sannaks. Having obtained the desired intelligence, we left the commodious and convenient bay without anchoring, and at 8.35 a. m. came to in Bailey Harbor, where the naturalists spent the day in exploring the region with fairly good results.

Bailey Harbor has an inner and an outer bay, divided by a broad shingle spit, extending from the western shore nearly two-thirds across. The only directions required to enter the outer harbor are to favor the eastern shore in order to give the flats on the opposite side a wide berth, as they cover at high water. The inner bay is entirely landlocked, and affords a secure harbor in from 5 to 8 fathoms near its center. To enter, favor the east side as before, and take a mid-channel course through the narrow passage, carrying about 9 fathoms. In the absence of surveys, it would be prudent to anchor off the inner side of the shingle spit. The head of the bay and western shore are lined with huge boulders.

Leaving Bailey Harbor at 4.42 p. m. the same day (September 10), we anchored at 6.05 off Belkofsky, a village having a population of 160, and, next to Unalaska, the largest native settlement west of Kadiak. Its principal industry is sea-otter hunting. We called to learn from Captain Lenard himself the particulars concerning the rock bearing his name, which is shown on the charts to the southward of the Sannaks, in about latitude 54° N. We did not meet him, however, as he had removed to another locality.

Belkofsky Bay is open from SW. to SE., and is not safe with strong winds between those points. The best anchorage for a stranger is in 10 fathoms, with the church bearing WNW. (mag.). It is claimed by some that better holding-ground may be found farther to the eastward, which may be true. The western part of the bay is strewn with boulders, which endanger a vessel's ground tackle and should be avoided.

A reef, partially bare at low water, extends from the Inner Iliasik to the mainland, and rising from it, about 60 yards from the latter shore, is a pinnacle rock, which is conspicuous. The only break in the reef occurs just outside of this rock, where there is a narrow channel having 2 fathoms at high water. It is used only by the smallest class of vessels.

We were detained by fog until 7 o'clock on the morning of the 11th, when a strong southeasterly wind drove it away sufficiently to allow us to proceed. Passing between Inner and Outer Iliasik islands, we favored the latter to avoid a reef that makes out about 100 yards from the former, then took a mid-channel course between Goloi and the mainland. The north end of Goloi Island and Moss Cape terminate in low shingle points, and the northern extremity of Dolgoi in a series of wedge-shaped bluffs, having their vertical thick ends outward.

Seal Cape, which forms the east side of Coal Bay, terminates in a flat-topped mound about 100 feet high, with low land between it and the mainland. A conical rock opened out from the cape at about WSW. (mag.), and this was the only rock we observed disconnected from the shore line.

The shores of Beaver Bay were partially obscured by mist, but high land was observed to extend from the eastern extremity of Seal Cape to the vicinity of the entrance to Otter Bay, and thence to within 4 or 5 miles of Cape Aliaksin.

There were no apparent outlying dangers in Unga Strait, and the chart was found to be unusually accurate, cross bearings of principal points plotting within reasonable limits.

At 3 p. m. we anchored in a cove on the west side of Portage Bay, which we have called "Albatross Anchorage." The naturalists and parties of volunteer collectors went out immediately after our arrival, and continued their explorations until the moment of departure.

Albatross Anchorage is a small cove lying on the west side of Portage Bay, near its head, between Three Finger Point and Peninsula Bluff. We anchored between the above points, where we were protected from the swell caused by a heavy southerly wind, and riding to a long scope of chain we found ample swinging room with  $3\frac{1}{2}$  fathoms at low water. Small vessels may go farther in and secure better protection by keeping well over on the southern side to avoid a ledge which uncovers at half tide. Large vessels would anchor in the open bay to the eastward of Three Finger Point or Peninsula Bluff. To enter Portage Bay take a mid-channel course. A spit making out about 300 yards from Reef Point was the only outlying danger observed.

A reconnoissance of Albatross Anchorage and adjacent portion of Portage Bay was made by the officers of this vessel. The position of the north extremity of Three Finger Point, by observations with artificial horizon, was found to be latitude  $53^{\circ} 34' 40''$  N., longitude  $160^{\circ} 38' 16''$  W., H. W. F. & C.,  $0^h 13^m$ , approximate; rise and fall, about 8 feet. The names of points correspond with those of our chart of the anchorage.

Getting under way at 1.50 p. m., September 12, we steamed through Gorman Straits, and thence for the south coast of Kadiak.

The existence of Scotland Rock in the position assigned it on the charts has been questioned, and while we can not confirm its existence or location with certainty, we saw a small conical rock about 10 feet in

height, a little open of the west tangent of Karpa Island when the latter bore NW.  $\frac{1}{2}$  N. (mag.) 11 miles distant.

The Semidi Islands were sighted at daylight on the morning of September 13, and half an hour later Chirikof became visible. The accuracy of the delineation of this island on the charts has been doubted by so many navigators that we took the opportunity to verify it by steaming along its south and east shores and taking angles on prominent points until we satisfied ourselves that it was laid down practically correct. The diverse opinions regarding the platting of this island may be accounted for from the fact that passing vessels lay a course to clear its southern extremity, which is high, and this carries them so far from the long, low northern extension that they do not see it even in clear weather.

The Trinity Islands were sighted at 3 p. m., and at 8 a. m. the following morning, September 14, we took a departure from Ugak Island and steamed offshore to intersect a rhumb line from Cape Greville to Cape Edgumbe, for the purpose of running a line of soundings between those points, this course having been decided upon after a conference with Captain Ludlow and at his request, which was based upon the following experience of the U. S. S. *Mohican* while en route from Sitka to Kadiak:

At meridian, June 21, 1893, she was in latitude  $57^{\circ} 16' N.$ , longitude  $143^{\circ} 11' W.$ , with clear, pleasant weather, and after running 10.4 miles WSW.  $\frac{1}{2}$  W. (mag.) was found to be in discolored water, with quantities of seaweed and floating kelp; and although 160 miles from the coast, appearances were so suspicious that they commenced sounding, but found no bottom at 100 fathoms. Similar reports have been made of discolored water, drifting kelp, etc., in various localities of the Gulf of Alaska by sealers, whalers, and others, casting suspicion over the region, which could be removed only by sounding; and as the *Albatross* was the only vessel in the fleet having the necessary appliances, the senior officer considered it advisable for us to make the examination.

The first sounding of the series was made at 5.55 p. m., September 14, in 838 fathoms, rocky bottom, latitude  $57^{\circ} 24' N.$ , longitude  $149^{\circ} 33' W.$ , and the maximum depth, 2,741 fathoms, was found in latitude  $57^{\circ} 14' N.$ , longitude  $148^{\circ} 06' W.$ , in the great submarine depression lying south of the Aleutian Chain and the Peninsula of Alaska. A depth of 2,099 fathoms was found in  $57^{\circ} 20' N.$ ,  $143^{\circ} 26' W.$ , where the *Mohican* encountered discolored water. The line developed a great basin with no indications of shoaling water except at the terminals.

In reporting the operations of the *Albatross* it is the intention to confine ourselves generally to a simple statement of facts; yet it may not be out of place in this instance to call attention to similar phenomena in other seas as a possible explanation of the appearance of discolored water in various parts of the Gulf of Alaska.

On the Atlantic and Gulf coasts of the United States patches of discolored water have frequently been encountered many miles at sea

off the mouths of the great rivers. Discolored water and soundings of 52, 64, and 66 fathoms were reported between  $5^{\circ} 00' N.$  and  $5^{\circ} 12' N.$  and longitude  $46^{\circ} 43' W.$  off the Amazon River, yet a cast of the lead in  $5^{\circ} 01' N., 46^{\circ} 44' W.,$  developed a depth of 1,876 fathoms. In the China Sea, off the great rivers, patches of discolored water are of frequent occurrence, and I have a vivid recollection of the anxiety their unexpected appearance caused me during my early cruising in those waters.

The Gulf of Alaska receives the drainage of the greatest glacial system in the United States, if not in the world; its waters reach the sea icy cold and laden with mud, heavier than the warmer waters of the gulf, hence they find their way seaward in the great system of ocean circulation as submarine currents, until by gradual precipitation of glacial mud and increase of temperature the relative specific gravity is reversed and they appear on the surface in patches of discolored water.

Strong westerly winds and rough seas were encountered on the 15th, which interfered somewhat with the work of sounding, but moderate to smooth weather followed until our arrival in Sitka at 1.30 p. m. September 17. Leaving Sitka at 2.30 p. m. September 18, we entered Goletas Channel at 2.30 a. m. on the 21st, after a smooth and uneventful run; reached Seymour Narrows at 5.30 p. m., two hours after high water, and encountered an adverse current of about 9 knots per hour, with the swirls and whirlpools incident to the narrow and intricate pass. Its full strength was not felt until we reached the southern entrance, and being under one boiler and not particularly good fires we were barely able to hold our own for the few minutes required to raise sufficient steam to send us through. We anchored for the night near Oyster Bay, reached Union Bay at 9.30 the following morning, took on board 145 tons of Comox coal, and at 8.35 a. m. September 23 left for Port Townsend, arriving at 12.54 a. m. on the 24th.

We were detained at the latter port until 8.36 a. m. on the 26th, when we left for San Francisco, arriving at 12.15 a. m. September 30, and at Mare Island at 2.15 p. m.

Ensign Houston Eldredge, United States Navy, reported for duty October 17; Ensign B. A. Anderson, United States Navy, was detached on the 19th, and Ensign H. B. Wilson, United States Navy, on the 20th.

Passed Assistant Surgeon E. S. Bogert, jr., United States Navy, was ordered to take charge of the medical department of this vessel, in addition to his duties on board the *Boston*, on October 30, and having been finally detached from that vessel, he reported for duty November 4, relieving Passed Assistant Surgeon T. A. Berryhill, United States Navy, who was detached October 31. Passed Assistant Engineer A. M. Hunt, United States Navy, was detached on the 8th, Passed Assistant Engineer Howard Gage, United States Navy, being ordered to take charge of the engineer's department in addition to his duties on board the U. S. S. *Monterey*, to which vessel he was attached.

We are greatly indebted to Mr. Hunt for intelligent and faithful service during the time he was attached to the *Albatross*. He superintended the installation of new boilers, the general and thorough overhauling of machinery, and designed new propellers, which have given great satisfaction. He took an active interest in the work of the vessel, and was always ready to forward it in every possible way.

W. R. Rush, lieutenant junior grade, reported for duty November 6, and on the same day Mr. A. B. Alexander was ordered to special duty in connection with statistical investigations concerning the acclimated fishes of the Pacific Coast.

I was sent to the United States naval hospital at Mare Island on November 10 for treatment, having been taken with grippe October 17; I finally returned to the vessel December 9.

Ensign Philip Williams, United States Navy, reported for duty November 15, and on the following day Ensign C. F. Hughes, United States Navy, was detached.

Lieut. W. R. Rush, United States Navy, was detached December 15.

Passed Assistant Engineer Howard Gage, United States Navy, reported for duty in charge of the machinery on the 23d, having been detached from the *Monterey*.

The vessel was ready for sea on December 31, and sailed for San Diego January 2, 1894, arriving on the evening of the 4th, after a boisterous trip.

About the 1st of March, 1894, numerous articles appeared in the newspapers concerning an unprecedented destruction of fish life along the southern California coast, and particularly in the vicinity of Santa Monica and Redondo Beach. Thinking the matter worthy of attention, I directed Mr. N. B. Miller to take passage on board the steamship *Santa Rosa* on March 3, prepared to make an exhaustive investigation and preserve a sufficient number of specimens for future examination. He returned on the 6th and submitted the following report:

On the 25th of February an article appeared in the *San Francisco Examiner*, stating that all sorts of rumors were afloat to account for the great numbers of dead fish that had been coming ashore during the previous week, and that the line of fish extended from Santa Barbara to San Diego.

I commenced an investigation by going on board the different vessels as they arrived at this port from either the north or south. The schooner *Jessie D.* arrived on February 28 from Cerros Island. Captain Hardwick reported that between Point San Tomas and San Diego he passed through large numbers of fish swimming near the surface, and apparently going south; the greatest numbers of fish were seen at night, and he was unable to recognize any but barracuda; he thinks, however, there were other fish among them. The schooner *Excelsior* arrived the same day from San Pedro, and reported that no dead fish were to be seen on the surface of the water between that port and San Diego, but great numbers were observed on the beaches at Santa Monica, Redondo, and Newport. Captain Alexander, of the steamer *Santa Rosa*, reported the same facts, and suggested Redondo as the best place to make an investigation. The fishermen of San Diego have found no dead fish either at Point Loma or on the beach in False Bay.

In obedience to your order of March 3, I took passage on the steamer *Santa Rosa* the same day, arriving in Redondo Sunday morning, March 4. I commenced as soon as possible to get at the facts by personal observation, and obtained also the ideas of fishermen as to the cause of the destruction of such great numbers of fish. Some of the fishermen at first thought that giant powder had been used, as there had been heard a number of loud explosions offshore a short time before the dead fish were seen on the surface; others claimed to have seen the water spout up into the air. After an investigation it was found that none of the fishermen were out at the time, as the water was then too rough for fishing with safety.

The first appearance of these fish was on the 24th of February, and for the first two or three days very few were seen, but on the 28th thousands of fish appeared on the surface of the water, both dead and alive; the live ones appeared to be unable to keep below the surface, or were trying to avoid deep water; those that got too near the shore in shallow water were thrown upon the beach. Most of the dead ones were carried out to sea by currents, and were probably eaten by gulls, as not a gull has been seen along the shore since the first fish made their appearance.

I examined the beach for several miles at Redondo, and found barracuda, flatfish, sardines, whitefish, red rockfish, anchovies, sea bass, and yellow-fins; the most numerous of the large fish were barracuda and flatfish. In the distance of half a mile I counted 168 flatfish and 225 barracuda, and in the same distance were a thousand or more sardines and other small species. I secured a number of specimens of sardines, anchovies, and red rockfish alive as they were thrown upon the beach by the surf. At this date, March 4, very few fish of any kind were to be seen on the surface, and no dead ones. I also succeeded in getting some fine specimens of barracuda and flatfish alive.

I examined very carefully a large number of fish, both living and dead; in every case the stomach of the fish was empty, and those that were thrown upon the beach dead had their gall bladders ruptured. The gills of the live ones were natural in color, but had patches of yellow slime attached to them which had a strong odor of petroleum. These fish are being used for food on the steamers and at the hotels, and also shipped to Los Angeles for the market, but no bad effects have as yet been reported from eating them.

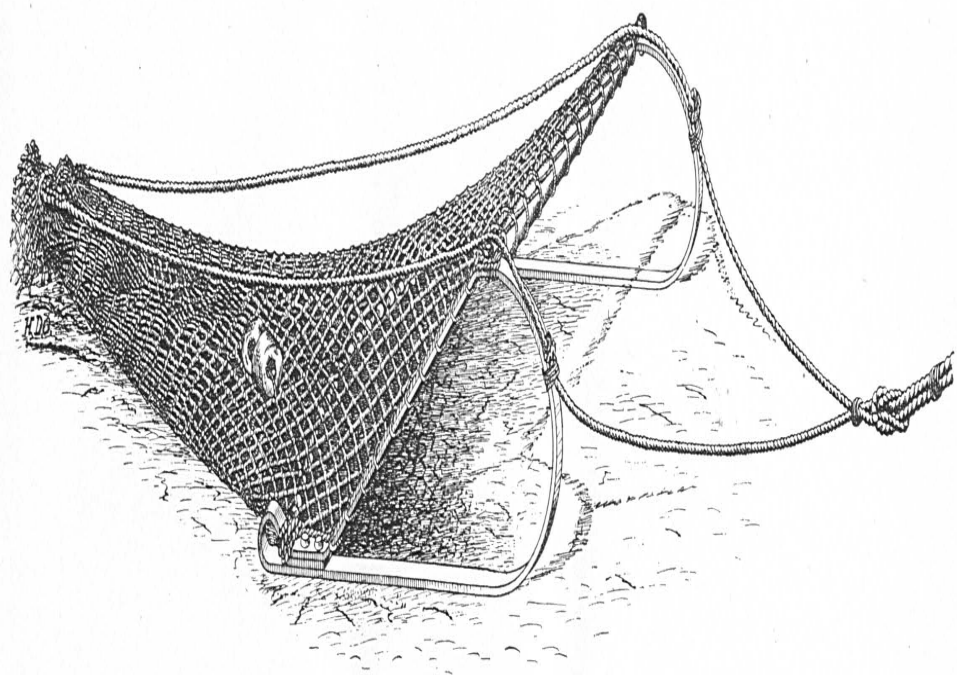
Of course, such an unusual occurrence caused great excitement among the fishermen. Mr. E. P. Maxey, of Redondo, states that he was born on the coast of southern California and has been a fisherman most of his life, and that nothing of the kind has ever happened before.

It is an established fact that there are oil springs all along the southern California coast, in from 2 to 700 feet of water, and from 1 to 10 miles from shore; and, as new springs have occurred in localities where they have never before been seen, and at the same time that the fish first appeared on the surface, the only explanation probable is that some seismic disturbance has taken place in the ocean not far from the mainland which has caused new springs to burst forth, throwing out an unusual amount of oil and gas, and that one or more of these springs have appeared on the banks or feeding grounds of the fish. The fish in the immediate neighborhood of these springs were probably killed by the explosion; those farther away were doubtless stunned or affected by the escaping oil and gas, which caused them to come to the surface, and from the effects of which it took them several days to recover.

On March 5 I visited Santa Monica, but found very few fish on the beach, and none floating on the surface. On the return trip to San Diego I kept a careful lookout for floating fish, but saw none.

A scientific examination of San Diego Bay was commenced by Mr. Miller on the 23d of February and completed March 25. The beaches were examined with a seine; then the boat dredge and oyster tongs





BOAT BEAM TRAWL.

were brought into requisition, followed finally by a boat beam trawl which was devised for and first used on this work. The results of the investigation will be found in the records submitted by Mr. Miller, copies of which are hereto appended.

The boat beam trawl was found so eminently successful that it seems to be worthy of special notice. It may be described as follows (see Pl. I):

Beam: Iron pipe; length, 3 feet 6 inches; diameter, outside, 1½ inches.

Runners: Size of iron, 1½ by ½ inch, flat bar; length, 2 feet 7 inches; height, 1 foot 1 inch.

Net: Length, 7 feet; mesh, 2 inches; jacket, ½-inch mesh; jacket length, 2½ feet.

The bridles, of 9-thread manila, were seized to the front of runner with three turns of seine twine and the ends lashed in with the tail lashing, the intention being that the bridle stops shall part in case of fouling the bottom and allow the net to come up tail first.

We left the harbor of San Diego at 4 p. m., March 27, and reached Mare Island at 10.50 a. m. on the 30th, after a smooth, foggy trip. The *Albatross* was docked from March 31 to April 5. Messrs. C. H. Townsend and A. B. Alexander left for the Puget Sound region by rail on the 8th, to prosecute Fish Commission work in advance of the arrival of the *Albatross*.

On April 11, by direction of the Commissioner of Fish and Fisheries, I reported by telegram to the Secretary of the Navy for assignment to duty in connection with patrol service in Bering Sea during the approaching season, and on the 13th I received instructions from the latter to proceed with the *Albatross*, when ready for service, to Port Townsend, Wash., and there to report to Commander Clark, U. S. N., in command of the Bering Sea squadron. Leaving Mare Island navy-yard on the 14th, Port Townsend was reached on the 19th.

Ensign W. R. Shoemaker, U. S. N., reported for duty on the 29th, and Lieut. Commander F. J. Drake, U. S. N., detailed as my relief, visited the ship.

On April 30, with the permission of the senior officer, got under way at 9 a. m. and steamed out into the Straits of Fuca for the purpose of showing to Lieut. Commander Drake the various apparatus and methods employed in the process of submarine exploration. Returning, we anchored in Port Townsend again at 5 p. m.

At 1 p. m., May 1, I was relieved of the command of the *Albatross* by Lieut. Commander F. J. Drake, U. S. N., who assumed command. I signed the log book, and took receipts from Captain Drake for the vessel's outfit, stores, and equipment, forwarding the latter at once to the Fish Commission. I left the ship at 6 p. m. en route for my home.

## OPERATIONS FROM MAY 1 TO JUNE 30, 1894.

By Lieutenant-Commander F. J. DRAKE, U. S. N., Commanding.

On April 19, 1894, while on duty at the navy-yard, Norfolk, Va., I received orders from the Secretary of the Navy to proceed to Port Townsend, Wash., and take command of the United States Fish Commission steamer *Albatross*, relieving Commander Z. L. Tanner, United States Navy.

I reported to the Commissioner of Fish and Fisheries at Washington, D. C., on the 21st of April, left Washington on the 22d for Port Townsend, and arrived on the 28th, when I reported on board the U. S. S. *Mohican* to Commander C. E. Clark, United States Navy, commander in chief of the United States naval force in Bering Sea.

On Tuesday, May 1, at 1 p. m., a thorough inspection of the vessel was made by Commander Tanner and myself, previous to the transfer of command. All hands were then mustered aft. The usual reading of orders being concluded, Commander Z. L. Tanner turned over the ship and her crew to Lieut. Commander F. J. Drake, who assumed command.

The *Albatross* being reported ready for sea, received instructions the same evening, May 1, to hold in readiness to proceed to Unalaska as the pioneer ship of the Bering Sea fleet.

On the 3d I sent on board the *Mohican*, flagship of the Bering Sea squadron, eleven blue prints of the chart of the eastern portion of Bering Sea, showing the work of the *Albatross* in that region. The blue prints were accompanied by a letter of instructions, giving information for additional safety in navigating those waters; this letter was also—and primarily—a request that the commander in chief issue orders to the commanding officers of the several vessels of the squadron relative to observations with regard to fur-seal life which might be made by them while engaged in patrol duty, besides furnishing each vessel with one of the blue prints. It was further requested that all data so collected be turned in to the commander in chief at the end of the season, to be collated on board the *Albatross* as a part of the information sought on that subject for the Fish Commission.

On May 5, with the permission of the commander in chief, got under way at 10.45 a. m. and stood out of Port Townsend to convey Messrs. Townsend and Alexander to Stuart, Waldron, and Lucia islands in order that they might obtain certain information from the fishermen of that region relative to the waters adjacent to the international boundary line.

At Reid Harbor, Stuart Island, but little industry in fishing was found, except for open market. A seining party in charge of Mr. Alexander made a haul at the head of the harbor with fair results. The

fishermen say that a very good trade is carried on in salmon during July and August, when they pass up Haro Strait to the westward of San Juan Island.

At Waldron Island Messrs. Townsend and Alexander visited the fishing hamlets on both sides of Sandy Point, on the west end of the island, half a dozen fishermen being interrogated. Two hauls of the seine on the beach at Cowlitz Bay and fishing trials with hand lines resulted but indifferently. Lay at anchor for the night in Cowlitz Bay, Waldron Island, and at daybreak on the 6th steamed over to Lucia Island, arriving at 7.40 a. m. Here some valuable information was obtained and photographs secured of types of fishing vessels and boats. Seining and fishing parties were sent out, and a rich and varied collection was obtained. Returning, we left Lucia Island at 11.20 for Port Townsend, where we arrived at 6 the same afternoon.

On the 10th Messrs. Townsend and Alexander left the ship to continue their work in Puget Sound and among the boundary islands.

May 16 final orders for sailing were received: Next morning at early daylight the entire fleet got under way, the *Yorktown*, *Adams*, *Alert*, and *Corwin* going out by way of the Straits of Fuca to their respective patrol stations. The *Albatross* followed the flagship *Mohican* through Haro Straits, Active Pass, and Strait of Georgia to Tribune Bay (south side of Hornby Island, British Columbia), where we anchored for the night, having made a run of 129 miles from Port Townsend.

At 9 a. m. on the 18th got under way with the *Mohican*, and stood up the Strait of Georgia and through Discovery Passage for Seymour Narrows, which we passed through at 6 p. m. at high-water slack. Continued on up Johnstone Strait to Alert Bay, Cormorant Island, where we anchored at 2 o'clock the next morning. Captain Lennan, who had been sent on board the flagship at Port Townsend to act as their pilot during the run up the inside passage, returned on board shortly after anchoring.

We were under way again at 4.10 a. m. May 19, and stood out through Goletas Channel and Queen Charlotte Sound to sea, thence shaping course for Unalaska in obedience to sealed orders to "proceed there with all dispatch, coal, and sail for Attu Island for the purpose of landing Lieutenant Jacobs, U. S. R. M., and his assistant, then to return to Unalaska; on the way back, however, to endeavor to be off the principal passages between the western groups of islands during the daytime, if possible, so as to intercept any sealers which may come from the westward with the intention of entering Bering Sea."

May 20 proved to be a pleasant day, with moderate long swell from the southwest and light head winds. A succession of thick fogs were encountered until the forenoon of the 25th, when the barometer fell rapidly and it came on to blow a gale from the northeast. At 7 p. m., having arrived off Unimak Pass, the weather being thick and the horizon so obscured that objects could not be distinguished over a

quarter of a mile, hove to for the night. At 4 a. m. May 26 filled away under steam and sail on course for Unimak Pass and arrived at Dutch Harbor at 2.24 p. m. the same day.

The season was very backward at Unalaska, signs of approaching spring not then having made their appearance. The snow line was but little above the water's edge, and no grass was visible. During our stay in port it snowed part of the time each day. The anglers who tried the streams for trout reported that they had not yet commenced to bite.

Left Dutch Harbor the morning of May 31, with overcast sky and peaks of mountains enveloped in clouds. Shaped course for Attu Island, with vessel under full steam-power. During the passage over the weather was pleasant, with occasional passing showers. A smooth sea with light westerly swell favored a quick passage, which was made without delay in 78 hours, arriving in Chichagof Harbor on June 4. Lieutenant Jacobs was landed the same day.

Hunting, seining, and collecting parties were dispatched on shore to gather such specimens as would best illustrate the commercial value of this island. As far as any trade is concerned, the few inhabitants of the village at the head of Chichagof Harbor, numbering 23 men, 48 women, and about 30 children, have apparently relapsed into a state of apathy from which only the advent of the company's steamer with supplies or the arrival of a vessel like the *Albatross* will arouse them. Game of any description is scarce at this season of the year, and only a few minor fox skins and straw baskets were offered in trade for plug tobacco, which evidently was in great demand. Seven frame houses, a thatched church built from driftwood, and a dozen or more mud huts constitute the village. I found that for three months—March, April, and May—these people had been subsisting on fish, all other provisions having been consumed. In consequence of their dilapidated condition and want of necessary supplies, I had issued from the paymaster's department, 10 pounds of tea, 50 pounds of sugar, and 105 pounds of sea biscuit, which was served out in equal shares to each family. These articles I deemed sufficient to sustain them until the arrival of the Alaska Commercial Company's supply steamer, which was not expected for some time.

Three hauls of the seine on the beach near one of the fresh-water streams on the south side of the bay yielded 300 salmon, 500 flounders, and 100 rock trout, with other minor species. Several Atka mackerel were caught from the ship's side. The natives here report that cod banks exist off the entrance to this harbor, where they make good catches in 50 to 60 fathoms, with sand and broken-shell bottom. Atka mackerel are also caught inshore on the south side of the harbor entrance in 20 to 30 fathoms, rocky bottom, and close to the ledges of outlying islets which form a barrier to the approach to the shore in this locality.

Tuesday morning, the 5th of June, got under way and steamed over to Agattu Island, about 30 miles SSE. (mag.) from Attu, to an entirely new field of investigation. Stood in and anchored in a broad, open bay on the eastern end of the island in 16 fathoms, sand and gravel. Sent seining, hunting, and fishing parties ashore in charge of Messrs. Townsend and Miller, and made fishing trials over the side, catching many cod and a few mackerel.

Little hydrographic work has been done around this island and, from the soundings taken when running in, this end appears to have a gradually sloping platform extending off 6 miles or more, which I should have developed, instead of making a reconnaissance, which was done by the officers on the afternoon of the 5th, had time permitted. At 6 miles it shows an average depth of 35 fathoms, gray sand and broken shells, which may extend well to the eastward and be a future field of examination. I have named this place McDonald Bay, in honor of the United States Commissioner of Fish and Fisheries.

On the morning of the 6th sent seining and fishing parties on shore with Mr. Townsend; weather thick, and blowing fresh from the southward. Ran a line of soundings out 6 miles over the platform to the eastward of Agattu; found the bottom irregular and studded with rocky patches, changing the soundings abruptly 8 to 10 fathoms. Therefore I deferred dredging in consequence of the probable loss of any apparatus sent to the bottom, and accordingly shaped a course due east (mag.) for the island of Kiska, on the Bering Sea side of this chain of islands. The conditions of weather were such as to make it impossible, with our limited time, to investigate more fully the banks to the eastward of Attu. This will have to remain for future work. The seining and fishing parties sent out at Agattu had negative results; but better conditions were looked for near Kiska, on the northeast side of the island.

With a strong westerly wind, the weather remained thick and foggy. This, in connection with the variable currents near these islands, would make the location of any platform suitable for dredging more or less doubtful. Had the weather remained pleasant for one or two days, I should have been able to have accomplished some good results, which would probably have been of interest to the Fish Commission. With unlimited time at this season of the year, I can readily see that a thorough examination of the platforms along these islands and in the several passes would undoubtedly open up a new field which would be productive of good results.

June 7, at 2 p. m., ran in and anchored in Kiska Harbor, on the east side of Kiska Island. Sent seining, fishing, and hunting parties on shore. Some salmon and trout were caught in a lake at the head of the bay. A few ptarmigan, ducks, and geese were secured by the hunters. Very little game appears to occur in this vicinity. The weather changed rapidly during the night to a stiff SE. blow, with rain, which drove in a dense fog, shutting out the land. On the 8th

it was foggy and rainy, with the wind moderating. Got under way and steamed off the NE. entrance to Kiska Harbor, and made a successful haul of the dredge in 35 fathoms, sandy bottom. A few specimens of fish, shells, sponges, etc., were obtained. Compelled to suspend operations for the day on account of heavy fog, we returned to anchorage in Kiska Bay. We were under way again at 9 a. m. June 9, and stood out of Kiska in a dense fog. Put over the dredge in 55 fathoms and made a successful haul. Several varieties of sponges, corals, a few fish, serpent starfish, etc., were obtained. Fishing trials from the ship and boats did not prove to be successful in the vicinity of this bay and entrance to harbor.

Shaped course for Atka, passing to the northward of Chugal and Khwostof islands. Arrived at Nazan Bay, Atka Island, the forenoon of June 10. Sent out seining, fishing, and hunting parties; very few fish were caught by any of the parties. From questioning the natives who fish around the islands, both at Attu and Atka, it appears that the Atka mackerel are caught on rocky ledges covered with kelp at Attu, near the entrance on the south shore of Chichagof Harbor, in 6 to 10 fathoms of water. It also appears from the statements made by the Aleuts that the Atka mackerel is fished principally on the side of ledges and islands where the tide runs strongest. Both spear and line are used.

Left Atka at 6 p. m. June 10 for Unalaska, passing to northward of intervening islands, and arrived in Dutch Harbor at 2 a. m. on the 12th.

During the forenoon of the 12th a whaleboat arrived in the harbor containing nine survivors of the whaling bark *James Allen*, which had been wrecked on the Agladak Reefs, east end of Amlia Island. The boat contained Captain Huntley and eight men, who had managed to reach this port in 32 days by coasting along the chain of islands. The bark was wrecked on the 11th of May, about 2.30 a. m., in attempting to pass into Bering Sea by the Seguan Pass. As the boat entered the harbor it was met by the steam launch of the *Bear*, then returning from Iliuliuk. From an interview held on board the *Bear* with the survivors, at which I was present, it was learned that the crew numbered fifty, all told. Five boats were lowered, and four got away from the wreck, the fifth boat being stove alongside. Several were drowned. One boat found its way to the Alaska Commercial Companys' station at Nazan Bay, Atka Island, on the 24th of May. The nine survivors in the boat were transferred on the 2d of June by the company's steamer *Dora* to the U. S. S. *Petrel*, and eventually were landed at Dutch Harbor. The captain's boat and one other, No. 3, kept together, and landed on the 12th of May on the north side of Amlia Island near the scene of the wreck. The fourth boat, containing the first and second mates and a crew of men, parted company with the others May 11, and was last seen well to windward under sail. This boat was the only one which managed to leave the wreck with an outfit of oars, spars, sails, compass, and charts.

No provisions were saved from the wreck or taken in the boats; hence, the only food obtained consisted of mussels, seaweed, and such fish as they could devise means to catch. The captain's boat and No. 3 coasted along the chain of islands, making a landing each night except two, when they were compelled to run before a westerly gale. No. 3 boat capsized off the Islands of Four Mountains; four men were drowned, and the remainder taken in the captain's boat, making a total of 23 men. One died the next day and was buried at sea. With 22 men he landed on the north shore, west end of Umnak Island, at an old deserted settlement, where huts were found which afforded shelter. Several days were passed here in resting and repairing the remaining boat. Captain Huntley then decided to take 8 of the strongest men and push on to Unalaska for relief and rescue of those left behind. He made the passage from Umnak to Dutch Harbor in ten days, with crew and boat.

It was decided by Captain Healy and myself that he should go immediately to the rescue of the men left on Umnak Island, as he had finished coaling, and that I should follow as soon as coaled and make a careful search of the shore lines of the islands from Dutch Harbor to Nazan Bay, and especially along the north shore of Amlia, as Captain Huntley, of the wrecked bark, believed that No. 4 boat had landed on the north side of Amlia Island, and in so doing had probably stove their boat, and consequently were unable to get away.

The *Albatross* sailed on the 13th, at noon, but encountered a gale and rough sea off Cape Makushin, which prevented a successful search of the shore line being made; hence, returned to our anchorage for the night. Got under way at 5.30 a. m., June 14, and continued search along the north shore of Unalaska, working westward; anchored at night in Chernofski Harbor, west end of Unalaska Island. Left at 5.30 on the morning of the 15th and continued the search along the north shore of Umnak Island. At noon stood off shore on account of a gale, heavy sea, and thick weather, which shut in the land at a distance of a mile, preventing further search. Stood to the westward along the chain of islands and anchored in Nazan Bay at 5 a. m., the 17th, in order to ascertain if any additional information had been obtained of No. 4 boat. It was learned, however, that nothing had been heard of the missing boat; hence, the *Albatross* left Nazan Bay at 7 a. m. and made a careful search of the shore line of Amlia and Seguam islands. A heavy fog and westerly wind then setting in, prevented the further search of Amukta and the Islands of Four Mountains. The *Albatross* was accordingly headed for Unalaska, as it was concluded that nothing more could be accomplished toward finding the missing boats, under the uncertain conditions of weather then existing. The circumstances also prevented utilizing any of this search to the advantage of the Fish Commission, which is to be regretted. Arrived at Dutch Harbor the evening of the 18th.



Sailed from Dutch Harbor at 8 p. m., June 21, for the Pribilofs. Arrived at St. George Island and anchored off the village at 8 p. m., June 22. Weather cloudy, rainy, and foggy, with fresh ENE. wind. For several days previous to the arrival of the *Albatross* communication with the shore from the north anchorage had been interrupted by heavy weather. At midnight got under way for St. Paul, where the *Albatross* arrived at 5 a. m., June 23. The Treasury agents reported that the seals were late this season in arriving, especially the cows.

At St. Paul orders were received for the *Albatross* to "cruise for ten days between a line drawn from St. Paul to Cape Newenham, and another from St. Paul to Akutan Island; then return to Unalaska. To go as far to the eastward as judgment seems best." One killing of 1,200 seals had taken place from the Reef Point rookery a few days previous to our arrival; another occurred on the 23d at Zapadni rookery, of 1,000 seals. Fresh salmon were found in the seals' stomachs at the last killing.

Information was received from otter hunters at Unalaska the day of our departure that the majority of seals were entering Bering Sea through False Pass, or Isanotski Strait, between Unimak Island and Alaska Peninsula. It was therefore concluded that some information might be brought to light relative to the migratory habits of the seal by making an examination at this period of that portion of Bering Sea included between a line drawn from Amak Island W. by N. (mag.) to a point 20 miles NE. of St. Paul, and another line from Cape Lapin, west end of Shaw Bay, W.  $\frac{1}{2}$  N. (mag.) to a point 20 miles SW. of St. George Island.

Accordingly, the *Albatross* sailed from St. Paul at 7 p. m., June 23, to cruise in search of pelagic sealers and investigate the supposed channel of migration, as outlined above. A part of the 24th and 25th was spent in examining this locality. A haul of beam trawl, also surface net, was made at a distance of  $1\frac{3}{4}$  miles from and across the mouth of False Pass; the usual temperatures and a specimen of bottom water were taken. The trawl was drawn for thirty minutes, the haul being successful. The principal specimens consisted of flounders, alligator-fish, starfish, hermit crabs, and sponges; bottom composed of black volcanic sand. On consultation with the naturalists it was decided that fishing trials under these conditions would not be productive of any additional information in this locality. Up to this time no seals nor sealers had been seen, although favorable sealing weather; a very marked contrast to conditions supposed to exist, from all accounts.

The run was then made to Port Moller, where we arrived June 27 at 7 a. m. Neither seals nor sealers were seen in this locality; we therefore continued on to Port Haiden, which was reached that afternoon. The weather being unsettled, accompanied by thick fog and mist, together with the late hour of the day, I did not consider it advisable to examine this locality or employ the time allotted to cruising in making

a reconnoissance of this port. Hence, a course was laid for Cape Newenham with the intention of reaching the fishing grounds in that locality, situated at the northern limit of our patrol work.

After running 50 miles from Port Haiden light field ice was encountered at midnight of the 27th in latitude  $57^{\circ} 34' N.$ , longitude  $160^{\circ} 10' W.$  At 1 a. m. it had become so thick and floating patches of such dimensions that further continuance of the same course, WNW. (mag.), would have been dangerous to the propellers; hence the *Albatross* was put about and by careful management pushed through the ice till open water was reached at 3 a. m., having been 3 hours in the ice field. The fog was thick when the ice was encountered, and the temperature fell to  $32^{\circ} F.$ , with intense humidity, which increased the chilling effect of the atmosphere, causing everything about the ship to be covered with heavy moisture, and consequently in a dripping state. A moderate breeze was blowing at the time from the southward and westward. As we emerged from the ice, a shift of wind lifted the fog, when a view of the ice field demonstrated that it was closed to the WNW. with southern limit extending a SW. by S. and an E. direction from our position as far as the distant horizon. The dimensions of several of the cakes when alongside of the *Albatross* were found to be about 3 feet out of water and from 200 to 300 feet in length, varying in width from 50 to 75 feet. It was composed principally of old shore ice and some snow ice, which had undoubtedly found its way to this part of Bristol Bay from the numerous inlets and rivers at its head. Evidently this is characteristic of a late season at the head of the bay, which will undoubtedly have its effect upon the appearance of the salmon in the Nushagak River, owing to the low temperature of the water. This will probably delay the cannery industry of this region and give their yield a late market for this season's work.

The course having been changed to SW. by S. (mag.), skirting the ice limit, the weather changed somewhat, making a fair day for this region, much above the average. In the 42 days subsequent to our departure from Queen Charlotte Sound only 5 days of partial sunshine have been experienced. The remaining days were enveloped in fog, mist, rain, and several summer gales of slight duration.

A few scattered fishing trials, with hand lines, of 30 minutes' duration each, with 13 to 15 lines down, were made, commencing in latitude  $57^{\circ} 58' N.$ , longitude  $166^{\circ} 04' W.$ , on a line drawn between St. Paul and Cape Newenham, and 134 miles from St. Paul. The line extended NE. by N. (mag.) 95 miles toward Cape Newenham, then SE. by S. (mag.) for a distance of 90 miles, and finished on a line WSW. (mag.) in latitude  $56^{\circ} 58' N.$ , longitude  $163^{\circ} 45' W.$  Scattering specimens only of codfish and two or three flounders were taken. The bottom at the various stations was composed largely of fine gray sand; the depth varied from 21 to 44 fathoms, the bottom temperature from  $32^{\circ}$  to  $35^{\circ} F.$  Soundings were continued at intervals in this region for the purpose

of filling in between the radial lines run by the *Albatross* on July 29 and 30 and August 10, 1893.

The position at noon June 30 was latitude  $56^{\circ} 59'$  N., longitude  $163^{\circ} 02'$  W.

The end of the fiscal year finds the *Albatross* engaged in patrol work connected with the Bering Sea squadron and making occasional soundings for hydrographic information. The confidential orders under which the vessel is performing patrol duty prevent legitimate work in the interest of the Fish Commission. Observations in this section in the study of seal life and the collection of data relative thereto, as well as the further development of the fishery resources of this region, can not be executed by the ship and her staff with any degree of satisfaction where sudden and frequent changes of base are ordered in the patrol work assigned, which is entirely foreign to the method and manner of investigation necessary in the study of the seal and its habits.

The following is a brief summary of the movements and operations of the *Albatross* during the year:

	No.		No.
Days steaming and under way.	138	Hauls of intermediate tow-net, Tanager	13
Nautical miles run by log.....	17,269.1		
Ports and anchorages made ....	61	surface tow-net.....	40
Hauls of beam-trawl.....	102	Fishing trials, hand-line.....	79
rake-dredge.....	5	Bottom temperatures taken.....	236
dredge.....	12	Serial temperatures taken, sets.....	95
mud bag.....	23	Water densities taken.....	230
tangles.....	2		

The following is the list of officers and assistants June 30, 1894: Lieut. Commander F. J. Drake, United States Navy, commanding; Lieut. A. F. Fechteler, United States Navy, executive officer and navigator; Ensign Houston Eldredge, United States Navy; Ensign W. R. Shoemaker, United States Navy; Ensign C. M. Fahs, United States Navy; Ensign Philip Williams, United States Navy; Passed Assistant Surgeon E. S. Bogert, jr., United States Navy; Assistant Paymaster Eugene D. Ryan, United States Navy; Passed Assistant Engineer Howard Gage, United States Navy. Captain's clerk, Harry Clifford Fassett. C. H. Townsend, resident naturalist; A. B. Alexander, fishery expert; N. B. Miller, general assistant; Capt. James E. Lennan, seal hunter.

## REPORT OF A. B. ALEXANDER, FISHERY EXPERT.

[Abstract.]

## INSHORE INVESTIGATIONS.

On May 30, 1893, the *Albatross* stopped at Comox, Vancouver Island, while en route for Bering Sea, for the purpose of coaling. During the detention at this port the drag seine was hauled to some extent, but the shores generally about here are unsuited to the use of such nets, being rocky in most places. No fishes of economic importance were secured, but clams were found to be abundant. The latter constitute one of the principal articles of food utilized by the small tribe of Indians, numbering about 100 persons, which camps in this locality during the summer months for the purpose of laying in a supply of salmon for winter use. These fish are either smoked or dried. For smoking they are hung on lines or poles near the roof of the huts or houses, where the smoke circulates freely among them; in drying, they are thrown upon the rocks or sand and left until sufficiently cured to permit of their being packed and shipped to the winter settlement of the tribe near the town of Union, 13 miles from the coast.

Hunting is the only winter occupation of these Indians. I saw no nets of any kind at the fishing settlement, and, from such information as was obtainable, I judge that all the salmon taken here are caught by trolling. Although plentiful enough to supply the wants of the local white and Indian population, salmon are not sufficiently abundant in this locality to induce the establishment of a cannery for their preparation.

Our next stopping-place was at Pender Island, British Columbia, 77 miles north of Comox, where we anchored for the night. Several hauls of a drag seine were made upon a fine beach near at hand, but without success, the strong current which sweeps by the island possibly accounting for the absence of fish.

St. Paul, Kadiak, was reached on June 7, and shortly after anchoring a seining party proceeded to a beach about  $1\frac{1}{2}$  miles east of the town, where a considerable number of flounders, sculpins, and salmon trout were captured in the net. The next morning a second visit was made to the same place with the object of laying in a stock of the trout, but only a single individual was secured. A few cod taken in the seine were small and sickly in appearance, but others procured by hand lines from the ship's deck were more thrifty-looking. We also noticed several native women and boys using hand lines from the beach and taking cod of the same character as those secured in our seine, but the white inhabitants always fish for cod and other bottom species a mile or two from the islands, where the condition of the fish is excellent.

In Humboldt Harbor, Popof Island, of the Shumagin group, 150 flounders and a few small salmon were seined at the mouth of a small

creek. Two halibut, weighing 5 pounds each, were the total result of a day's fishing with hand lines at the same place. A week later (June 16) repeated hauls were made with the drag seine in Humboldt Harbor, but all kinds of fish except flounders were as scarce as they had been on the previous trial. A few cod and halibut were taken from the ship with hand lines. They were in fine condition, but too small for market.

Seining was subsequently carried on at Northeast Harbor, Sandy Cove, and Yukon Harbor, of the Shumagin group, the two former being on Little Koniushi Island, the latter on Big Koniushi Island. Cod were plentiful at Sandy Cove, 50 being secured in a short space of time. Their range in weight was from 4 to 16½ pounds, the average weight being 7½ pounds. At Northeast and Yukon harbors only a few flounders were obtained, the beaches being composed of large stones and affording few places where the seine could be hauled.

Mist Harbor, Nagai Island, is one of the finest harbors in the Shumagin group for the establishment of a fishing station for cod, being entirely landlocked and of sufficient size to accommodate a large fleet of fishing vessels. The water is everywhere deep, over 20 fathoms occurring within an eighth of a mile of the shore at the entrance, and it is also very clear, the bottom being visible to a considerable depth. The fishing trials were, however, poorly rewarded, and the shores near the water's edge were observed to be almost entirely barren of animal life. The drag seine was employed in all parts of the harbor. One salmon was seen to jump at the mouth of a small mountain stream, but repeated hauls failed to secure us a single specimen. Later in the season the salmon probably strike in here in considerable numbers. Late in the day, by the use of a couple of hand lines off a rocky point not far from the ship's anchorage, I succeeded in catching a couple of cod weighing 3 pounds each, and it is possible that this species may enter the harbor abundantly at some other season.

The following morning a visit was paid to a small lake on the island about a mile from the entrance to the harbor, where over 20 small trout and a large quantity of sticklebacks were obtained by seining.

Sanborn Harbor, on the west side of Nagai Island, is well sheltered and offers many advantages for a fishing station. The drag seine was hauled there in many places and there were secured large numbers of two species of flounders, 6 adult salmon, besides many young salmon about 2 inches long, 8 salmon trout, and a dozen sculpins.

Collections were also made in a small lake adjacent to the harbor, which at one time was connected with the sea, but now has its outlet entirely cut off by a dam of rocks and wood built by fishermen. Its water, formerly salt or brackish, has become perfectly fresh, but in addition to several hundred small trout our seining catch consisted of a large number of starry flounders and a few tomcod. Neither the condition nor quality of the flounders appeared to have suffered from their presence in the fresh water, and they were eaten on board the ship.

Four visits were paid to Unalaska during the season, and more or less collecting was done at each. On June 23 the drag seine was hauled several times along the beach or spit which forms Dutch Harbor, but only 2 flounders and 4 sea trout were thus obtained. This beach has never afforded good results in previous trials; in most places it makes off very abruptly, and the bottom is nearly devoid of such life as attracts flounders and other food-fishes. Clams are fairly abundant, and at low tide the crews of whalers, men-of-war, and other vessels may frequently be seen collecting them.

On July 18 a party from the *Albatross*, in company with one from the whaling bark *Stamboul*, made a seining trip to Glacier Bay, about  $7\frac{1}{2}$  miles from Dutch Harbor, for the purpose of obtaining a supply of salmon. A whaleboat belonging to the latter ship was used for the trip, and three hauls of the large seine sufficed to fill it comfortably full with dressed fish. The next day a sufficient quantity was taken in the same place to supply the wants of four other whalers anchored in the harbor.

Before leaving Unalaska on this trip three-fourths of a barrel of clams, 80 starry flounders, and several hundred small trout were secured for transplanting to St. Paul Island, the fishes being intended for the lakes on that island and the clams for the muddy flats of a lagoon a short distance from the settlement. Starry flounders had always been quite abundant at Unalaska, but on this occasion we were unable to obtain more than 2 individuals after repeated hauls of the seine in several parts of the harbor. A visit was then paid to a fresh-water lake at Summer Bay, at the southern entrance to Unalaska Harbor, for the purpose of procuring the trout, but to our surprise many starry flounders were taken with them in the seine. The sea water does not approach nearer than one-third of a mile from the mouth of the lake, and no salt water ever enters it, but a rapid stream flows from the lake to the sea. The natives set nets for salmon across the stream during July and a part of August. It would, therefore, appear that the flounders must ascend the stream to the lake.

During the second week in August salmon and herring were the only fishes obtained by us in Unalaska Harbor, and neither of these species was then abundant. Herring strike this part of the island every season, generally by the 1st of August. They are then found close inshore in considerable numbers, but the writer has never seen them schooling, nor has he been able to learn that they do so. It is probable that they spawn in the spring about the same time that they do in southeastern Alaska.

Between the 4th and the 8th of September seine hauls were made in Summer Bay, but without success. Trout were numerous in the adjacent lake, and many were captured both by seining and by hook and line. Young salmon were also abundant.

Four days in the first part of July were spent at the Bay of Waterfalls. Adak Island. Salt-water fishes were not abundant, but trout

were numerous in the lakes and in the streams flowing from them. A few flounders and sculpins were the only species taken in the seine the first day. The following day a 40-foot seine was hauled in two of the lakes near the shore, resulting in the capture of trout and sticklebacks only. Quite a number of young salmon were caught at the mouth of a small stream which rushes down the side of a steep hill, but no salmon were found elsewhere in the bay, possibly due to the fact that on this side of the island there are no streams large enough for the ascent of these fishes.

The water at the mouth of the harbor is very deep. A cod trawl, baited with salt salmon, was set in 40 fathoms near the eastern side of the entrance, and was allowed to remain down seven hours. At the end of that time the catch consisted of 1 halibut weighing 10 pounds, 3 skates, 4 sculpins, and 3 starfish, this result not indicating a rich fishing bottom in that locality. One Atka mackerel, the only specimen secured here, was taken on a hand line from the ship's rail. It is possible that this species becomes abundant about the island at the proper season, especially in view of its proximity to Atka Island, where they occur in immense numbers.

On July 5 the ship anchored in Chapel Cove, a short distance from the previous locality. At this place the shore is mostly rocky, and only a few beaches were found where the seine could be employed. Two sea trout, and a quantity of young cod, from 2 to 3½ inches long, were the only fish secured by this means, and nothing was obtained by the use of hand lines from the ship.

#### OFFSHORE INVESTIGATIONS, BERING SEA.

The first fishing trial with hand lines in the open waters of Bering Sea was made at dredging station<sup>1</sup> No. 3484, latitude 57° 18' N., longitude 171° 54' W., 60 fathoms, where 5 cod were taken on muddy bottom. They ranged in weight from 13 to 22 pounds, and were in good condition, showing no signs of disease, as frequently happens among the cod caught on the inshore grounds. At station No. 3485, latitude 57° 18' N., longitude 172° 34' W., 62 fathoms, one cod weighing 12 pounds and one large flounder (*Atheresthes stomias*) were obtained by the same means. At the latter station the beam trawl brought up a large quantity of Alaskan pollock.

No trials with hand lines were made on either the 13th or 14th, but at station No. 3489, latitude 57° N., longitude 173° 44' W., 184 fathoms, a small cod was captured in the beam trawl. A cod trawl was baited on the morning of the 13th, but no suitable bottom being found during these two days, it was finally set on the 15th off the village at St. George Island, but nothing was taken.

<sup>1</sup> There are two series of stations made by the *Albatross*, namely, dredging station and sounding station. The former are simply designated as "station," the latter as "hyd. station."

On July 17 seven hauls were made with the beam trawl in depths of 41 to 688 fathoms. At the first station, No. 3496, latitude  $56^{\circ} 32' N.$ , longitude  $169^{\circ} 45' W.$ , 41 fathoms, the catch consisted of sponges, small pieces of coral, a few shrimps, 7 sculpins, and 2 flounders, but nothing was secured on the hand lines, which were kept down twenty minutes. At stations Nos. 3497 and 3498, 86 and 142 fathoms, the same character of bottom was found to exist. At station No. 3500, latitude  $56^{\circ} 02' N.$ , longitude  $169^{\circ} 30' W.$ , 121 fathoms, the beam trawl gave indications of a rich bottom, the catch including sponges, hermit crabs, 3 sculpins, 12 red rockfish, 4 flounders, 1 cod, and several species of small fishes. Two subsequent hauls, made later in the day, were in too deep water for the capture of edible fishes.

Leaving St. Paul Island in the morning of July 28, fishing trials were made as follows during the day: Hand lines were used for ten minutes at station No. 3503, latitude  $57^{\circ} 06' 15'' N.$ , longitude  $170^{\circ} 11' W.$ , 17 fathoms, mud and fine sand, without taking any fishes. The same results were obtained at hyd. station No. 3307, latitude  $57^{\circ} 03' N.$ , longitude  $169^{\circ} 54' W.$ , 35 fathoms, fine sand; and at station No. 3504, latitude  $56^{\circ} 57' N.$ , longitude  $169^{\circ} 27' W.$ , 34 fathoms, fine sand. The beam trawl used at the latter station brought up a large variety of animal life, but the only edible fishes were 4 flounders. The hand lines were again unsuccessful at hydrographic station No. 3308, latitude  $57^{\circ} 03' N.$ , longitude  $168^{\circ} 52' W.$ , 43 fathoms, sand and shells; and at station No. 3505, latitude  $57^{\circ} 09' N.$ , longitude  $168^{\circ} 17' W.$ , 44 fathoms, fine sand.

The only cod taken during the day was a single specimen captured in the beam trawl at the last mentioned station. This failure to take any cod with the hand lines during the day was doubtless due to the rapid drifting of the ship, caused by the prevalence of a strong breeze. The bottom over which we passed is considered good fishing ground early in the spring and late in the fall, previous to the appearance of the seals and after their departure. It has been the general experience of fishermen to find cod scarce about the Pribilof Islands during the summer months. In November and until the ice prevents making trips to the west grounds, the natives of both St. George and St. Paul have no difficulty in catching all the cod required for their use.

On July 29 six trials with hand lines were made, resulting in the capture of 47 cod and 1 flounder. The best fishing for the day was obtained at hyd. station No. 3312, latitude  $57^{\circ} 38' N.$ , longitude  $165^{\circ} 20' W.$ , 35 fathoms, where 17 cod were taken. Their average weight was  $7\frac{1}{2}$  pounds and their average length  $26\frac{1}{3}$  inches. The next best results were secured at station No. 3507, latitude  $57^{\circ} 43' N.$ , longitude  $164^{\circ} 42' W.$ , 31 fathoms, 14 cod being caught in a drift of only twelve minutes. They averaged  $8\frac{1}{2}$  pounds in weight and  $26\frac{3}{4}$  inches in length. The beam trawl at this station brought up mollusks, crabs, starfish, flounders, etc. These trials indicated a rich bottom and a good fishing ground, the depth of water also being convenient for fishing



operations. Ten cod were subsequently obtained at station No. 3508, latitude  $58^{\circ} 33' N.$ , longitude  $164^{\circ} 49' W.$ , 23 fathoms, the beam trawl hauled at the same place yielding mollusks, crabs, shrimps, starfish, and small fishes.

On July 31 two hand-line trials were made, but without success. One was at hydrographic station No. 3322, latitude  $57^{\circ} 10' N.$ , longitude  $169^{\circ} 05' W.$ , 42 fathoms; the other at station No. 3509, latitude  $57^{\circ} N.$ , longitude  $169^{\circ} 43' W.$ , 35 fathoms. The failure to take cod at these two places occasioned no surprise, as they were too close to the Pribilof Island to make it probable that cod were at all abundant there.

A line of fishing and dredging stations was commenced on August 1, in 27 fathoms, 5 miles N.E.  $\frac{1}{2}$  E. of Walrus Island, of the Pribilof group, being carried thence north (magnetic). At the first station the beam trawl brought up large quantities of the common sand-dollar (flat sea-urchin), many mollusks, and a few small crabs, but nothing was taken on the hand lines, five of which were kept down fifteen minutes. Four more stations were made during the day, 20 miles apart, but at none of them did the trial with hand lines prove successful. At most of these positions, moreover, the beam trawl showed little evidence of a rich bottom, such as would be expected to attract fishes, although it is reported that cod have been found abundant in a part of the region crossed by the line of investigations. At station No. 3513, latitude  $58^{\circ} 27' N.$ , longitude  $169^{\circ} 01' W.$ , 35 fathoms, 2 large flounders, a number of Alaskan pollock, and a bushel of crabs were captured in the beam trawl.

On August 2 five fishing and dredging stations were made and six cod were obtained, one having come up in the beam trawl. The first trial, at which one cod was secured on the hand lines, was in 13 fathoms, Northwest Cape of Nunivak Island, bearing NNE.  $\frac{1}{2}$  E., 19 miles distant. The next successful trial as regards the capture of cod was at station No. 3517, 24 fathoms, Northwest Cape bearing E.  $\frac{1}{4}$  N., 51 miles distant. Four specimens were taken here. In this locality it is possible that a vessel anchoring for a short time would be able to toll a school of cod by the bait which naturally falls from the hooks. During the night the ship worked in the direction of St. Matthew Island.

Early the following morning, August 3, hand-line fishing was begun at hydrographic station No. 3348, latitude  $60^{\circ} 24' N.$ , longitude  $170^{\circ} 48' W.$ , 35 fathoms, and was continued later at a second station 21 miles N.E. by E.  $\frac{1}{2}$  E. of Pinnacle Island. At both of those positions and at most of the sounding stations made in the vicinity of St. Matthew Island the bottom was found to consist of mud, and no fishes were captured on the hooks. Cod are known to occur in that locality, however, and halibut may also frequent the same waters, but it is not probable that either of these species is sufficiently abundant there to afford a profitable fishery. From the station last mentioned fishing trials and dredge hauls were made at intervals of 20 miles in a SSE. course in depths of

29 to 41 fathoms, the bottom continuing to consist largely of mud until we approached the Island of St. Paul, when more or less sand and pebbles were found. The only fish taken on the hand lines were three Alaskan pollock, a species frequently found on muddy bottom.

On the morning of August 5 a line of observations was commenced off St. Paul Island, extending in a NW.  $\frac{1}{2}$  W. direction from that island, the stations, as in previous days, being mostly 20 miles apart. Trials with hand lines were made at six different positions, beginning at hydrographic station No. 3353, latitude  $57^{\circ} 24' N.$ , longitude  $170^{\circ} 24' W.$ , and ending at station No. 3529, latitude  $58^{\circ} 36' N.$ , longitude  $172^{\circ} 24' W.$  No fish were taken near the Pribilof Islands. The first cod, a single specimen, was caught at station No. 3527, latitude  $57^{\circ} 48' N.$ , longitude  $171^{\circ} 21' W.$ , 52 fathoms. The best fishing for the day was obtained at station No. 3528, latitude  $58^{\circ} 19' N.$ , longitude  $172^{\circ} 02' W.$ , 55 fathoms, the catch consisting of 4 cod, averaging  $13\frac{3}{4}$  pounds in weight and  $29\frac{1}{4}$  inches in length. The bottom of both of those stations was composed of mud, and the indications were not favorable to good fishing. During the day over 70 fur seals were seen, the first observed this season at a distance from the Pribilof Islands.

On the following day (August 6) hand lines were tried at four positions and cod were taken at two of them, only one at each, in depths of 57 and 59 fathoms, muddy bottom (hydrographic station No. 3357, latitude  $59^{\circ} 24' N.$ , longitude  $173^{\circ} 31' W.$ ; station No. 3531, latitude  $59^{\circ} 55' N.$ , longitude  $174^{\circ} 17' W.$ ). On August 7 the ship ran back to St. Paul Island on a S. by E. course from hydrographic station No. 3362, latitude  $57^{\circ} 41' N.$ , longitude  $174^{\circ} 05' W.$ , 77 fathoms, frequent trials being made for bottom fish, but without success.

During August 9 a course was run E.  $\frac{1}{2}$  S. from St. Paul Island, 10 cod being taken on the hand lines at six stations, the small number secured in this direction being explained by the fact that we were cruising over a common feeding ground of the fur seals.

Amak Island was sighted the next morning. Hand lines were put over at two stations, seventeen minutes being given to each trial, and the result at each being five cod. The sea was smooth and a light breeze blowing. This was in the region where cod are known to be plentiful, and had the forenoon been entirely given over to fishing a catch of 100 or more fish might have been expected. I have heard that the vessels which resorted to the cod banks of Bristol Bay in 1892 obtained better fares than ever before. The fish were also much larger and in better condition.

From Amak Island the ship proceeded to Shaw Bay, Unimak Island, and thence to Dutch Harbor and Chernofski Harbor, Unalaska. On August 17 hand lines were tried for nineteen minutes a short distance off the mouth of the latter harbor, in 43 fathoms, Western Head bearing S.  $\frac{3}{4}$  W. The weather was calm, the sea smooth, and the ship lay nearly stationary, but only one cod was captured. The bait used was recently salted salmon. Three years before we had found cod plentiful on these

same grounds, and their scarcity at this trial is not to be taken as an indication that they are absent from the region, the state of the tide and other conditions being sufficient to account for their biting at one time of day and not at another, as happens on other fishing-grounds.

As explained in a previous report, the fishing-ground off Chernofski extends only a short distance from the shore, the continental platform in this region being comparatively narrow. A run of 20 miles NNW. from the above position carried the ship into a depth of 407 fathoms. Hydrographic work was carried on during the remainder of the day in the direction of St. George Island, which we reached in the afternoon of the 18th. Two hauls of the beam trawl were made the same day between that island and St. Paul Island, in depths of 41 and 43 fathoms, only a small amount of material being obtained, and the hand lines employed in the same places failing to secure a single fish. The last station was 16 miles off the western end of St. George Island, which bore SE.  $\frac{1}{4}$  E. From that position the hydrographic work was carried WSW. to a distance of about 225 miles from the island, mostly through deep water in which no fishing trials could be made.

On August 31 five trials with hand lines were made in Akutan Bay, formed by Akun and Akutan islands, the total catch amounting to 7 cod. The depth of water ranged from 36 to 51 fathoms. The beam trawl was also hauled twice in the same bay, bringing up 11 large and 24 small flounders and a number of sculpins, crabs, and shrimps. The indications point to a fair feeding-ground for fishes, and it is reasonable to suppose that the cod resort to this bay for spawning in the fall and winter months. Should that prove to be the case Akutan Bay would be a favorable locality at that season for small-boat fishing.

In the evening the ship anchored in Akun Cove, on the NE. side of Akun Island. At the head of this cove there is a small lake which is separated from the salt water by a narrow spit composed of pebbles, stones, and sand. Three good-sized trout, several small ones, and a number of young salmon were caught in this lake by means of a 120-foot drag seine.

During September 1 a line of soundings was carried from Akun Island on a WNW.  $\frac{1}{4}$  W. course, the depths ranging from 74 to 96 fathoms. The beam trawl was used at four stations, but as the bottom seemed everywhere unfavorable to the occurrence of cod the hand lines were not put over.

On the following day dredging was carried on between St. George and St. Paul islands, and an attempt was also made to fish with hand lines, but the wind was fresh and the ship drifted too rapidly for the leads to be kept on the bottom. The inquiries made about these islands by the *Albatross* indicate that good fishing is confined to more or less scattered areas of bottom, the total extent of which is small, and a run of only a few miles would carry the ship from a favorable locality to one that seemed entirely barren. The best places are known to the inhabitants of the islands, who are able to locate them by bearings from the shore;

but the natives do not exert themselves specially to lay in a supply of either cod or halibut, their wants being so well provided for by the Government. The village of St. Paul secures its cod and halibut from two small fishing-grounds, one of which lies off the eastern end of Otter Island, the other about  $1\frac{1}{2}$  miles from the settlement.

The last trial with hand lines in Bering Sea was made at station No. 3558 (latitude  $56^{\circ} 58'$  N., longitude  $170^{\circ} 09'$  W.), 25 fathoms. Five cod and 3 sculpins were taken there in the course of fifteen minutes, the former averaging 12 pounds in weight. The total number of trials with hand lines in the sea during the summer had been 70, the total catch by that means amounting to 116 cod.

On September 8 the *Albatross* again anchored in Akun Bay. The charts locate a fishing village in this bay, but we found there only a single small building, which is occupied by fishermen during the salmon season. The salmon (red salmon) which run here are much superior to those about Unalaska Island, and every year parties come over from the latter island in order to obtain a supply. In one haul of the seine on the beach we succeeded in capturing all the salmon we could take care of, and all of the boats belonging to the ship could readily have been loaded.

Just back of the beach here there is a lake about  $1\frac{1}{2}$  miles long by  $\frac{1}{2}$  mile wide. We launched our dory into this lake and made about a dozen seine hauls, securing a quantity of trout and young salmon. We were puzzled at first to account for the presence of the salmon in the lake, but on a closer examination we found that there had been an outlet which the sea had closed up, the fresh water at the time of our visit forcing its way under the beach through gravel and stones. At the places where the fresh water was oozing through many salmon were endeavoring to effect an entrance into the lake. So active were they in their efforts that several had managed to work some 10 or 15 feet up the steep beach into a little pool about 6 inches deep.

Arriving back on board the ship at dark, we found that the crew had caught several cod with hand lines, and a halibut weighing 17 pounds.

From Akun Island the *Albatross* proceeded to Deer Island, located between the Sannak islands and the mainland, a night anchorage being made off the southern and western end of the island. Hand lines were thrown over there and in the course of  $1\frac{1}{2}$  hours 27 cod and 6 halibut were captured. The former averaged  $6\frac{1}{2}$ , the latter  $6\frac{1}{2}$  pounds in weight. In most parts of this region cod are plentiful, and it is not necessary to go far from the harbors to find good fishing. Halibut do not seem to be so abundant, however, although they are at least sufficiently common to supply all local demands.

A day was spent in collecting in Bailey Harbor, which is located a short distance to the westward of Belkofski, a native village containing about 200 inhabitants. Salmon, several species of flounder, (chiefly the starry flounder), and young cod were taken abundantly with

the drag seine in all parts of the harbor. Dog and humpback salmon were seen jumping in every direction and dead individuals lined the shores on both sides. In a small stream fed by water oozing out of wet moss the writer counted 336 dead salmon and about the same number of living ones, but the latter looked as though they would not survive much longer, as they were covered with scars and bruises.

The stream was about 4 feet wide, in no place over 1 foot deep, and generally much less. Tall, thick grass obscured the course of most of the stream, and it could only be followed by forcing one's way through the rank growth. In so doing, one's foot would constantly come in contact with salmon, which would jump and rush upstream, making a great splashing as they went. Several attempts were made to drive a number downstream, but they were all unsuccessful. In many places the bottom of the stream was thickly covered with salmon eggs, the most of which were dead. The dead salmon filled the air with a sickening odor. As there is no large stream entering Bailey Harbor, the small ones become overcrowded with salmon, and thousands are obliged to remain in the bay without the chance of reaching fresh water.

Bailey Harbor would apparently be a desirable locality for a fishing settlement. It is well protected from the wind in most directions, but a heavy gale from the south would cause a heavy swell to enter, and yet a lee could be found by shifting from one side of the harbor to the other, as the occasion might require. Small boats could run into the inner harbor and find shelter from all kinds of weather. Fish are abundant and easily taken.

A run of 80 miles east brought us to Portage Bay, where we found shore collecting very poor as compared with Bailey Harbor. The water is very shallow and but few places exist which are favorable for seining. Only one large salmon and about a dozen small ones were taken. Flounders and sculpins are also scarce. Our seine catch consisted mainly of young cod, and 12 cod were caught on hand lines. Many dead salmon were lying on the beaches and some were floating on the waters of the bay. A mountain stream flows into the head of the bay, but as the tide was low at the time of our visit there, we made no attempt to seine at its mouth. Taken as a whole, Portage Bay does not seem to offer as many inducements for fishing as Bailey Harbor. The work in Portage Bay completed our fishery investigations for the season of 1893.

On June 19, 1894, I joined the ship at Unalaska, and on the evening of the 21st we sailed for the Pribilof Islands, where we arrived the following day. A drag seine was hauled in the lake on St. Paul Island, where a number of trout were planted last season. The seine reached nearly across the lake, and was hauled from one end of it to the other, with the object of determining whether the fish had survived the winter. Nothing was found to indicate that any of them were alive. The seine touched bottom, and had there been fish in this small body of water, it is very probable that a few would have been captured. The people

living on the Island of St. Paul say that the past winter was very severe, more so than for many years, and that the lake was frozen to the bottom. If this be true, the trout planted were undoubtedly killed by the ice.

The first ocean investigation was made with the beam trawl on June 26, off the northern entrance to Isanotski Strait, generally known as False Pass. The bottom here is composed of volcanic sand, and has very little on it to support a large amount of life. The principal part of the catch consisted of starfishes; the economic species were flounders and one small cod; the cod, however, was dead and considerably bruised, as if it had been washed about violently by the sea.

The first trial for bottom fish was made on June 29 at hydrographic station 3492, latitude  $57^{\circ} 59' N.$ , longitude  $166^{\circ} 04' W.$ , in 32 fathoms of water. Fifteen hand lines baited with salt salmon were put over, and fishing carried on for thirty minutes. The result of this trial was two cod. Another trial was made the same day at hydrographic station 3493, in latitude  $58^{\circ} 06' N.$ , longitude  $165^{\circ} 22' W.$ , 26 fathoms of water. The same time was given here as at the previous station. Four cod and two flounders were caught; the last-named species were taken on very small hooks, none being caught on the regular cod gear.

On the 30th three fishing trials were made, the first at hydrographic station 3495, in 27 fathoms, latitude  $57^{\circ} 28' N.$ , longitude  $163^{\circ} 14' W.$  Nothing was taken here. At the next station, which was in latitude  $56^{\circ} 59' N.$ , longitude  $163^{\circ} 02' W.$ , in 34 fathoms of water, one cod, weighing  $6\frac{3}{4}$  pounds, was taken. Later in the day we hove to and put over 13 hand lines, in 37 fathoms, for thirty minutes. The result of this investigation was the same as at the first station.

The result of the fishing trials made in this region was far different from what was anticipated; fairly good fishing was looked for. The ground lying between the Pribilof Islands and Cape Newenham has never been considered by fishermen to be as prolific as the banks farther south, yet at times cod may be expected in considerable numbers. The almost negative result of the above trials could not have been due to any fault of the bait, for it was such as we have always used, salt salmon, and of good quality. It seems reasonable to suppose that the low temperature of the water at the bottom where these fishing trials were carried on accounts for the scarcity of fish. A comparison of the bottom temperatures found this season with those of past years shows a difference of from  $4^{\circ}$  to  $8^{\circ}$ . The bottom temperature of water at the fishing stations thus far this season has varied from  $32^{\circ}$  to  $35^{\circ} F.$  A difference of a few degrees may prevent cod from migrating to favorite grounds. In past years it has been found that cod exist in greatest numbers in water ranging from  $38^{\circ}$  to  $43^{\circ}$ . The cause for the extra cold temperature of the water this season is no doubt due to a very late summer and considerable quantities of field ice.

## THE BLISH DISTANCE-FINDER.

By Commander Z. L. TANNER, U. S. Navy.

This simple and admirable little instrument was devised by John B. Blish, lieutenant, United States Navy. It has been used to advantage on board this vessel for about two years, and we have found it particularly valuable at night and in stormy weather.

With the course and distance and two bearings of a point of land, without computation or reference to books or charts, the instrument will give the distance of the point at the time of the first and second bearings, the distance to be run from second bearing to bring it abeam; also the distance at which it will be passed if the course is maintained. Repeated observations will show whether the vessel is actually making her course.

Referring to the sketch, Fig. I is a plan view, full size, and Fig. II a sectional view.

Scales of degrees and points are marked on the arc, and there is a scale of equal parts on CD, CE, and CF, which may be used as miles or fractions of a mile. A and B are silk threads pivoted at C and drawn under an elastic band which rests snugly in a groove surrounding the instrument, as shown in Fig. II. The band permits free movement of the arms, yet holds them in place when set. The vessel is supposed to be heading at all times from C to E, hence all bearings are plotted from E.

To use the distance finder, take a bearing of a point, note the number of degrees or points it bears from the ship's head, note the reading of the log, and set the arm A, counting the degrees from E; steer the same course until the bearing is sufficiently changed to make a good angle, then take another bearing, note distance run between first and second bearings, and set arm B on the number of degrees or points the object bears from the ship's head, counting from E as before. Then find the distance by log, GH, parallel with CE and between the arms A and B.

To find the distance of the point when the first bearing was taken, measure the interval CG on the scale CE or CD.

To find the distance of the point when the second bearing was taken, measure CH on CE or CD.

To find the distance to be run from the second bearing to bring the point abeam, read the interval HI on CE.

To find the distance the point will be when abeam, read CI on the scale CD, which is equal to the interval between CE and GHI, and may be read anywhere between those lines.

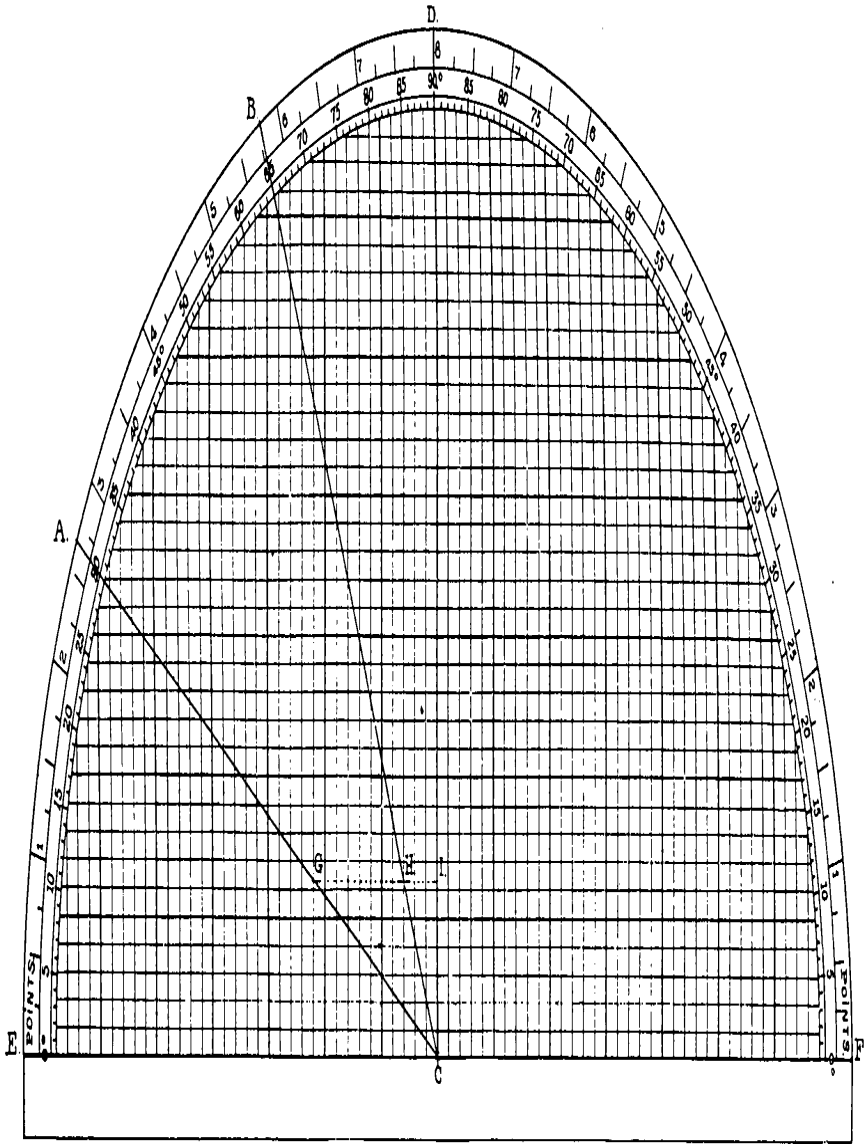


Figure I.

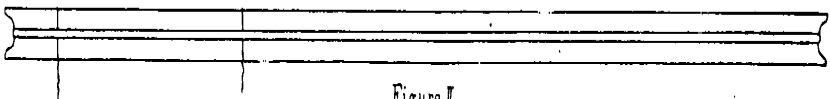


Figure II.

THE BLISH DISTANCE FINDER.



If the point is to be passed at a distance of 5 miles or less, it may be found convenient to have the lines on the scale represent half miles instead of miles. In reading the scale, fractions of a mile are estimated to tenths to correspond with the divisions of the patent log.

## EXAMPLE.

First bearing,  $30^\circ$  from ship's head (or E).

Second bearing,  $65^\circ$  from ship's head (or E).

Distance by log between first and second bearings, 8 miles. Set arm A on  $30^\circ$  for first bearing, and arm B on  $65^\circ$  for the second bearing.

Then, 8 miles, the distance run, equals GH between the arms A and B.

CG measured on CE or CD equals 12.6 miles, distance of point at first bearing.

CH measured on CE or CD equals 7 miles, distance of the point at second bearing.

HI measured on CE or CD equals 3 miles, distance to be run from second bearing to bring the point abeam.

CI measured on CD equals 6.3 miles, distance the point will be from the vessel when it is abeam.

The distances CI and HI are those mostly used in practice, but if the distances CG or CH are required, grasp the arm A at G, or arm B at H, and swing them to CE or CD and read off the distance from the scale.

The distance finder in use on board the *Albatross* was improvised by Ensign Henry B. Wilson, United States Navy. The scales were marked in India ink on Irish linen writing paper, which was then glued to a wooden frame, and finally given several coats of shellac varnish. Sewing silk was used for the arms, which were held in place by an ordinary elastic band resting in the groove, and a small nail constituted the pivot.

It will be observed that the left quadrant of the semicircle is used in the description and the example; the right one may be used in like manner by assuming that the ship's head is at F. The instrument is used as though the vessel was at C, steering to E, on the line CE, but in reality she was at G when the first bearing was taken, at H at the time of the second bearing, steering for I, on the line GHI, and the pivot C is the point on which both bearings were taken.

The distance finder and Table 5A of the new Bowditch Navigator are constructed on the same principle.

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TABLES.

Record of hydrographic soundings by the U. S. Fish Commission steamer Albatross for the fiscal year ending June 30, 1894.

Serial No.	Date.	Time of day.	Position.		Depth.	Character of bottom.	Temperature.			Instrument used.	Weight of sinker.
			Lat. N.	Long. W.			Air.	Sur-face.	Bot-tom.		
	1893.		° ' "	° ' "	Fms.		° F.	° F.	° F.		Lbs.
3240	Apr. 26	10.00 a. m.	36 48 15	121 59 05	266	None obtained.	58	54	.....	Sigsbee	35
3241	Apr. 27	8.33 a. m.	37 29 00	124 01 20	301	stf. gy. M.	54	53	.....	do	35
3242	June 5	1.15 p. m.	57 40 00	143 18 00	2,064	gy. oz.	48	47	35.0	do	00
3243	June 6	9.01 p. m.	57 44 00	150 45 00	59	gy. S. Sh.	46	45	.....	Tanner	25
3244	June 8	7.00 p. m.	56 48 00	152 30 00	87	stf. M.	47	45	.....	do	25
3245	June 15	6.10 p. m.	54 42 00	160 47 00	60	bl. M.	47	44	.....	do	25
3246	June 17	8.10 a. m.	54 50 15	159 01 00	48	gy. S. P.	46	43	.....	do	25
3247	do	8.28 a. m.	51 50 30	159 05 20	41	gy. S. rky.	46	43	.....	do	25
3248	do	8.45 a. m.	54 56 45	159 09 00	36	gy. S.	46	43	.....	do	25
3249	do	9.01 a. m.	54 57 45	159 11 00	38	gy. S.	46	43	.....	do	25
3250	do	9.16 a. m.	54 58 45	159 13 45	33	S. brk. Sh.	46	43	.....	do	25
3251	do	9.52 a. m.	55 01 30	159 16 30	27	gy. S.	46	43	.....	do	25
3252	do	10.14 a. m.	55 02 15	159 19 00	17	fne. gy. S.	46	43	.....	do	25
3253	June 27	6.58 a. m.	54 04 00	162 55 00	48	S. G.	48	46	.....	do	25
3254	July 1	12.03 p. m.	51 32 00	175 52 00	697	bk. S.	43	48	36.6	Sigsbee	35
3255	do	4.24 p. m.	51 35 40	176 41 00	62	crs. gy. S. Sh.	47	48	.....	Tanner	25
3256	do	5.51 p. m.	51 35 40	176 46 15	46	crs. gy. S.	48	48	.....	do	25
3257	July 5	9.47 a. m.	51 33 30	176 50 00	57	Sh.	50	47	.....	do	25
3258	do	10.06 a. m.	51 32 00	176 49 00	78	gy. S. Sh.	50	47	.....	do	25
3259	do	11.23 a. m.	51 28 00	176 49 00	172	gy. S. P.	50	47	39.4	Sigsbee	35
3260	do	12.02 p. m.	51 24 00	176 50 00	428	gy. S. Sh.	52	44	38.6	do	35
3261	July 6	8.53 a. m.	51 19 00	176 39 00	1,622	bk. S. brk. Sh.	48	44	36.0	do	35
3262	do	11.03 a. m.	51 11 00	176 25 00	2,350	gy. oz. fne. S.	52	44	36.9	do	60
3263	do	2.12 p. m.	51 09 00	176 04 00	2,039	gy. M. S.	52	44	37.3	do	60
3264	do	6.27 p. m.	50 41 00	175 30 00	3,323	gy. M. S.	49	48	39.6	do	60
3265	do	10.24 p. m.	50 28 00	175 10 00	4,002	br. oz. S.	50	49	34.6	do	60
3266	July 7	2.44 a. m.	50 16 00	174 51 00	3,191	None obtained.	50	48	.....	do	00
3267	do	6.22 a. m.	50 03 00	174 30 00	2,802	gy. oz.	50	49	35.0	do	00
3268	do	12.23 p. m.	50 31 00	173 54 00	3,067	hard	53	49	.....	do	60
3269	do	10.05 p. m.	50 57 00	173 06 00	3,794	br. oz. S.	49	48	.....	do	60
3270	July 8	3.47 a. m.	51 23 00	172 18 00	2,320	br. oz. S.	50	49	.....	do	60
3271	do	9.03 a. m.	51 50 00	171 38 00	1,330	fne. bk. S.	49	48	.....	do	60
3272	do	3.39 p. m.	52 24 00	171 40 00	250	rky.	48	44	.....	Tanner	25
3273	do	4.55 p. m.	52 31 00	171 42 00	320	fne. G.	47	41	.....	do	25
3274	do	6.44 p. m.	52 44 00	171 35 00	97	dk. S. P.	46	41	.....	Sigsbee	35
3275	do	7.53 p. m.	52 54 00	171 29 00	369	fne. bk. S. G.	45	40	.....	do	35
3276	July 9	11.06 a. m.	55 04 00	176 11 00	1,554	gn. M. S.	49	46	.....	do	35
3277	do	2.57 p. m.	55 36 00	176 02 00	1,626	gn. M.	48	47	.....	do	35
3278	do	6.48 p. m.	56 06 00	169 58 00	68	gy. S. Sh.	48	47	.....	do	35
3279	do	7.53 p. m.	56 16 00	169 57 00	72	gy. S. bk. Sp.	48	47	.....	Tanner	35
3280	do	9.46 p. m.	56 35 00	169 55 00	52	S. rky.	48	47	.....	do	35
3281	July 12	4.20 a. m.	57 18 00	169 38 00	35	gy. S. Sh.	42	42	.....	do	25
3282	do	7.01 p. m.	57 18 00	172 20 00	62	gn. M.	43	44	38.0	do	25
3283	do	7.37 p. m.	57 18 00	172 27 00	62	gn. M. S.	43	44	36.6	do	25
3284	do	9.53 p. m.	57 18 00	172 43 00	62	Co.	42	44	38.0	do	25
3285	do	10.35 p. m.	57 18 00	172 51 00	64	gn. M.	43	44	37.0	do	25
3286	do	11.38 p. m.	57 18 00	173 00 00	65	gn. M.	43	44	37.0	do	25
3287	July 13	12.22 a. m.	57 18 00	173 09 00	60	gn. M.	42	44	37.0	do	25
3288	do	1.09 a. m.	57 18 00	173 18 00	67	rky.	42	44	37.0	do	25
3289	do	1.50 a. m.	57 19 00	173 27 00	69	rky.	42	44	37.8	do	25
3290	do	2.30 a. m.	57 19 00	173 30 00	71	gn. M.	42	43	38.0	do	25
3291	do	3.12 a. m.	57 19 00	173 45 00	82	rky.	42	42	37.8	do	25
3292	do	6.14 a. m.	57 16 00	173 46 00	78	gn. M. fne. S.	43	43	37.9	do	25
3293	do	7.02 a. m.	57 11 00	173 42 00	77	gy. S.	43	43	37.9	do	25
3294	do	8.47 a. m.	57 06 00	173 42 00	81	gy. S.	43	43	38.0	do	25
3295	do	12.37 p. m.	56 51 00	173 37 00	516	gn. M. S.	47	45	37.0	Sigsbee	35
3296	do	4.41 p. m.	56 42 00	173 18 00	80	fne. gy. S. rky.	46	46	37.7	do	35
3297	do	5.30 p. m.	56 37 00	173 21 00	80	fne. gy. S. bk. Sp.	46	46	37.7	do	35
3298	do	6.14 p. m.	56 32 00	173 24 00	797	yl. M. G.	46	46	36.2	do	35
3299	do	7.25 p. m.	56 29 00	173 19 00	1,188	None obtained.	47	46	35.5	do	35
3300	do	10.18 p. m.	56 30 00	172 56 00	74	gy. S.	46	45	38.0	do	35
3301	July 14	2.21 a. m.	56 30 00	172 25 00	100	fne. gy. S. bk. Sp.	46	44	38.0	Tanner	25
3302	July 17	11.10 a. m.	56 07 00	169 33 00	260	fne. gy. S.	49	46	38.3	Sigsbee	35
3303	do	10.47 p. m.	55 24 00	168 34 00	843	fne. gy. S.	48	45	.....	do	35
3304	July 18	2.41 a. m.	55 09 00	168 11 00	809	fne. gy. S.	51	45	.....	do	35
3305	do	5.28 a. m.	54 56 00	167 44 00	756	gn. M. vol. S.	50	46	.....	do	35
3306	do	8.42 a. m.	54 42 00	167 39 00	442	gn. M.	50	48	.....	do	35
3307	July 28	12.28 p. m.	57 03 00	169 54 00	35	fne. gy. S.	50	44	41.9	Tanner	25
3308	do	5.19 p. m.	57 03 00	168 52 00	43	gy. S. Sh.	50	45	37.6	do	25
3309	do	10.56 p. m.	57 15 00	167 42 00	41	fne. gy. S.	45	43	36.0	do	25
3310	July 29	1.29 a. m.	57 21 00	167 05 00	33	fne. bk. S.	45	42	35.0	do	25
3311	do	4.04 a. m.	57 27 00	166 30 00	38	fne. S. bk. M.	45	42	34.8	do	25

Record of hydrographic soundings by the U. S. Fish Commission steamer Albatross for the fiscal year ending June 30, 1894—Continued.

Serial No.	Date.	Time of day.	Position.				Depth.	Character of bottom.	Temperature.			Instrument used.	Weight of sinker.
			Lat. N.	Long. W.	Air.	Sur. face.			Bot. tom.				
	1893.							° F.	° F.	° F.			
3312	July 29	9.46 a. m.	57 38 00	165 20 00	35	fne. S. dk. M.	45	42	35.5	Tanner	25		
3313	do	5.14 p. m.	58 13 00	164 47 00	26	fne. gy. S.	44	42	41.4	do	25		
3314	do	11.22 p. m.	58 42 00	165 30 00	22	gy. S.	43	41	41.8	do	25		
3315	July 30	2.04 a. m.	58 51 00	166 11 00	21	fne. gy. S.	42	41	41.0	do	25		
3316	do	5.00 a. m.	58 36 00	166 38 00	25	fne. gy. S.	42	41	40.1	do	25		
3317	do	8.31 a. m.	58 22 00	167 04 00	29	crs. gy. S.	44	42	37.0	do	25		
3318	do	1.16 p. m.	58 07 00	167 29 00	36	gn. M. fne. S.	45	42	35.5	do	25		
3319	do	5.50 p. m.	57 52 00	167 54 00	38	dk. M. fne. S.	46	43	37.5	do	25		
3320	do	10.27 p. m.	57 38 00	168 19 00	36	fne. gy. S.	46	43	36.1	do	25		
3321	July 31	3.22 a. m.	57 24 00	168 42 00	41	gy. S. rky.	46	44	36.8	do	25		
3322	do	6.40 a. m.	57 10 00	169 05 00	42	fne. gy. S. bk. Sp.	46	44	37.3	do	25		
3323	Aug. 1	4.44 p. m.	58 08 30	169 14 00	38	dk. M. fne. S.	47	45	31.8	do	25		
3324	do	10.44 p. m.	58 45 30	169 48 00	30	fne. gy. S. M.	44	43	33.9	do	25		
3325	Aug. 2	1.16 a. m.	59 04 00	168 34 00	24	fne. gy. S. bk. Sp.	43	42	39.8	do	25		
3326	do	7.36 p. m.	59 41 00	168 06 00	22	fne. gy. S. Sh.	42	41	41.1	do	25		
3327	do	10.07 a. m.	59 55 00	167 55 00	14	gy. S.	42	42		Bassnett tube.	25		
3328	do	10.22 a. m.	59 56 00	167 54 00	16	gy. S. Sh.	42	42		do	25		
3329	do	10.37 a. m.	59 58 00	167 53 00	14	fne. gy. S.	42	42		do	25		
3330	do	11.35 a. m.	60 00 00	167 53 00	14	fne. gy. S.	42	42		do	25		
3331	do	11.50 a. m.	60 01 30	167 54 00	14	fne. gy. S.	42	42		do	25		
3332	do	12.05 p. m.	60 03 00	167 55 00	11	fne. gy. S.	42	42		do	25		
3333	do	12.20 p. m.	60 05 00	167 56 00	15	fne. gy. S.	42	42		do	25		
3334	do	12.35 p. m.	60 06 30	167 57 00	16	fne. gy. S.	42	42		do	25		
3335	do	12.50 p. m.	60 08 00	167 58 00	15	fne. gy. S.	42	42		do	25		
3336	do	1.05 p. m.	60 09 30	167 59 00	15	fne. gy. S. bk. Sh.	42	42		do	25		
3337	do	1.20 p. m.	60 11 00	168 00 00	16	fne. gy. S.	42	42		do	25		
3338	do	1.35 p. m.	60 13 00	168 01 00	16	fne. gy. S. bk. Sh.	42	42		do	25		
3339	do	1.50 p. m.	60 14 30	168 02 00	16	fne. gy. S.	42	43		do	25		
3340	do	2.05 p. m.	60 16 00	168 03 00	16	fne. gy. S.	42	43		do	25		
3341	do	2.20 p. m.	60 17 30	168 04 00	16	fne. gy. S.	43	43		do	25		
3342	do	2.35 p. m.	60 19 00	168 05 00	16	fne. gy. S.	43	43		do	25		
3343	do	2.50 p. m.	60 21 00	168 05 00	17	fne. gy. S. bk. Sh.	43	43		do	25		
3344	do	3.05 p. m.	60 22 00	168 06 00	16	fne. gy. S.	43	43		do	25		
3345	do	3.20 p. m.	60 24 00	168 07 00	19	fne. gy. S. bk. Sh.	43	43		do	25		
3346	do	3.35 p. m.	60 26 00	168 08 00	19	fne. gy. S.	43	43		do	25		
3347	do	11.45 p. m.	60 26 00	169 54 00	27	gn. M. fne. S.	41	41	35.3	Tanner	25		
3348	Aug. 3	3.10 a. m.	60 24 00	170 48 00	35	bk. M.	42	42	32.0	do	25		
3349	do	1.15 p. m.	59 47 00	171 08 00	38	dk. M.	43	43	31.8	do	25		
3350	do	11.01 p. m.	58 52 00	170 38 00	40	bk. M.	45	44	30.8	do	25		
3351	Aug. 4	2.39 a. m.	58 33 00	170 28 00	42	None obtained	46	43		do	25		
3352	do	6.11 a. m.	58 15 00	170 18 00	40	gn. M. fne. S.	46	44	35.4	do	25		
3353	Aug. 5	4.15 a. m.	57 24 00	170 24 00	37	fne. gy. S. Sh.	47	43	40.3	do	25		
3354	do	1.53 p. m.	58 04 00	171 41 00	55	gn. M.	48	45	37.4	do	25		
3355	do	11.29 p. m.	58 52 00	172 45 00	57	gn. M.	46	44	35.3	do	25		
3356	Aug. 6	2.04 a. m.	59 09 00	173 09 00	57	gn. M.	45	43	34.2	do	25		
3357	do	4.42 a. m.	59 24 09	173 31 00	57	gn. M.	45	43	35.7	do	25		
3358	do	3.46 p. m.	59 33 00	175 00 00	70	gn. M.	51	49	36.7	do	25		
3359	Aug. 7	12.02 a. m.	58 43 00	176 10 00	71	gn. M.	44	44		Sigsbee	35		
3360	do	5.02 a. m.	58 11 00	176 38 00	1,744	gn. M. fne. S.	45	44	35.5	do	35		
3361	do	10.16 a. m.	58 01 00	175 41 00	1,367	gn. M. fne. S.	48	40	35.2	do	35		
3362	do	5.10 p. m.	57 41 00	174 05 00	77	gn. M.	49	47	38.0	do	35		
3363	do	11.12 p. m.	57 25 00	172 50 00	69	dk. gn. M. fne. S.	47	45	37.8	Tanner	25		
3364	Aug. 8	4.13 a. m.	57 08 00	171 38 00	60	gn. M.	47	45	37.8	do	25		
3365	Aug. 9	4.21 a. m.	56 49 00	169 42 00	37	fne. S. Sh.	46	44	40.9	do	25		
3366	do	1.09 p. m.	56 37 00	167 55 00	59	gn. M. S.	49	46	38.0	do	25		
3367	do	6.39 p. m.	56 31 00	166 43 00	55	dk. gn. M. fne. S.	48	40	37.5	do	25		
3368	Aug. 10	12.18 a. m.	56 23 00	165 28 00	48	gn. M. fne. S.	48	45	36.5	do	25		
3369	do	2.47 a. m.	56 18 00	164 48 00	40	fne. gy. S.	48	45	36.4	do	25		
3370	do	7.10 p. m.	54 53 15	164 25 40	29	dk. gy. S. Lava.	53	47		Bassnett tube.	25		
3371	do	7.20 p. m.	54 52 00	164 26 20	17	dk. gy. S. Lava.	53	47		do	25		
3372	do	7.25 p. m.	54 51 30	164 26 40	15	dk. gy. S.	53	47		do	25		
3373	do	7.30 p. m.	54 51 00	164 27 00	14	dk. gy. S.	53	47		do	25		
3374	do	7.35 p. m.	54 50 30	164 27 20	9	dk. gy. S.	53	47		do	25		
3375	Aug. 17	7.13 a. m.	53 25 00	167 33 00	43	bk. S.	47	46	41.8	Tanner	25		
3376	do	9.21 a. m.	53 35 00	167 53 00	89	G.	47	44	40.3	Sigsbee	35		
3377	do	9.53 a. m.	53 38 00	167 50 00	407	fne. gy. S. bk. Sp.	48	44	37.9	do	35		
3378	do	11.08 a. m.	53 45 00	168 01 00	755	gn. M. fne. S.	48	44	36.2	do	35		
3379	do	12.10 p. m.	53 52 00	168 01 30	717	dk. S. fne. G.	48	47	36.5	do	35		
3380	do	1.20 p. m.	53 56 00	168 07 00	781	bk. vol. S.	48	47	36.0	do	35		
3381	do	2.57 p. m.	54 04 00	168 14 00	1,263	gy. S.	49	48	35.8	do	35		
3382	do	7.05 p. m.	54 30 00	168 35 00	822	hard.	49	47	36.4	do	35		
3383	do	11.16 p. m.	54 56 00	168 50 00	1,205	gy. S.	48	46	35.9	do	35		
3384	Aug. 18	3.20 a. m.	55 22 00	169 17 00	1,187	gn. M. S.	48	47	35.9	do	60		
3385	do	7.20 a. m.	55 00 00	169 24 00	1,036	gn. M. S.	48	47	36.0	do	35		
3386	do	9.01 a. m.	55 50 00	169 27 00	341	gn. M. crs. bk. S.	49	47	38.3	do	35		
3387	do	10.25 a. m.	56 09 00	169 29 00	292	dk. M.	49	48	38.7	Tanner	25		

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Record of hydrographic soundings by the U. S. Fish Commission steamer Albatross for the fiscal year ending June 30, 1894—Continued.

Serial No.	Date.	Time of day.	Position.		Depth.	Character of bottom.	Temperature.			Instrument used.	Weight of sinker.
			Lat. N.	Long. W.			Air.	Sur-face.	Bot-tom.		
	1893.		° ' "	° ' "	<i>Fms.</i>		° F.	° F.	° F.		<i>Lbs.</i>
3388	Aug. 18	11.50 a. m.	58 10 00	169 32 00	74	gy. S. G.	49	48	.....	Tanner	25
3389	do	10.18 p. m.	56 47 00	170 34 00	57	dk. M.	46	43	.....	do	25
3390	Aug. 19	12.39 a. m.	56 45 00	171 10 00	63	fne. gy. S. bk. Sp	46	45	.....	do	25
3391	do	2.50 a. m.	56 42 00	171 45 00	65	fne. gy. S. bk. Sp	46	45	.....	do	25
3392	do	5.19 a. m.	56 30 00	172 21 00	78	gy. S. M.	47	45	38.9	do	25
3393	do	8.02 a. m.	56 36 00	172 56 00	340	gn. M.	46	46	38.1	do	25
3394	do	10.47 a. m.	56 32 00	173 32 00	1,631	bl. M. fne. S. G.	47	46	35.4	Sigsbee	35
3395	do	3.02 p. m.	56 29 00	174 26 00	1,787	crs. bk. S.	48	47	35.4	do	35
3396	do	8.11 p. m.	56 25 00	175 35 00	2,000	gn. M. fne. S. bk. Sp.	47	47	35.4	do	60
3397	Aug. 20	2.11 a. m.	56 21 00	176 45 00	2,049	gn. M.	48	47	35.0	do	60
3398	do	9.45 a. m.	55 25 00	176 13 00	2,055	gn. M. fne. S.	48	47	35.1	do	60
3399	do	4.21 p. m.	54 38 00	175 27 00	2,041	gn. M. S.	56	40	35.1	do	60
3400	do	11.18 p. m.	55 00 00	174 32 00	1,996	gn. M. fne. S.	48	47	55.3	do	60
3401	Aug. 21	4.48 a. m.	55 23 00	173 38 00	1,928	gn. M. fne. S.	48	47	35.5	do	60
3402	do	10.04 a. m.	55 46 00	172 44 00	1,833	gn. M. fne. S.	51	48	35.1	do	60
3403	do	10.62 p. m.	56 20 00	171 04 00	171	gn. M. fne. S.	50	46	.....	Tanner	35
3404	Aug. 22	1.07 a. m.	56 18 00	170 34 00	69	gn. M. fne. S.	49	46	39.0	do	25
3405	do	4.09 a. m.	56 01 00	170 50 00	924	gn. M. ers. S.	48	47	36.0	Sigsbee	35
3406	do	7.16 a. m.	55 43 00	171 07 00	1,647	gn. M. fne. S.	49	48	35.4	do	60
3407	do	1.46 p. m.	54 59 00	171 49 00	1,867	gn. M.	49	48	35.1	do	60
3408	do	8.03 p. m.	54 17 00	172 30 00	1,932	gn. M. fne. S.	48	47	35.0	do	60
3409	Aug. 23	9.25 a. m.	53 48 00	173 11 00	1,948	br. M. bk. S.	50	48	35.1	do	60
3410	do	4.25 p. m.	53 29 00	171 51 00	1,429	gn. M. bk. S.	50	48	35.2	do	60
3411	do	10.25 p. m.	53 09 00	170 31 00	1,027	bk. S.	50	48	35.8	do	60
3412	Aug. 24	9.00 a. m.	53 38 00	170 39 00	1,171	bk. S. C.	48	47	.....	do	60
3413	do	5.43 p. m.	54 08 00	170 47 00	1,053	gn. M. fne. S.	49	48	.....	do	60
3414	Aug. 31	9.01 a. m.	54 13 00	165 58 00	42	dk. gy. S.	51	46	44.6	Tanner	25
3415	do	9.48 a. m.	54 10 00	165 54 00	42	dk. gy. S.	51	46	45.0	do	25
3416	do	10.46 a. m.	54 07 00	165 51 00	38	bk. M. fne. S.	54	47	45.0	do	25
3417	do	1.56 p. m.	54 18 00	165 41 00	45	G. brk. Sh.	61	46	45.9	do	25
3418	do	3.40 p. m.	54 26 00	165 28 00	84	G. era. bk. S.	50	46	41.5	do	25
3419	do	5.52 p. m.	54 14 00	165 33 00	23	fne. gy. S.	55	47	.....	Bassnett tube.	25
3420	do	5.57 p. m.	54 13 45	165 33 30	23	fne. gy. S.	55	47	.....	do	25
3421	do	6.03 p. m.	54 13 30	165 34 00	28	fne. gy. S.	55	47	.....	do	25
3422	do	6.09 p. m.	54 13 15	165 34 30	25	fne. gy. S. bk. Sp	55	47	.....	do	25
3423	do	6.15 p. m.	54 13 00	165 35 00	26	fne. gy. S. Sh.	55	47	.....	do	25
3424	Sept. 1	7.54 a. m.	54 36 00	165 27 00	113	bk. S. G.	50	40	39.0	Tanner	25
3425	do	2.17 p. m.	55 12 00	166 36 00	81	G. M.	53	49	39.9	do	25
3426	do	9.28 p. m.	55 47 00	167 53 00	78	fne. bk. S.	49	47	38.8	do	25
3427	do	11.30 p. m.	55 59 00	168 19 00	79	fne. gy. S.	49	46	39.0	do	25
3428	Sept. 2	1.37 a. m.	56 11 00	168 45 00	97	fne. dk. S.	48	46	39.0	do	25
3429	do	5.03 a. m.	56 22 00	169 09 00	77	crs. S. G.	49	47	40.0	do	25
3429a	do	9.33 a. m.	56 28 00	170 04 00	01	gn. M. fne. S.	49	47	39.3	do	25
3430	do	2.30 p. m.	56 55 00	170 18 00	47	gn. M. fne. S.	49	46	40.6	do	25
3431	Sept. 3	11.48 a. m.	56 48 00	169 20 00	43	gn. M.	47	45	39.0	do	25
3432	Sept. 8	7.28 a. m.	54 01 30	166 23 00	42	bk. S. G.	51	47	44.7	do	25
3433	do	7.54 a. m.	54 05 00	166 18 00	40	rky	52	47	43.2	do	25
3434	do	8.39 a. m.	54 09 00	166 15 00	54	G. brk. Sh.	52	45	42.5	do	25
3435	do	9.14 a. m.	54 12 00	166 09 00	57	dk. G.	51	45	42.1	do	25
3436	do	10.46 a. m.	54 16 40	165 50 00	49	dk. gy. S.	51	45	44.0	do	25
3437	do	12.00 p. m.	54 18 00	165 40 00	50	gy. S. brk. Sh.	57	40	43.0	do	25
3438	do	12.27 p. m.	54 15 30	165 32 00	51	crs. dk. S. brk. Sh.	57	40	42.0	do	25
3439	Sept. 9	7.56 a. m.	54 27 00	163 55 00	52	fne. gy. S. bk. Sp.	52	48	46.5	do	25
3440	do	10.02 a. m.	54 32 00	163 31 00	54	bk. S. G.	55	48	44.0	do	25
3441	do	10.54 a. m.	54 33 00	163 19 00	61	bk. G.	55	48	42.8	do	25
3442	do	12.50 p. m.	54 39 00	163 05 00	35	fne. G. brk. Sh.	53	47	45.0	do	25
3443	do	1.11 p. m.	54 40 00	163 03 00	37	G. brk. Sh.	53	47	.....	do	25
3444	do	1.47 p. m.	54 44 00	162 50 00	41	rky	53	47	.....	Bassnett tube.	25
3445	do	2.10 p. m.	54 46 00	162 52 00	30	crs. dk. S.	51	48	.....	do	25
3446	do	2.40 p. m.	54 48 00	162 50 00	33	bk. S.	51	48	.....	do	25
3447	do	3.19 p. m.	54 51 00	162 43 00	23	rky	51	49	.....	do	25
3448	do	3.35 p. m.	54 52 00	162 41 00	15	brk. Sh.	51	49	.....	do	25
3449	do	3.47 p. m.	54 53 00	162 39 00	18	G. brk. Sh.	51	49	.....	do	25
3450	do	3.58 p. m.	54 53 30	162 38 00	15	G. brk. Sh.	51	49	.....	do	25
3451	do	4.08 p. m.	54 54 00	162 37 00	10	bk. S. brk. Sh.	51	49	.....	do	25
3452	Sept. 11	8.43 a. m.	55 12 30	161 53 00	22	bk. S. R.	52	48	.....	do	25
3453	do	10.43 a. m.	55 15 00	161 18 00	32	dk. S.	53	49	.....	do	25
3454	do	11.41 a. m.	55 19 00	161 03 00	28	crs. S. G. brk. Sh.	52	49	.....	do	25
3455	do	12.43 p. m.	55 22 30	160 54 00	31	gy. S. bk. Sp.	52	49	.....	do	25
3456	do	12.58 p. m.	55 24 30	160 49 30	32	bk. S.	52	49	.....	do	25
3457	do	1.19 p. m.	55 25 00	160 45 00	42	fne. bk. S.	53	49	.....	do	25

Record of hydrographic soundings by the U. S. Fish Commission steamer Albatross for the fiscal year ending June 30, 1894—Continued.

Serial No.	Date.	Time of day.	Position.		Depth.	Character of bottom.	Temperature.			Instrument used.	Weight of sinker.
			Lat. N.	Long. W.			Air.	Sur-face.	Bot-tom.		
	1893.		° ' "	° ' "	Fms.		° F.	° F.	° F.		Lbs.
3458	Sept. 11	1.30 p. m.	55 26 00	160 41 00	36	brk. Sh	53	49	.....	Bassnett	25
3459	do	1.44 p. m.	55 28 00	160 37 00	21	brk. Sh	53	49	.....	tube.	25
3460	do	1.50 p. m.	55 29 00	160 35 00	19	G. brk. Sh	52	48	.....	do	25
3461	do	2.01 p. m.	55 30 00	160 34 30	13	bk. S. Sh	52	48	.....	do	25
3462	do	2.08 p. m.	55 31 00	160 35 00	27	fne. bk. S. Sh	52	48	.....	do	25
3463	do	2.14 p. m.	55 32 00	160 35 00	31	fne. bk. S.	52	48	.....	do	25
3464	do	2.21 p. m.	55 33 00	160 35 00	38	bk. S.	52	48	.....	do	25
3465	do	2.28 p. m.	55 34 00	160 35 00	38	gy. S. Sh	52	48	.....	do	25
3466	do	2.35 p. m.	55 35 00	160 35 00	42	bk. S.	52	49	.....	do	25
3467	do	2.40 p. m.	55 35 30	160 35 00	31	bk. S. Sh	52	49	.....	do	25
3468	do	2.43 p. m.	55 36 00	160 35 00	26	bk. S.	52	49	.....	do	25
3469	Sept. 14	8.09 a. m.	57 14 00	151 52 00	46	gy. S. brk. Sh	48	47	.....	Tanner	25
3470	do	5.56 p. m.	57 24 00	149 33 00	938	rky	48	47	36.1	Sigsbee	35
3471	do	8.06 p. m.	57 21 00	149 11 00	1,427	bl. M. S.	49	47	35.1	do	00
3472	do	10.52 p. m.	57 18 00	148 38 00	1,961	br. M. fne. S.	50	48	35.1	do	00
3473	Sept. 15	1.53 a. m.	57 14 00	148 06 00	2,741	br. M.	50	47	35.0	do	00
3474	do	5.39 a. m.	57 08 00	147 22 00	2,587	br. M.	53	51	35.0	do	00
3475	do	9.20 a. m.	57 11 00	146 41 00	2,320	gy. Oz.	57	51	35.0	do	00
3476	do	1.10 p. m.	57 15 00	145 52 00	2,150	gy. Oz.	56	51	34.6	do	00
3477	do	4.50 p. m.	57 18 00	145 05 00	2,149	gy. Oz.	59	52	35.1	do	00
3478	do	8.44 p. m.	57 20 00	144 17 00	2,119	gy. Oz.	53	51	35.1	do	00
3479	Sept. 16	12.26 a. m.	57 20 00	143 27 00	2,099	gy. Oz.	53	51	35.1	do	00
3480	do	4.35 a. m.	57 17 00	142 28 00	2,034	gy. Oz.	53	51	35.1	do	00
3481	do	8.40 a. m.	57 12 00	141 31 00	1,946	lt. br. Oz.	55	52	35.1	do	00
3482	do	1.02 p. m.	57 09 30	140 37 00	1,826	lt. br. Oz.	58	54	35.1	do	00
3483	do	5.65 p. m.	57 09 00	139 38 00	1,868	br. Oz.	59	55	35.0	do	00
3484	do	9.12 p. m.	57 07 00	138 40 00	1,724	br. and gy. Oz.	54	53	35.1	do	00
3485	Sept. 17	1.25 a. m.	57 04 00	137 43 00	1,553	gy. Oz.	53	51	35.1	do	00
3486	do	5.28 a. m.	57 01 00	136 40 00	1,270	br. M.	53	52	35.1	do	00
3487	do	7.44 a. m.	57 00 00	136 12 30	756	gn. M. S.	55	53	38.0	do	35
3488	do	9.43 a. m.	56 58 40	135 47 30	55	rky	55	54	45.0	Tanner	25

Serial No.	Date.	Time of day.	Position.		Depth.	Character of bottom.	Temperature.			Remarks.
			Lat. N.	Long. E.			Air.	Sur-face.	Bot-tom.	
	1894.		° ' "	° ' "	Fms.					
Hy. 3490	June 6	9.00 p. m.	52 46 30	175 27 00	2,237	No specimen	44	40	.....	
Hy. 3491	June 7	5.08 a. m.	52 41 30	176 24 00	2,107	br. M. fne. S.	40	39	3.50	
Dr. 3598	June 8	3.18 p. m.	52 01 00	177 34 00	34	bk. G.	43	40	.....	Beam-trawl.
Dr. 3599	June 9	10.49 a. m.	52 05 00	177 40 00	55	rky. fne. S. Sh	43	42	.....	Do.
			West.							
Dr. 3600	June 26	3.41 p. m.	55 06 00	163 28 00	9	fne. dk. vol. S	43	41	40.0	Beam-trawl.
Hy. 3492	June 29	1.08 p. m.	57 59 00	166 04 00	32	gy. S.	44	38	33.0	Fished.
Hy. 3493	do	4.16 p. m.	58 00 00	165 22 00	26	fne. gy. S.	45	38	35.7	Do.
Hy. 3494	do	11.55 p. m.	58 24 00	163 38 00	21	fne. gy. S.	40	37	34.5	
Hy. 3495	June 30	7.36 a. m.	57 28 00	163 14 00	27	fne. gy. S.	38	38	34.0	Do.
Hy. 3496	do	12.03 p. m.	56 59 00	163 02 00	34	fne. gy. S.	42	40	32.0	Do.
Hy. 3497	do	3.24 p. m.	56 59 00	163 48 00	37	fne. gy. S.	42	40	34.3	Do.
Hy. 3498	do	9.34 p. m.	56 58 00	165 15 00	44	gn. M.	41	38	34.0	

Record of dredging and trawling stations of the U. S. Fish Commission steamer Albatross.

Serial No.	Date.	Time.	Position.		Temperatures.				Character of bottom.	Wind.		Drift.		Instrument used, etc.
			Lat. N.	Long. W.	Air.	Sur-face.	Bot-tom.	Depth.		Direction.	Force.	Direction.	Dis-tance.	
			°	'	°	'	° F.	° F.	Fms.			Miles.		
3477	Apr. 26	9.20 a.m.	36 50 00	121 59 45	54	51	46.5	80	rky.....	North	1			L. B. T.
3478	do	11.24 a.m.	36 44 45	120 57 00	56	53	.....	63	gy. S. M.....	SW	2			L. B. T., surface tow net.
3479	Apr. 27	6.55 a.m.	37 28 00	123 00 00	52	50	.....	276	gn. M. fine. S.....	WNW	3			L. B. T.
3480	July 8	11.02 a.m.	52 06 00	171 45 00	50	47	.....	283	bk. S. Co. rky.....	West	2			L. B. T.
3481	do	1.29 p.m.	52 15 00	171 40 00	51	48	.....	248	bk. S. G.....	West	2			L. B. T. and swabs.
3482	July 12	9.05 a.m.	57 18 00	170 42 00	43	42	38.9	42	gn. M. fine. S.....	SW	3	WSW, 1/4 W.....	0.7	S. B. T. and swabs.
3483	do	12.32 p.m.	57 18 00	171 18 00	44	42	36.8	56	gn. M.....	SW	3	S. by E.....	0.5	Do.
3484	do	4.11 p.m.	57 18 00	171 54 00	43	44	37.4	60	bu. M.....	SW by W.	3	SW, 1/4 W.....	1.0	L. B. T. and mud bag.
3485	do	8.13 p.m.	57 18 00	173 34 00	42	44	37.1	62	gn. M.....	SW by W.	2	S. by W, 1/4 W.....	0.7	L. B. T.
3486	July 13	3.51 a.m.	57 19 00	173 53 00	43	43	38	150	gn. M. fine. S.....	SW	1	ESE, 1/2 E.....	1.0	L. B. T. and mud bag.
3487	do	7.24 a.m.	57 10 00	173 45 00	43	43	37.6	81	gn. M. fine. S.....	SE	1			Do.
3488	do	9.14 a.m.	57 05 00	173 47 00	45	45	37.3	106	gn. M. gy. S.....	SE	1	E, 1/2 N.....	1.2	Do.
3489	do	10.22 a.m.	57 00 00	173 14 00	47	46	38.5	184	gn. M. gy. S.....	SE	1	E, 1/2 S.....	1.2	Do.
3490	do	3.09 p.m.	56 47 00	173 14 00	46	46	38	78	gn. M. fine. S.....	E. by N.....	3	NE. by E.....	1.3	Do.
3491	July 14	4.05 a.m.	56 32 00	172 28 00	45	44	.....	103	gn. M. fine. gy. S.....	ENE	3.5	SE	2.5	Do.
3492	do	8.12 a.m.	56 32 00	171 50 00	46	45	37.8	70	gn. M. fine. S.....	NNE	5	NE. by E.....	0.8	Do.
3493	do	11.12 a.m.	56 33 00	171 20 00	47	46	38.5	67	gn. M. fine. S.....	NNE	4	E. by S.....	0.3	Do.
3494	do	2.56 p.m.	56 34 00	170 34 00	50	46	38.5	65	gn. M. fine. S.....	North	3	ESE	1.2	L. B. T.
3495	do	5.55 p.m.	56 32 00	170 01 00	46	45	38.5	56	gn. M. fine. S.....	North	2	SE. by E.....	1.2	L. B. T.
3496	July 17	3.45 a.m.	56 32 00	169 45 00	48	42	39.9	41	gy. S. St. gn. M.....	SW	3	SE. by E.....	0.1	L. B. T. and mud bag.
3497	do	8.09 a.m.	56 18 00	169 38 00	48	42	38.7	86	gy. S. bk. Sp.....	SW	3	SE. by S.....	1.2	Do.
3498	do	9.10 a.m.	56 13 00	169 36 00	48	45	38.6	142	fine. gy. S. G.....	SW	3	SE. by E.....	0.8	Do.
3499	do	9.51 a.m.	56 12 00	169 35 00	49	46	38.5	162	fine. gy. S. G.....	SW	3	SE. by S.....	0.4	L. B. T.
3500	do	11.53 a.m.	56 02 00	169 30 00	49	46	38.6	121	fine. gy. S. G.....	South	3	SE. by S.....	0.7	L. B. T., surface tow net.
3501	do	2.16 p.m.	55 51 00	169 18 00	50	47	36.9	688	gn. M.....	South	3	SE, 1/2 E.....	4.0	Do.
3502	do	6.55 p.m.	55 38 00	169 00 00	49	46	.....	368	gn. M. dk. S.....	SSW	3	SE, 1/2 E.....	0.5	Do.
3503	July 28	10.44 a.m.	57 06 15	170 11 00	54	43	37.9	17	gn. M. fine. S.....	NW	3	NE. by E, 1/2 E.....	0.3	S. B. T.
3504	do	2.23 p.m.	56 57 00	169 27 00	54	45	37.8	34	fine. gy. S. bk. Sp.....	WNW	2	NE. by E.....	0.2	L. B. T.
3505	do	7.53 p.m.	57 03 00	168 17 00	46	44	38.1	44	fine. gy. S.....	WNW	4	E. by N.....	0.5	L. B. T.
3506	July 29	6.39 a.m.	57 33 00	165 55 00	43	42	32	36	gy. S. M.....	NE	2	XXW, 1/4 W.....	0.8	L. B. T.
3507	do	1.60 p.m.	57 43 00	164 42 00	50	43	37.5	31	fine. gy. S.....	NNW	2	NNW, 1/4 W.....	0.8	L. B. T., surface tow net.
3508	do	7.33 p.m.	58 33 00	164 49 00	43	41	42	23	fine. gy. S. Sh.....	NW	2	W, 1/2 S.....	1.0	Do.
3509	July 31	11.09 a.m.	57 00 00	169 43 00	46	43	40.8	35	fine. gy. S. Sh.....	SE	4	W, 1/2 S.....	0.3	R. D.
3510	Aug. 1	6.14 a.m.	57 12 30	169 51 00	47	43	40.1	27	Sh. bk. S.....	NE	4	NNW	1.7	L. B. T.
3511	do	10.10 a.m.	57 32 00	169 38 00	48	44	37.2	39	fine. S. dk. M.....	NW by E.....	4	NW. by W.....	0.6	L. B. T.
3512	do	1.34 p.m.	57 49 30	169 27 00	49	45	36.6	38	fine. S. gn. M.....	NW	3	NE	0.5	R. D.
3513	do	7.43 p.m.	58 27 00	169 01 00	46	43	.....	35	fine. S. gn. M.....	NNW	4	North	0.7	L. B. T. and mud bag.
3514	Aug. 2	4.05 a.m.	59 23 00	168 21 00	40	40	40.8	21	fine. gy. S.....	NW. br W.	4	North	0.6	L. B. T.
3515	do	10.43 a.m.	59 39 00	167 53 00	42	42	41.8	13	fine. gy. S.....	NNW	4	North	0.6	L. B. T. and mud bag.
3516	do	3.57 p.m.	60 28 00	168 08 00	43	44	42.2	17	fine. gy. S.....	NW	3	WSW, 1/4 W.....	0.2	L. B. T.
3517	do	8.01 p.m.	60 27 00	169 04 00	41	41	40.3	24	fine. gy. S.....	West	4	WSW, 1/2 W.....	1.0	L. B. T., surface tow net.
3518	Aug. 3	6.40 a.m.	60 22 00	171 42 00	41	42	33.9	36	gn. M.....	West	3	SSE, 1/2 E.....	1.0	Do.

3519	...do	10.03 a.m.	60 06 00	171 25 00	43 42 31.1	37	bk. M. fne. S	SSE	2	ESE	0.5	Do.
3520	...do	4.10 p.m.	50 28 00	170 57 00	43 43 32.2	38	gn. M. fne. S	SE	3	E. by S	0.7	L. B. T. and mud bag, surface tow net.
3521	...do	7.35 p.m.	59 09 00	170 48 00	43 43 31.9	40	gn. M. fne. S	SE	5	ESE	0.5	L. B. T., surface tow net.
3522	Aug. 4	9.24 a.m.	57 58 00	170 09 00	46 44 35.7	41	crs. gy. S. G.	SW	4	SSE	1.0	L. B. T. and mud bag, surface tow net.
3523	...do	1.18 p.m.	57 39 00	170 02 00	47 45 38	39	gn. M. fne. S	SSW	3	SSE	0.7	L. B. T., surface tow net.
3524	...do	4.08 p.m.	57 24 00	169 56 00	46 45 40.3	36	gy. S. P.	SSW	4	SSE	1.3	Do.
3525	...do	5.49 p.m.	57 21 00	170 05 00	46 45 41.6	29	bk. S. Sh.	SSE	4	SE ½ E	0.7	R. D.
3526	Aug. 5	7.24 a.m.	57 31 00	170 57 00	47 44 38.9	49	dk. M. fne. S	SSW	3	NW. by W	0.8	R. D.
3527	...do	10.35 a.m.	57 48 00	171 21 00	48 44 38	52	gn. M.	SSW	4	NW. by W	0.8	L. B. T., surface tow net.
3528	...do	5.03 p.m.	58 19 30	172 02 00	47 45 35.9	55	dk. gn. M. fne. S	SW	3	NW. by W	0.7	L. B. T.
3529	...do	8.18 p.m.	58 36 00	172 24 00	46 45 36.1	56	gn. M.	SW	3	NW. ¼ W	0.7	L. B. T.
3530	Aug. 6	7.33 a.m.	59 39 00	173 53 00	45 44 34.9	59	dk. gn. M. fne. S	Calm	0	W. ½ N	0.5	L. B. T., surface tow net.
3531	...do	11.00 a.m.	59 55 00	174 17 00	47 46 35.1	59	gn. M.	SE	1	W. ½ S	1.0	Do.
3532	...do	7.40 p.m.	59 12 00	175 39 00	48 44 34.8	77	dk. gn. M. fne. S	N. by E	3	SE	1.2	Do.
3533	Aug. 7	7.42 p.m.	57 34 00	173 33 00	47 46 39.2	70	gy. S. bk. Sp.	NW. by N	4	NE	0.7	L. B. T.
3534	Aug. 8	5.56 a.m.	57 03 00	171 19 00	47 45 38.1	59	gn. M.	NW	5	NE. by E	0.9	L. B. T.
3535	...do	8.56 a.m.	57 02 00	170 46 00	48 45 39	52	gn. M. fne. S	NNW	5	NNE	0.8	L. B. T.
3536	...do	10.18 a.m.	57 05 00	170 35 00	48 45 42.4	40	gn. M. fne. S	NNW	5	NNE	0.5	L. B. T.
3537	Aug. 9	6.55 a.m.	54 45 00	169 06 00	45 43 38	49	fne. gy. S	SW	2	E. ½ N	1.0	L. B. T., surface tow net.
3538	...do	10.13 a.m.	56 41 00	168 29 00	48 46 38	59	gn. M. S.	West	2	E. ½ N	0.8	Do.
3539	...do	3.49 p.m.	56 34 00	167 19 00	49 45 38.9	57	gn. M. S.	SW	3	E. ½ S	0.5	L. B. T. and mud bag, surface tow net.
3540	...do	9.12 p.m.	56 27 00	166 03 00	47 45 36	51	gn. M. fne. S	SSW	3	East	0.6	L. B. T., surface tow net.
3541	Aug. 10	5.19 a.m.	56 14 00	164 08 00	48 46 36.1	49	bk. M. fne. S	SSE	3	E. ½ N	0.5	L. B. T. and mud bag, surface tow net.
3542	...do	8.43 a.m.	56 10 00	163 26 00	49 47 39.2	49	dk. M. fne. S	SE	3	SE. by E. ½ E	0.7	L. B. T., surface tow net.
3543	Aug. 18	4.17 p.m.	56 41 00	169 39 00	48 44 42.7	43	bk. S. Sh.	WNW	2	East	1.0	Do.
3544	...do	7.20 p.m.	56 50 00	169 59 00	47 44 41.1	41	fne. gy. S. Sh.	NW. by N	2	WSW	0.5	Do.
3545	Aug. 21	5.07 p.m.	56 15 00	171 33 00	52 48 36	1,020	gn. M. fne. S. C.	West	5	NNE. ¾ E	0.7	Agassiz dredge, surface tow net.
3546	Aug. 31	11.24 a.m.	54 12 00	165 42 00	54 47 45.6	36	G. bk. S	South	2.4	NW	1.0	L. B. T. and mud bag.
3547	...do	12.38 p.m.	54 16 00	165 45 00	54 47 45	51	fne. bk. S	South	2.3	NNE. ¾ E	0.7	L. B. T., surface tow net.
3548	Sept. 1	9.03 a.m.	54 44 00	165 42 00	52 47 39.5	91	bk. S	East	3	W. ½ S	1.5	Do.
3549	...do	11.54 a.m.	55 00 00	166 10 00	53 49 40.1	78	fne. bk. S	E. by S	5	WNW	2.0	Do.
3550	...do	4.26 p.m.	55 24 00	167 02 00	51 48 39	76	br. M.	NE	5	NNW. ¾ W	0.8	Do.
3551	...do	6.56 p.m.	55 36 00	167 28 00	49 47 39.1	74	gn. M.	NE	3	N. by W. ¾ W	1.2	Do.
3552	Sept. 2	6.35 a.m.	56 28 00	169 28 00	50 47 39.8	54	bk. S. rky.	North	4	NNW. ¾ W	0.5	L. B. T.
3553	...do	7.58 a.m.	56 28 00	169 46 00	48 48 39.5	51	fne. gy. S. M.	NNE	3	NNW. ¾ W	0.8	L. B. T., surface tow net.
3554	...do	10.33 a.m.	56 34 00	170 19 00	48 47 39.5	62	gn. M.	NE. by N	4	N. by W. ¾ W	1.0	Do.
3555	...do	12.41 p.m.	56 45 00	170 18 00	47 46 40.2	57	gn. M.	NE. by N	4	N. by W. ¾ W	0.7	Do.
3556	...do	3.21 p.m.	56 57 30	170 33 00	49 46 41	49	gn. M. fne. S	NE	4	NW. by W	1.5	Do.
3557	...do	4.49 p.m.	57 04 00	170 24 00	48 45 45	26	S. bk. Sp.	NE	4	NW	1.0	L. B. T.
3558	Sept. 3	7.04 a.m.	56 58 00	170 09 00	46 45 42.9	25	S. dk. Sp. rky.	NNE	4	SE. by E. ¾ E	1.0	L. B. T.
3559	...do	9.17 a.m.	56 56 00	169 52 00	47 46 42.5	39	gy. S. brk. Sh.	NE. by E.	4	East	0.8	L. B. T. and mud bag, surface tow net.
3560	...do	1.10 p.m.	56 40 00	169 20 00	47 45 40.7	43	fne. gy. S. bk. Sp.	NNE	3	E. ½ N	0.7	L. B. T.
3561	...do	2.51 p.m.	56 31 00	169 17 00	48 45 40.7	48	gy. S. bk. Sp.	NE	3	ESE	0.8	L. B. T.

Record of boat dredging and trawling stations of the U. S. Fish Commission steamer Albatross.

Serial No.	Date.	Time.	Position, San Diego Bay, California.	Temperatures.			Depth.	Character of bottom.	Drift.		Instrument used, etc.
				Air.	Sur-face.	Bot-tom.			Direction.	Dis-tance.	
				° F.	° F.	° F.	Fms.		Mile.		
	1894.										
3562	Mar. 19	9.25 a. m.	Coronado Wharf, SW, $\frac{1}{2}$ mile	62	58		7	S. bk. Sh.	0.3	Beot dredge.	
3563	...do...	10.25 a. m.	Beacon No. 8, W, $\frac{1}{2}$ mile	64	56		6 $\frac{1}{2}$	fine S. bk. Sh.	0.3	Do.	
3564	...do...	10.50 a. m.	Beacon No. 8, NW, by W, $\frac{1}{2}$ W, $\frac{1}{2}$ mile	66	58		5	fine S. M. bk. Sh.	0.3	Do.	
3565	...do...	11.28 a. m.	Beacon No. 8, NW, by W, $\frac{1}{2}$ W, 1 mile	64	58		4 $\frac{1}{2}$	fine S. M. bk. Sh.	0.3	Do.	
3566	...do...	11.58 a. m.	Beacon No. 9, ESE, $\frac{1}{2}$ mile	60	58		3	fine S. bk. Sh.	0.3	Do.	
3567	Mar. 21	9.37 a. m.	Beacon No. 10, SE, $\frac{1}{2}$ S, $\frac{1}{2}$ mile	57	57		3	fine S. bk. Sh.	0.3	Do.	
3568	...do...	9.52 a. m.	End National City Wharf, N, by E, $\frac{1}{2}$ E, 200 yards	57	57		4	hrd. bk. Sh.	0.3	Do.	
3569	...do...	10.08 a. m.	End National City Wharf, NNW, $\frac{1}{2}$ mile	59	57		6	fine S. bk. Sh.	0.3	Do.	
3570	...do...	10.24 a. m.	End National City Wharf, N, by W, $\frac{1}{2}$ W, 1 $\frac{1}{2}$ miles	60	57		2	fine S. oyster Sh.	0.3	Do.	
3571	...do...	11.05 a. m.	End National City Wharf, N, by W, $\frac{1}{2}$ W, 1 $\frac{1}{2}$ miles	50	57		2	hrd.	0.3	Do.	
3572	...do...	11.18 a. m.	End National City Wharf, N, by W, $\frac{1}{2}$ W, 2 $\frac{1}{2}$ miles	58	56		2	M. fine S.	0.3	Do.	
3573	...do...	11.44 a. m.	End National City Wharf, N, by W, $\frac{1}{2}$ W, 2 $\frac{1}{2}$ miles	58	56		1 $\frac{1}{2}$	M. S.	0.3	Beot beam-trawl.	
3574	...do...	2.45 p. m.	Beacon No. 7, NW, by N, $\frac{1}{2}$ mile	64	57		5 $\frac{1}{2}$	fine S.	0.3	Do.	
3575	...do...	3.12 p. m.	Beacon No. 7, E, $\frac{1}{2}$ N, $\frac{1}{2}$ mile	64	57		6 $\frac{1}{2}$	fine S.	0.3	Do.	
3576	...do...	3.32 p. m.	Beacon No. 5, W, $\frac{1}{2}$ mile	64	58		5	fine S. bk. Sh.	0.3	Do.	
3577	...do...	4.03 p. m.	Beacon No. 5, NNW, $\frac{1}{2}$ mile	65	57		6	fine S. bk. Sh.	0.3	Do.	
3578	...do...	4.45 p. m.	Beacon No. 4, ESE, 300 yds.	59	56		6	fine S. bk. Sh.	0.3	Do.	
3579	Mar. 22	9.53 a. m.	Beacon No. 3, NNW, $\frac{1}{2}$ W, $\frac{1}{2}$ mile	57	53		9	hrd.	0.2	Do.	
3580	...do...	10.13 a. m.	Ballast Point Light House, SSE, $\frac{1}{2}$ mile	57	53		7	hrd.	0.1	Do.	
3581	...do...	10.29 a. m.	Ballast Point Light House, WSW, $\frac{1}{2}$ W, 300 yards	56	53		12	fine S. R.	0.2	Do.	
3582	...do...	10.55 a. m.	Point Loma Light House, SW, by W, $\frac{1}{2}$ W, $\frac{1}{2}$ mile	59	54		6 $\frac{1}{2}$	fine S. R.	0.2	Do.	
3583	...do...	11.10 a. m.	Point Loma Light House, W, $\frac{1}{2}$ S, $\frac{1}{2}$ mile	59	53		4	fine S. R.	0.2	Do.	
3584	...do...	11.25 a. m.	Bell Buoy, W, $\frac{1}{2}$ S, 125 yds.	58	54		8	fine S. R.	0.3	Do.	
3585	Mar. 24	1.30 p. m.	Beacon No. 8, WNW, $\frac{1}{2}$ mile	63	57		4	fine gy. S.	0.3	Do.	
3586	...do...	1.50 p. m.	Beacon No. 9, ESE, $\frac{1}{2}$ mile	63	57		4	fine gy. S.	0.4	Do.	
3587	...do...	2.30 p. m.	Beacon No. 9, ENE, $\frac{1}{2}$ E, 300 yds.	64	57		3	fine gy. S.	0.2	Do.	
3588	...do...	3.05 p. m.	Beacon No. 10, WNW, $\frac{1}{2}$ mile	64	57		2 $\frac{1}{2}$	R. oyster Sh.	0.3	Do.	
3589	...do...	3.25 p. m.	End National City Wharf, N, by W, $\frac{1}{2}$ W, $\frac{1}{2}$ mile	64	57		3	R. oyster Sh.	0.3	Do.	
3590	...do...	3.50 p. m.	End National City Wharf, N, by W, $\frac{1}{2}$ W, 1 $\frac{1}{2}$ miles	65	57		3 $\frac{1}{2}$	R. bk. Sh.	0.3	Do.	
3591	...do...	4.25 p. m.	Beacon No. 8, SW, $\frac{1}{2}$ S, $\frac{1}{2}$ mile	64	57		4 $\frac{1}{2}$	R. bk. Sh.	0.4	Do.	

NOTE.—All bearings are magnetic. Chart used, C. S. No. 5106.



Record of dredging and trawling stations of the U. S. Fish Commission steamer Albatross.

Serial No.	Date.	Time.	Position.		Temperatures.				Depth.	Character of bottom.	Wind.		Drift.		Instrument used, etc.
			Lat. N.	Long. W.	Air.	Sur. face.	Bot. tom.	Fms.			Direction.	Force.	Direction.	Dis- tance.	
	1894.		C	"	O	"	° F.	° F.	° F.	Fms.				Miles.	
3582	Apr. 30	9.50 a.m.	48 10 00	122 45 30	48	46	.....	27	R. S.....	SSE.....	2	W. by N.....	0.3	S. B. T.	
3583	...do....	10.29 a.m.	48 11 30	122 48 00	48	46	46	37	Rky.....	SSE.....	2	WNW.....	0.3	Ship's dredge.	
3584	...do....	10.47 a.m.	48 12 00	122 50 00	50	46	46	36	S. P.....	SSE.....	2	West.....	0.4	Tangles.	
3585	...do....	11.56 a.m.	48 13 00	122 59 30	51	46	45	49	Rky. G. S.....	ENE.....	3	South.....	3.0	Tangles.	
3586	...do....	1.08 p.m.	48 14 30	122 58 00	53	46	44	81	bu. M.....	West.....	1	SW. $\frac{1}{2}$ S.....	0.8	L. B. T.	
3587	...do....	2.08 p.m.	48 15 00	123 00 00	53	46	45	67	crs. bk. S.....	West.....	2	SW. $\frac{1}{4}$ W.....	1.0	L. B. T.	
				E.											
3588	June 8	3.24 p.m.	52 01 00	177 34 00	43	40	.....	34	bk G.....	SE. by E...	2	SE.....	2.0	L. B. T.	
3589	June 9	10.52 a.m.	52 05 00	177 40 00	43	42	.....	55	rky. fne. S. Sh.	Calm.....	0	NE. $\frac{1}{2}$ N.....	0.3	L. B. T.	
				W.											
3600	June 26	3.37 p.m.	55 06 00	163 28 00	43	41	40	9	fne. dk. vol. S.	SW.....	4	SW.....	1.0	L. B. T. and surface tow net.	

INVESTIGATIONS OF THE STEAMER ALBATROSS.

Record of intermediate tow-net stations of the U. S. Fish Commission steamer Albatross.

(Condition of sea, smooth.)

Serial No.	Date.	Time.	Position.		Temperatures.		Depth (in fathoms).	Wind.		Drift.		Appearance of sky.	Remarks.
			Latitude N.	Longitude W.	Air.	Sur-face.		Bot-tom.	Direction.	Force.	Direction.		
	1882.		° ' "	° ' "	° F.	° F.							
31	Apr. 26	10.11 a.m.	36 48 15	121 59 05	58 54	53 1	5 to surface...	N.	1		Clear	Entire net open.	
32	Apr. 27	8.30 a.m.	37 29 00	123 01 20	54 53	41.7	100 to surface.	WNW	3		do	All specimens from upper net.	
33	Aug. 3	6.40 a.m.	60 22 00	171 42 00	41 42	33.9	25 to surface.	W	3		Cloudy		
33	do	6.40 a.m.	60 22 00	171 42 00	41 42	33.9	25 fathoms*	W	3		do	Specimens from both nets.	
34	do	10.00 a.m.	60 06 00	171 25 00	43 42	31.1	25 to surface.	SSE	2		do		
34	do	10.03 a.m.	60 06 00	171 25 00	43 42	31.1	25 fathoms*	SSE	2		do	Do.	
35	Aug. 4	9.24 a.m.	57 58 00	170 09 00	46 44	35.7	30 to surface.	SW	4		do		
35	do	9.24 a.m.	57 58 00	170 09 00	46 44	35.7	30 fathoms*	SW	4		do	Do.	
36	Aug. 6	7.33 a.m.	59 39 00	173 53 00	45 44	34.9	43 to surface.	Calm	0		do		
36	do	7.33 a.m.	59 39 00	173 53 00	45 44	34.9	43 fathoms*	Calm	0		do	All specimens from upper net.	
37	do	11.00 a.m.	59 55 00	174 17 00	47 46	35.1	44 to surface.	SE	1		do		
37	do	11.00 a.m.	59 55 00	174 17 00	47 46	35.1	44 fathoms*	SE	1		do	Specimens from both nets.	
38	Aug. 9	6.55 a.m.	54 45 00	169 06 00	45 43	38	40 to surface.	SW	2		do		
38	do	6.55 a.m.	54 45 00	169 06 00	45 43	38	40 fathoms*	SW	2		do	Do.	
39	Aug. 10	8.43 a.m.	56 10 00	163 26 00	49 47	39.2	30 to surface.	SE	3		do		
39	do	8.43 a.m.	56 10 00	163 26 00	49 47	39.2	30 fathoms*	SE	3		do	Do.	
40	Aug. 18	4.17 p.m.	56 41 00	169 39 00	48 44	42.7	30 to surface.	WNW	2		Overcast.		
40	do	4.17 p.m.	56 41 00	169 39 00	48 44	42.7	30 fathoms*	WNW	2		do	Do.	
41	Aug. 20	4.03 p.m.	54 38 00	175 27 00	56 49	35.1	125 to surface.	NNE	3		do		
41	do	4.03 p.m.	54 38 00	175 27 00	56 49	35.1	125 fathoms*	NNE	3		do	Do.	
42	Aug. 21	9.48 a.m.	55 46 00	172 44 00	51 48	35.1	250 to surface.	W	5		do		
42	do	9.48 a.m.	55 46 00	172 44 00	51 48	35.1	250 fathoms*	W	5		do	Do.	
43	Aug. 22	1.29 p.m.	54 59 00	171 49 00	49 48	35.1	100 to surface.	SE. by S.	2		Cloudy		
43	do	1.29 p.m.	54 59 00	171 49 00	49 48	35.1	100 fathoms*	SE. by S.	2		do	Do.	
44	Sept. 1	9.03 a.m.	54 44 00	165 42 00	52 47	39.5	50 to surface.	E.	3		do		
44	do	9.03 a.m.	54 44 00	165 42 00	52 47	39.5	50 fathoms*	E.	3		do	Do.	
	1894.												
45	Apr. 30	1.68 p.m.	48 14 30	122 58 00	53 46	41	4 to surface...	W	1	SW, S	0.2	Clear	Do.

\* Lower net closed at this depth by messenger.

Record of fishing stations of the U. S. Fish Commission steamer Albatross.

Station No.	Date.	Time.	Position.		Depth (in fathoms).	Character of bottom.	Bait used.	Number of lines used.	Length of trial.	Fish taken.	Average	
			Latitude N.	Longitude W.							weight.	length.
										Minutes.	Pounds.	Inches.
3482	July 12	9.05 a.m.	57 18 00	170 42 00	42	gy. M. fine. S	Salt salmon	4	10	None		
3483	do	12.32 p.m.	57 18 00	171 18 00	56	gy. M.	do	6	15	do		
3484	do	4.11 p.m.	57 18 00	171 54 00	60	blue M.	do	6	20	5 cod	16	33½
3485	do	8.13 p.m.	57 18 00	172 34 00	62	gy. M.	do	8	20	1 cod*	12	31
3496	July 17	5.45 a.m.	56 32 00	169 45 00	41	gy. M.	do	4	15	None		
3500	do	11.53 a.m.	56 02 00	169 30 00	121	fine. gy. S				1 cod	8	28
3503	July 28	10.44 a.m.	57 06 15	170 11 00	17	fine. bk. S.	Salt salmon	8	10	None		
3507	do	12.27 p.m.	57 03 00	169 54 00	35	fine. gy. S.	do	7	20	do		
3504	do	2.23 p.m.	56 57 00	169 27 00	34	fine. gy. S.	do	8	14	do		
3508	do	5.18 p.m.	57 03 00	168 52 00	43	gy. S. Sh.	do	7	14	do		
3505	do	7.55 p.m.	57 09 00	168 17 00	44	fine. gy. S.	do	8	15	2 cod†	23	16½
3511	July 29	4.00 a.m.	57 27 00	166 30 00	38	fine. gy. S. M.	do	5	15	1 cod	8	27
3506	do	6.39 a.m.	57 33 00	165 55 00	36	gy. S. and M.	do	8	15	2 cod	7½	25½
3512	do	9.46 a.m.	57 38 00	165 20 00	35	fine. dk. S. and M.	do	8	23	17 cod	7½	26½
3507	July 29	1.00 p.m.	57 43 00	164 42 00	31	fine. gy. S.	do	9	12	14 cod	8½	26½
3513	do	5.14 p.m.	58 13 00	164 47 00	26	fine. gy. S.	do	8	15	3 cod*	7½	26½
3508	do	7.33 p.m.	58 33 00	164 49 00	23	fine. gy. S. and Sh.	do	9	30	10 cod	8½	27½
3512	July 31	6.48 a.m.	57 10 00	169 03 00	42	fine. gy. S. bk. Sp.	do	7	14	None		
3509	do	11.09 a.m.	57 10 00	169 43 00	35	fine. gy. S.	do	7	15	do		
3510	Aug. 1	6.14 a.m.	Walrus Island, SW. ½ W., distance 3 miles.		27	bk. Sh. and S.	do	5	15	do		
3511	do	10.10 a.m.	57 32 00	169 38 00	39	fine. P. bk. M.	do	9	15	do		
3512	do	1.34 p.m.	57 49 30	169 27 00	38	fine. gy. S. gn. M.	do	11	15	do		
3523	do	4.43 p.m.	58 08 30	169 14 00	38	fine. gy. S. bk. M.	do	10	15	do		
3513	do	7.45 p.m.	58 27 00	169 01 00	35	fine. S. gy. M.	do	10	10	do		
3514	Aug. 2	4.19 a.m.	59 22 00	168 21 00	21	fine. gy. S.	do	6	15	do		
3526	do	7.38 a.m.	59 41 00	168 06 00	22	fine. gy. S. Sh.	do	6	10	do		
3515	do	10.45 a.m.	NW. Cape Nunivak Island, bearing NNE. ½ E. 19 miles.		13	fine. gy. S.	do	9	15	1 cod	11½	29
3516	do	3.57 p.m.	NW. Cape ESE. distance 27 miles.		17	fine. gy. S.	do	10	15	None		
3517	do	8.03 p.m.	NW. Cape E. ¼ N. 51 miles.		24	fine. gy. S.	do	8	23	5 cod‡	8	27½
3548	Aug. 3	3.09 a.m.	60 24 00	170 48 00	35	bk. M.	do	6	15	None		
3518	do	6.40 a.m.	Pinnacle Island, bearing SW. by W. ½ W., distance 21 miles.		36	gn. M.	do	8	17	do		
3519	do	10.22 a.m.	60 06 00	171 25 00	37	bk. M. fine. S.	do	8	10	do		
3349	do	1.14 p.m.	59 46 00	171 08 00	38	st. dk. M.	do	10	15	do		
3520	do	4.10 p.m.	59 28 00	170 57 00	38	gy. M. fine. S.	do	9	15	do		
3521	do	7.36 p.m.	59 09 00	170 48 00	40	gy. M.	do	10	14	do		
3532	Aug. 4	6.11 a.m.	58 15 00	170 18 00	40	gy. M. fine. S.	Salt salmon, shells.	5	15	do		
3522	do	9.24 a.m.	57 53 00	170 09 00	41	dk. gy. S. and G.	do	9	15	do		

\* And 1 *Atheresthes* flounder.

† Taken in beam-trawl.

‡ And 1 flounder.

§ One taken in trawl.

Record of fishing stations of the U. S. Fish Commission steamer Albatross—Continued.

Station No.	Date.	Time.	Position.		Depth (in fathoms).	Character of bottom.	Bait used.	Number of lines used.	Length of trial.	Fish taken.	Average	
			Latitude N.	Longitude W.							weight.	length.
										Minutes.	Pounds.	Inches.
3523	Aug. 4	1.20 p.m.	57 39 00	170 02 00	39	gy. M. fine S.	Salt salmon, shells.	7	19	None		
3524	..do	4.08 p.m.	57 24 00	169 56 00	36	gy. S. P.	do	7	15	do		
3525	..do	5.40 p.m.	57 21 00	170 05 00	29	bk. S. brk. Sh.	do	6	13	do		
3533	Aug. 5	4.15 a.m.	57 24 00	170 24 00	37	fine gy. S. and Sh.	do	4	15	do		
3528	..do	7.25 a.m.	57 31 00	170 57 00	49	dk. M. fine S.	do	5	15	do		
3527	..do	10.36 a.m.	57 48 00	171 21 00	52	gy. M.	do	6	15	1 cod	11	29
3534	..do	1.52 p.m.	58 04 00	171 41 00	55	gy. M.	do	8	25	2 cod	7½	26
3528	..do	5.02 p.m.	58 19 30	172 02 00	55	dk. gy. M. fine S.	do	5	26	4 cod	13½	29½
3529	..do	8.19 p.m.	58 36 00	172 24 00	56	gn. M.	do	6	15	1 cod	8	28
3537	Aug. 6	4.45 a.m.	59 24 00	173 31 00	57	gn. M.	do	5	20	do	11	28
3530	..do	7.33 a.m.	59 39 00	173 53 00	59	dk. gy. M. fine S.	do	6	15	None		
3531	..do	11.02 a.m.	59 55 00	174 17 00	59	gy. M.	Salt shells, cod.	9	25	12 cod	11½	30
3538	Aug. 8	3.46 a.m.	59 33 00	175 00 00	70	gy. M.	Salt salmon.	10	17	None		
3534	..do	4.13 a.m.	57 08 00	171 38 00	60	gy. M.	do	4	15	do		
3535	..do	8.35 a.m.	57 02 00	170 46 00	52	dk. gn. M. fine S.	do	5	15	do		
3536	..do	10.19 a.m.	57 05 00	170 35 00	40	fine S. dk. M.	do	5	15	do		
3535	Aug. 9	4.20 a.m.	58 49 00	169 42 00	37	fine sh. S.	do	4	15	do		
3537	..do	6.55 a.m.	54 45 00	169 06 00	49	fine gy. S.	do	6	15	do		
3538	..do	10.15 a.m.	56 41 00	168 29 00	59	gn. M. S.	Salmon shells.	7	18	3 cod	13½	30½
3536	..do	1.10 p.m.	56 37 00	167 55 00	59	gn. M. S.	Salt salmon, shells.	8	21	5 cod	11	30
3539	..do	3.50 p.m.	56 34 00	167 19 00	57	gn. M. S.	do	8	17	2 cod	9½	25½
3537	..do	6.40 p.m.	56 31 00	168 43 00	55	dk. M. fine S.	do	6	7	None		
3541	Aug. 10	5.20 a.m.	56 14 00	164 08 00	49	bk. M. fine S.	do	5	17	5 cod	11½	30
3542	..do	8.45 a.m.	56 10 00	163 26 00	49	dk. M. fine S.	do	9	17	do	11	29
3575	Aug. 17	7.14 a.m.	Chernofski, bearing SE. ½ E. Western Head, S. ½ W.		43	bk. S.	Salt salmon.	8	19	1 cod	11	29
8543	Aug. 18	4.18 p.m.	St. George Island, S. by S. ½ S., distance 5¼ miles.		43	bk. S. brk. Sh.	do	7	15	None		
3544	..do	7.20 p.m.	Western end St. George, SE. ½ E., 16 miles.		41	fine gy. S. Sh.	do	7	14	do		
3414	Aug. 31	9.05 a.m.	54 13 00	165 58 00	42	bk. gy. S. M.	do	9	15	Asterrosten flounder.		
3415	..do	9.48 a.m.	54 10 00	165 54 00	42	dk. gy. S.	do	9	11	None		
3416	..do	10.47 a.m.	54 07 00	165 51 00	38	bk. M. fine S.	do	9	16	2 cod	8½	27
3546	..do	11.26 a.m.	54 12 00	165 42 00	36	G. bk. Sh.	do	8	16	5 cod	10½	30
3547	..do	12.39 p.m.	54 16 00	165 45 00	51	fine bk. S.	do	3	15	None		
3558	Sept. 3	7.04 a.m.	56 58 00	170 09 00	25	S. and dk. Sp.	do	7	15	5 cod*	12	29
Sept. 9	5.30 p.m.	Deer Island, bearing about SW., distance 3 miles.			12	do	do	6	90	27 cod †	6½	23
Sept. 11	Portage Bay				6	dk. M., G. and S.	Salmon-rod sculpin	2	6	12 cod	9½	29½

\* And 3 sculpin.

† And 6 halibut.

Record of fishing stations of the U. S. Fish Commission steamer Albatross—Continued.

Serial No.	Date.	Time of day.	Position.		Character of bottom.	Temperature.			Bait used.	N. of lines.	Length of trawl.	Food-fishes taken.	Cod.		Average of cod.					
			Lat. N.	Long. W.		Depth.	Air.	Surface.					Bottom.	Sexes.	Weight.	Length.	Weight.	Length.		
	1884.		°	'	°	'							♂	♀	Lbs.	In.	Lbs.	In.		
Hy. 3492	June 29	1.00 p. m.	57	59	166	04	gy. S. ....	32	44	38	33	Salt salmon ....	15	30	2 cod.....	1	11	30		
Hy. 3493	...do....	4.17 p. m.	58	06	165	22	fne. gy. S. ....	26	45	38	35.7	...do.....	15	30	4 cod, 2 flounders .....	1	9	29	10	29½
Hy. 3495	June 30	7.38 a. m.	57	28	163	14	fne. gy. S. ....	27	38	38	34	...do.....	13	30	Nothing .....					
Hy. 3496	...do....	12.03 p. m.	58	59	163	02	fne. gy. S. ....	34	42	40	32	...do.....	14	30	1 cod.....	1	6½	28	6½	28
Hy. 3497	...do....	3.24 p. m.	56	59	163	48	fne. gy. S. ....	37	42	40	34.3	...do.....	13	30	Nothing .....					



Dr. 3518	do	6.50 a.m.	36	60 22 00	171 42 00	41	42	33.9	41.7	41.1									
Dr. 3519	do	10.10 a.m.	37	60 06 00	171 25 00	43	42	31.1	42.0	40.8									
Hy. 3549	do	1.20 p.m.	38	59 47 00	171 08 00	43	43	31.8	43.0	42.5	29.8		29.8						
Dr. 3520	do	4.20 p.m.	38	59 28 00	170 57 00	43	43	32.2	42.6	39.1									
Dr. 3521	do	7.40 p.m.	40	59 09 00	170 48 00	43	43	31.9	43.0	42.8									
Hy. 3550	do	11.10 p.m.	40	58 52 00	170 38 00	45	44	30.8	43.2	42.8									
Hy. 3532	Aug. 4	6.20 a.m.	40	58 15 00	170 18 00	46	44	35.4	43.1	41.1	40.0		32.0						
Dr. 3522	do	9.30 a.m.	41	57 58 00	170 09 00	46	44	35.7	44.0	44.0									
Dr. 3523	do	1.20 p.m.	39	57 39 00	170 02 00	47	45	38.0	44.5	44.0									
Dr. 3524	do	4.10 p.m.	36	57 24 00	169 56 00	46	45	40.3	44.0	43.5	42.3		37.9						
Dr. 3525	do	5.50 p.m.	29	57 21 00	170 05 00	46	45	41.6	43.0	41.9	41.3								
Hy. 3553	Aug. 5	4.20 a.m.	37	57 24 00	170 24 00	47	43	40.3	43.3	42.9									
Dr. 3526	do	7.30 a.m.	49	57 31 00	170 57 00	47	44	38.9	44.2	43.9	43.1		39.1	37.2					
Dr. 3527	do	10.40 a.m.	52	57 48 00	171 21 00	48	44	38.0	45.0	45.0									
Hy. 3534	do	2.00 p.m.	55	58 04 00	171 41 00	48	45	37.4	44.8	44.4									
Dr. 3528	do	5.10 p.m.	55	58 19 30	172 02 00	47	45	35.9	45.6	45.2	44.5		43.0	35.5	35.2				
Dr. 3529	do	8.20 p.m.	56	58 36 00	172 24 00	46	45	36.1	45.2	44.5									
Hy. 3535	do	11.30 p.m.	57	58 52 00	172 45 00	46	44	35.3	45.2	44.2									
Hy. 3536	Aug. 6	2.10 a.m.	57	59 09 00	173 09 00	45	43	34.2	43.3	43.2	39.0		34.9	33.2	33.7				
Hy. 3537	do	4.50 a.m.	57	59 24 00	173 31 00	45	43	35.7	44.7	41.8									
Dr. 3530	do	7.40 a.m.	59	59 39 00	173 53 00	45	44	34.9	44.3	43.0									
Dr. 3531	do	11.10 p.m.	59	59 55 00	174 17 00	47	46	35.1	43.5	43.4	33.0		34.0	33.6	33.6				
Hy. 3538	do	3.50 p.m.	70	59 33 00	173 00 00	51	46	36.7	44.8	44.4									
Dr. 3532	do	7.50 p.m.	77	59 12 00	173 09 00	48	44	34.8	44.6	42.9									
Hy. 3539	Aug. 7	12.10 a.m.	71	58 43 00	176 10 00	44	44	.....	45.1	45.0	45.0		44.2	34.0	37.1	36.8			
Hy. 3540	do	5.20 a.m.	1,744	58 11 00	176 38 00	45	44	35.5	35.9	35.0									
Hy. 3561	do	10.30 a.m.	1,367	58 01 00	175 41 00	48	46	35.2	46.7	45.8									
Hy. 3532	do	5.20 p.m.	77	57 41 00	174 05 00	49	47	38.0	46.0	45.5	40.1		39.0	38.0	38.1	38.1	38.0		
Dr. 3533	do	7.50 p.m.	70	57 34 00	173 33 00	47	46	39.2	45.9	45.0									
Hy. 3563	do	11.20 p.m.	69	57 25 00	172 59 00	47	45	37.8	46.1	45.3									
Hy. 3564	Aug. 8	4.20 a.m.	60	57 08 00	171 38 00	47	45	37.8	44.4	45.0	45.1		39.6	38.1					
Dr. 3534	do	6.00 a.m.	59	57 03 00	171 19 00	47	45	38.1	45.3	46.1									
Dr. 3535	do	9.00 a.m.	52	57 02 00	170 46 00	48	45	39.0	43.4	43.5									
Dr. 3536	do	10.20 a.m.	40	57 05 00	170 35 00	48	45	42.4	43.4	42.5	42.2		41.9						
Hy. 3585	Aug. 9	4.30 a.m.	37	56 49 00	169 42 00	46	44	40.9	44.1	41.0	40.0		39.9						
Dr. 3537	do	7.00 a.m.	49	54 45 00	169 06 00	45	43	38.0	45.6	45.2									
Dr. 3538	do	10.20 a.m.	59	56 41 00	168 29 00	48	46	38.0	45.5	46.1									
Hy. 3586	do	1.20 p.m.	59	56 37 00	167 55 00	49	46	38.0	45.9	45.4	38.8		36.5	37.2	37.0				
Dr. 3539	do	4.00 p.m.	57	56 34 00	167 19 00	49	45	38.9	46.2	46.7									
Hy. 3567	do	6.40 p.m.	55	56 31 00	166 43 00	48	46	37.5	46.5	46.6									
Dr. 3540	do	9.20 p.m.	51	56 27 00	166 08 00	47	45	36.0	46.4	46.0	34.1		34.1	34.2					
Dr. 3541	Aug. 10	5.20 a.m.	49	56 14 00	164 06 00	48	46	36.1	46.9	47.2	35.4		34.9	35.2					
Dr. 3542	do	8.50 a.m.	49	56 10 00	163 26 00	49	47	39.2	47.0	47.0									
Hy. 3585	Aug. 18	7.40 a.m.	1,636	55 50 00	169 24 00	48	47	36.0	47.7	48.2									
Dr. 3543	do	4.20 p.m.	43	56 41 00	169 39 00	48	44	42.7	42.0	41.9	41.3		41.0	41.0					
Dr. 3544	do	7.30 p.m.	41	56 30 00	169 39 00	47	44	41.1	44.6	43.0									
Hy. 3592	Aug. 19	5.30 a.m.	76	56 39 00	172 21 00	47	45	38.9	46.0	46.0	46.6	42.4	39.1	38.4	38.0	38.4			





Record of ocean temperatures and specific gravities.

[All specimens were taken at about 1 foot below the surface, by means of a specimen bottle.]

Date.	Time of day.	Station.	Lat. N.		Long. W.		Depth.	Temperature by attached thermometer.		Temp. of specimen at time specific gravity was taken.	Specific gravity.	Specific gravity reduced to 60° F.	Specific gravity reduced to 15° C.		
			°	'	°	'		°	'						
1893.															
July	1		51	32	00	175	52	00	Surface	48	43	63	1.0248	1.0245211	1.0243991
	2								do	49	60	63	1.0246	1.025011	1.024101
	5	Adak Island.	51	23	00	176	49	00	do	42	52	63	1.0248	1.025211	1.024391
	6		51	09	00	176	19	00	do	44	52	63	1.0244	1.024811	1.023901
	7		50	31	00	174	02	00	do	50	52	63	1.0244	1.024811	1.023901
	8		52	06	00	171	45	00	do	48	50	63	1.0244	1.024811	1.023901
	9		55	06	00	170	10	00	do	46	49	63	1.0246	1.025011	1.024191
Aug.	1		57	39	00	169	33	00	do	44	49	65	1.0236	1.024290	1.023470
	1		58	15	00	169	05	00	do	44	46	65	1.0234	1.024090	1.023270
	1		58	52	00	168	45	00	do	42	43	65	1.0234	1.024000	1.023270
	2		59	29	00	168	09	00	do	41	41	65	1.0234	1.024000	1.023270
	2		60	03	00	167	55	00	do	42	42	65	1.0232	1.023800	1.023070
	2		60	28	00	168	17	00	do	44	43	65	1.0230	1.023600	1.022870
	2		60	25	00	170	10	00	do	41	41	65	1.0230	1.023600	1.022870
	3		60	19	00	171	41	00	do	42	41	65	1.0230	1.023600	1.022870
	3		59	58	00	171	17	00	do	43	43	65	1.0230	1.023600	1.022870
	3		59	25	00	170	50	00	do	43	42	65	1.0230	1.023600	1.022870
	3		58	44	00	170	35	00	do	43	45	65	1.0230	1.023600	1.022870
	4		58	20	00	170	10	00	do	44	40	65	1.0230	1.023600	1.022870
	4		57	48	00	170	04	00	do	45	40	65	1.0234	1.024090	1.023270
	4		57	23	00	169	55	00	do	45	40	65	1.0234	1.024090	1.023270
	5		57	53	00	171	28	00	do	45	50	65	1.0236	1.024290	1.023470
	5		58	28	00	172	06	00	do	45	47	65	1.0238	1.024490	1.023670
	5		58	53	00	172	40	00	do	44	46	65	1.0232	1.023800	1.023070
	6		59	25	00	173	30	00	do	44	44	65	1.0232	1.023800	1.023070
	6		59	54	00	172	18	00	do	46	48	65	1.0232	1.023800	1.023070
	6		59	25	00	175	20	00	do	45	50	65	1.0236	1.024000	1.023270
	6		58	40	00	176	12	00	do	44	44	65	1.0236	1.024290	1.023470
	7		58	10	00	173	30	00	do	44	46	65	1.0240	1.024090	1.023270
	7		57	57	00	175	19	00	do	40	48	65	1.0242	1.024890	1.024070
	7		57	43	00	173	52	00	do	47	48	65	1.0238	1.024490	1.023670
	8		57	22	00	172	26	00	do	45	47	65	1.0234	1.024090	1.023270
	8		57	10	00	170	55	00	do	45	47	65	1.0232	1.023800	1.023070
	8	St. Paul Island.							do	44	48	65	1.0230	1.023600	1.022870
	9		56	39	00	168	13	00	do	46	48	65	1.0230	1.023600	1.022870
	9		56	33	00	166	50	00	do	46	48	65	1.0230	1.023600	1.022870
	9		56	22	00	165	20	00	do	45	48	65	1.0232	1.023800	1.023070
	10		56	12	00	163	48	00	do	47	49	65	1.0234	1.024090	1.023670
	10		55	56	00	163	38	00	do	48	51	62	1.0240	1.024270	1.023450
	11		54	20	00	165	42	00	do	48	52	62	1.0244	1.024670	1.023850
	17		53	51	00	168	00	00	do	47	48	62	1.0246	1.024870	1.024050
	17		54	28	00	168	10	00	do	47	49	62	1.0242	1.024470	1.023650
	17		55	07	00	169	03	00	do	46	48	62	1.0243	1.024570	1.023750
	18		55	42	00	169	10	00	do	47	48	62	1.0244	1.024670	1.023850
	18		56	19	00	169	32	00	do	46	49	62	1.0244	1.024670	1.023850
	18		50	45	00	169	40	00	do	44	47	62	1.0242	1.024470	1.023650
	18		58	48	00	169	59	00	do	43	46	62	1.0242	1.024470	1.023650
	19		56	40	00	172	30	09	do	45	46	62	1.0242	1.024470	1.023650
	19		56	31	00	173	45	09	do	47	48	62	1.0244	1.024670	1.023850
	19		56	27	00	175	27	00	do	45	46	62	1.0246	1.024870	1.024050
	19		56	22	00	176	48	00	do	47	47	62	1.0246	1.024870	1.024050
	20		55	38	00	176	20	00	do	47	48	62	1.0246	1.024870	1.024050
	20		65	08	00	175	56	00	do	48	51	62	1.0244	1.024670	1.023850
	20		54	40	00	173	30	00	do	48	49	62	1.0244	1.024670	1.023850
	20		54	58	00	174	31	00	do	47	48	62	1.0244	1.024670	1.023850
	21		65	17	00	173	93	00	do	47	49	63	1.0244	1.024811	1.023901
	21		56	47	00	172	41	00	do	49	51	63	1.0242	1.024611	1.023701
	21		50	08	00	171	45	00	do	48	51	63	1.0244	1.024811	1.023901
	21		50	18	00	170	35	00	do	46	49	63	1.0246	1.025011	1.024191
	22		55	44	00	171	10	00	do	47	48	63	1.0244	1.024811	1.023691
	22		55	09	00	171	39	00	do	48	49	63	1.0244	1.024811	1.023691
	22		54	46	00	171	53	00	do	48	49	63	1.0244	1.024811	1.023691
	22		54	25	00	172	12	00	do	47	48	63	1.0244	1.024811	1.023691
	23		54	08	00	172	23	00	do	47	49	63	1.0243	1.024711	1.023691
	23		53	42	00	172	44	00	do	48	50	63	1.0244	1.024911	1.023991
	23		53	45	00	172	06	00	do	48	49	63	1.0242	1.024611	1.023791

## Record of ocean temperatures and specific gravities—Continued.

Date.	Time of day.	Station.	Lat. N.	Long. W.	Depth.	Temperature by attached thermometer.			Temperature of the air.	Temp. of specimen at time specific gravity was taken.	Specific gravity.	Specific gravity reduced to 60° F.	Specific gravity reduced to 15° C.
						°	'	"					
1893.													
Aug. 23	12 p. m.		53 46 00	171 35 00	Surface	47	40	63	1.0244	1.024811	1.023991		
24	6 a. m.		53 47 00	171 07 00	do	47	48	63	1.0244	1.024811	1.023991		
24	12 m.		53 48 00	170 42 00	do	47	49	63	1.0245	1.024711	1.023891		
24	6 p. m.		53 52 00	169 38 00	do	48	49	63	1.0244	1.024811	1.023991		
24	12 p. m.		53 55 00	168 40 00	do	47	49	63	1.0244	1.024811	1.023991		
25	6 a. m.		54 06 00	167 32 00	do	45	46	63	1.0242	1.024611	1.023791		
25	12 m.		54 00 00	166 34 00	do	45	48	63	1.0244	1.024811	1.023991		
31	12 m.	Akutani Bay.			do	47	54	63	1.0245	1.024711	1.023891		
31	6 p. m.	Akun Cove			do	47	55	63	1.0244	1.024811	1.023991		
Sept. 1	12 m.		55 00 00	166 10 00	do	49	53	63	1.0242	1.024611	1.023791		
1	6 p. m.		55 20 00	167 18 00	do	48	50	63	1.0238	1.024211	1.023391		
2	12 m.		56 40 00	170 18 00	do	46	47	63	1.0238	1.024211	1.023391		
2	12 p. m.	SW. Bay, St. Paul Island.			do	44	46	63	1.0238	1.024211	1.023391		
3	6 a. m.	Off Otter Island.			do	45	46	63	1.0238	1.024211	1.023391		
3	12 m.		56 48 00	169 26 00	do	45	47	63	1.0236	1.024011	1.023191		
3	6 p. m.		56 10 00	168 40 00	do	46	47	63	1.0238	1.024211	1.023391		
3	12 p. m.		55 38 00	167 45 00	do	45	46	63	1.0240	1.024411	1.023591		
4	6 a. m.		54 45 00	167 12 00	do	47	49	63	1.0240	1.024411	1.023591		
4	12 m.		54 00 00	166 33 00	do	46	50	63	1.0240	1.024411	1.023591		
5	12 m.	Dutch Harbor			do	47	53	63	1.0238	1.024211	1.023391		
8	12 m.		54 18 00	165 30 00	do	46	57	63	1.0242	1.024611	1.023791		
9	12 m.		54 37 00	163 16 00	do	47	53	63	1.0238	1.024211	1.023391		
9	6 p. m.	Off Deer Island.			do	49	51	63	1.0232	1.023611	1.022791		
10	12 m.	Bailey Harbor			do	50	52	63	1.0180	1.018411	1.017591		
11	12 m.		55 20 00	161 01 00	do	49	52	63	1.0230	1.023411	1.022591		
11	6 p. m.	Portage Bay			do	50	51	63	1.0216	1.022011	1.021191		
12	6 p. m.	Unga Strait			do	50	51	63	1.0230	1.023411	1.022591		
13	12 m.		55 37 00	155 38 00	do	49	52	63	1.0238	1.024211	1.023391		
13	6 p. m.		56 04 00	154 45 00	do	49	50	63	1.0240	1.024411	1.023591		
13	12 p. m.		56 30 00	153 43 00	do	47	48	63	1.0240	1.024411	1.023591		
14	6 a. m.		56 55 00	152 37 00	do	47	48	63	1.0240	1.024411	1.023591		
14	12 m.		57 20 00	150 57 00	do	46	47	63	1.0242	1.024611	1.023791		
14	6 p. m.		57 18 00	150 12 00	do	47	48	63	1.0242	1.024611	1.023791		
14	12 p. m.		57 16 00	148 40 00	do	47	49	63	1.0240	1.024411	1.023591		
15	6 a. m.		57 16 30	147 10 00	do	51	53	63	1.0242	1.024611	1.023791		
15	12 m.		57 15 00	146 05 00	do	51	56	63	1.0242	1.024611	1.023791		
15	6 p. m.		57 10 00	144 42 00	do	51	55	63	1.0242	1.024611	1.023791		
15	12 p. m.		57 08 00	143 18 00	do	51	53	63	1.0240	1.024411	1.023591		
16	6 a. m.		57 07 00	142 10 00	do	51	53	63	1.0242	1.024611	1.023791		
16	12 m.		57 11 00	140 49 00	do	51	58	63	1.0240	1.024411	1.023591		
16	6 p. m.		57 08 00	139 05 00	do	54	57	63	1.0240	1.024411	1.023591		
16	12 p. m.		57 02 00	137 20 00	do	52	54	63	1.0240	1.024411	1.023591		
17	6 a. m.	Sitka Sound			do	52	54	63	1.0240	1.024411	1.023591		
18	12 m.	Sitka Harbor			do	52	64	69	1.0180	1.019887	1.019067		
18	12 m.		54 18 00	133 55 00	do	53	57	69	1.0234	1.024687	1.023867		
19	6 p. m.		53 42 00	133 22 00	do	55	67	69	1.0236	1.024887	1.024067		
19	12 p. m.		52 58 00	132 40 00	do	53	57	69	1.0236	1.024887	1.024067		
20	6 a. m.		52 16 00	131 58 00	do	53	56	69	1.0236	1.024887	1.024067		
20	12 m.		51 37 00	131 03 00	do	55	60	69	1.0232	1.024487	1.023667		
20	6 p. m.		51 28 00	130 12 00	do	64	60	69	1.0232	1.024487	1.023667		
20	12 p. m.		51 15 00	129 15 00	do	53	55	69	1.0230	1.024287	1.023467		
21	6 a. m.		51 03 00	128 11 00	do	48	48	69	1.0228	1.024087	1.023267		
21	12 m.	Johnston Strait			do	50	50	69	1.0218	1.023087	1.022267		
21	6 p. m.	Seymour Narrows			do	50	55	69	1.0212	1.022487	1.021667		
21	12 p. m.	Oyster Bay, B. C.			do	51	60	69	1.0192	1.020487	1.019667		
22	6 a. m.	Bayne Sound			do	54	53	69	1.0192	1.020487	1.019667		
23	12 m.	Gulf of Georgia			do	56	61	69	1.0190	1.020287	1.019467		
23	6 p. m.	Active Pass			do	58	62	69	1.0102	1.011187	1.010367		
26	12 m.	Off Race Rocks			do	52	54	69	1.0224	1.023687	1.022867		
27	12 m.		46 04 00	124 58 00	do	56	50	69	1.0196	1.019887	1.019067		
28	12 m.		42 30 00	124 39 00	do	52	57	69	1.0240	1.025287	1.024467		
29	12 m.		39 11 00	124 03 00	do	53	56	69	1.0240	1.025287	1.024467		

Record of temperatures and specific gravities.

Date.	Time of day.	Station.	Lat. N.		Long. W.		Depth.	Temperature by attached thermometer.	Temperature of the air.	Temp. of specimen at time specific gravity was taken.	Specific gravity.	Specific gravity reduced to 15°C.
			°	'	°	'						
1894.												
May							<i>Fms.</i>					
19	12 m		50 57 00		128 47 00		Surface	47	51	64	1.0232	1.022928
	6 p. m.		51 15 00		129 55 00		do	49	51	63	1.0236	1.023228
	12 p. m.		51 30 00		130 42 00		do	47 48	62	62	1.023650	1.023650
	6 a. m.		51 40 00		131 40 00		do	48 52	62	62	1.0244	1.023850
	12 m		51 54 00		133 39 00		do	49 50	62	62	1.0244	1.023850
	6 p. m.		52 15 00		134 50 00		do	49 52	62	62	1.0244	1.023850
	12 p. m.		52 32 00		136 00 00		do	47 51	62	62	1.0244	1.023850
	6 a. m.		52 46 00		137 05 00		do	46 48	62	62	1.0245	1.023950
	12 m		53 07 00		138 24 00		do	44 48	62	62	1.0245	1.024050
	6 p. m.		53 15 00		139 45 00		do	44 49	62	62	1.0240	1.024050
	12 p. m.		53 20 00		141 00 00		do	43 46	62	62	1.0246	1.024050
	6 a. m.		53 28 00		143 40 00		do	44 46	62	62	1.0244	1.023850
	12 m		53 37 00		144 10 00		do	42 48	62	62	1.0244	1.023850
	6 p. m.		53 43 00		145 30 00		do	42 48	62	62	1.0244	1.023850
	12 p. m.		53 50 00		147 00 00		do	40 44	62	62	1.0244	1.023850
	6 a. m.		53 56 00		148 25 00		do	39 42	62	62	1.0244	1.023850
	12 m		54 07 00		149 59 00		do	38 42	62	62	1.0240	1.024050
	6 p. m.		54 16 00		151 55 00		do	38 42	62	62	1.0246	1.024050
	12 p. m.		54 20 00		153 20 00		do	38 42	62	62	1.0246	1.024050
	6 a. m.		54 28 00		155 05 00		do	38 40	62	62	1.0246	1.024050
	12 m		54 30 00		156 49 00		do	38 41	62	62	1.0246	1.024050
	6 p. m.		54 32 00		157 55 00		do	39 43	62	62	1.0246	1.024050
	12 p. m.		54 35 00		159 10 00		do	38 41	62	62	1.0244	1.023850
	6 a. m.		54 18 00		160 25 00		do	38 40	62	62	1.0244	1.023850
	12 m		53 67 00		161 48 00		do	38 43	62	62	1.0242	1.023650
	6 p. m.		53 48 00		163 10 00		do	37 38	62	62	1.0242	1.023650
	6 a. m.	Unimak Pass					do	36 37	62	62	1.0236	1.023050
	3 p. m.	Dutch Harbor					do	39 40	62	62	1.0236	1.023050
	12 m		54 03 00		167 54 00		do	38 40	62	62	1.0242	1.023650
June	1		53 44 00		174 24 00		do	39 40	62	62	1.0244	1.023850
	3	East	53 20 00		178 45 00		do	41 48	62	62	1.0244	1.023850
	5	8 a. m.	Atka Island				do	41 44	58	58	1.0252	1.024140
	5	6 p. m.	Agattu Island				do	40 44	58	58	1.0252	1.024140
	8	12 m	Kyska Island				do	40 44	58	58	1.0252	1.024140
	9	12 m	East	52 07 00	177 43 00		do	40 42	58	58	1.0253	1.024240
	9	6 p. m.	do	52 15 00	179 10 00		do	40 42	58	58	1.0253	1.024240
	9	12 p. m.	West	52 20 00	179 35 00		do	39 41	58	58	1.0254	1.024340
	10	6 a. m.	do	52 23 00	178 20 00		do	40 43	58	58	1.0254	1.024340
	10	12 m	Atka Island				do	41 44	58	58	1.0254	1.024340
	11	6 p. m.	53 20 00		169 38 00		do	39 41	58	58	1.0252	1.024140
	14	12 m	Chernofski Harbor				do	39 43	58	58	1.0210	1.019940
	15	6 p. m.	53 27 00		168 14 00		do	38 41	58	58	1.0252	1.024140
	16	12 m	52 57 00		171 55 00		do	39 41	58	58	1.0254	1.024340
	17	9 a. m.	Amliia Island				do	39 40	58	58	1.0254	1.024340
	22	8 p. m.	St. George Island				do	37 39	58	58	1.0246	1.023540
	23	12 m	St. Paul Island				do	38 44	58	58	1.0244	1.023340
	24	12 m	57 34 00		167 58 00		do	36 39	58	58	1.0244	1.023340
	24	6 p. m.	56 48 00		167 50 00		do	38 41	58	58	1.0242	1.023140
	24	12 p. m.	56 10 00		167 40 00		do	38 39	58	58	1.0242	1.023140
	25	6 a. m.	55 50 00		167 00 00		do	39 40	58	58	1.0242	1.023140
	25	12 m	56 12 00		165 45 00		do	39 41	58	58	1.0240	1.022940
	25	6 p. m.	56 05 00		164 40 00		do	38 40	58	58	1.0240	1.022940
	25	12 p. m.	55 45 00		163 50 00		do	38 40	58	58	1.0240	1.022940
	26	6 a. m.	55 30 00		164 18 00		do	38 41	58	58	1.0240	1.022940
	26	12 m	55 33 00		163 23 00		do	40 41	58	58	1.0240	1.022940
	26	4 p. m.	55 08 00		163 30 00		do	40 43	58	58	1.0240	1.022940
	26	4 p. m.	55 08 00		163 30 00		Bottom, 9 fms.	40	43	58	1.0240	1.022940
	26	12 p. m.	56 10 00		162 03 00		Surface	38	41	58	1.0240	1.022940
	27	6 a. m.	56 17 00		160 50 00		do	37 40	58	58	1.0240	1.022940
	27	12 m	56 31 00		159 48 00		do	40 43	58	58	1.0242	1.023140
	27	6 p. m.	56 54 00		158 45 00		do	39 41	58	58	1.0242	1.023140
	27	12 p. m.	57 20 00		159 55 00		do	35 37	58	58	1.0242	1.023140
	27	6 a. m.	57 05 00		159 40 00		do	35 36	58	58	1.0242	1.023140
	28	12 m	56 38 00		160 35 00		do	36 37	58	58	1.0242	1.023140
	28	6 p. m.	56 55 00		161 45 00		do	40 39	58	58	1.0242	1.023140
	28	12 p. m.	57 18 00		163 20 00		do	37 38	58	58	1.0240	1.022940
	29	6 a. m.	57 38 00		164 50 00		do	38 38	58	58	1.0240	1.022940
	29	12 m	57 56 00		166 10 00		do	38 39	58	58	1.0238	1.022740
	29	6 p. m.	58 15 00		164 45 00		do	37 40	58	58	1.0238	1.022740
	29	12 p. m.	58 18 00		163 35 00		do	38 37	58	58	1.0238	1.022540
	30	6 a. m.	57 40 00		163 25 00		do	40 42	58	58	1.0234	1.022340
	30	12 m	56 60 00		163 02 00		do	40 43	58	58	1.0234	1.022340
	30	6 p. m.	56 58 00		164 20 00		do	40 43	58	58	1.0234	1.022340
	30	12 p. m.	56 55 00		165 40 00		do	38	38	58	1.0236	1.022540

Record of animal life, driftwood, kelp,

FROM DUTCH HARBOR, UNALASKA ISLAND, FOR

Date.	Meridian positions.		Mean temperatures.		Seals	Whales.	Little auks.	Cor-morants.	Ducks.
	Latitude north.	Longitude west.	Air.	Water surface.					
1893.	° ' "	° ' "	°	°					
July 1	51 32 00	175 52 00	44	44					
2	Bay of Waterfalls, Adak Island.		52	47					

FROM BAY OF WATERFALLS, ADAK ISLAND,

July 5	51 23 00	176 49 00	49	45					
6	51 09 00	176 19 00	50	47					Few
7	50 21 00	174 02 00	51	49		Two			
8	52 06 00	171 45 00	47	44		Many kill- era.			
9	55 00 00	170 10 00	47	45	Three	Two			
10	St. Paul Island, Pribilofs.		45	41	Many		Great many.		

FROM ST. PAUL ISLAND, ON CRUISE IN BERING

July 11	St. George Island, Pribilofs.		45	41	Many		Great many.		
12	57 17 00	171 10 00	43	43	Nine	One			
13	56 56 00	173 40 00	44	44	Fifteen	Fourteen			
14	56 34 00	171 18 00	47	45	Twenty		Several		
15	St. George Island, Pribilofs.		46	42	Many	One	Great many.		

FROM ST. GEORGE ISLAND TO DUTCH HARBOR,

July 16	East anchorage, St. Paul Island, Pribilofs.		45	42	Many		Great many.		
17	56 02 00	169 30 00	49	44	Six	One	Great many.		
18	54 34 00	167 14 00	55	48	One	One			
19	Dutch Harbor, Unalaska Island.		56	40					

FROM DUTCH HARBOR, UNALASKA

July 26	55 33 00	168 05 00	47	44	One				
27	East anchorage, St. Paul Island, Pribilofs.		46	43	Many		Great many.	Few	
28	57 05 00	170 04 00	49	43	Two		Great many.		
29	57 41 00	104 58 00	46	42	Two				
30	58 12 00	167 29 00	44	42	One				
31	57 01 00	169 44 00	50	44	Three		Great many.		
Aug. 1	57 30 00	169 33 00	46	43	One	One		Two	
2	60 03 00	167 55 00	41	42					
3	59 58 00	171 17 00	43	42					One
4	57 48 00	170 04 00	45	43	One		Many	Few	
5	57 53 00	171 28 00	48	44	Three				
6	59 54 00	174 18 00	48	44	Sixteen				
7	57 57 00	175 19 00	47	45	One				

*etc., observed from deck of Albatross at sea.*

BAY OF WATERFALLS, ADAK ISLAND, ALASKA.

Gulls.	Gonies.	Guillemots.	Petrels.	Puffins.	Terns.	Driftwood.	Kelp.	Remarks.
One....	Many....	Many....	.....	Many....	.....	Much....	Much....	Many whitegonies. Driftwood on the beaches.

TO ST. PAUL, PRIBILOF ISLANDS, BERING SEA.

.....	Several.	Few.....	.....	Several.	.....	.....	.....	Many seals close to rookeries.
.....	Several.	.....	.....	Many.	.....	.....	.....	
.....	Few.	.....	Few.	Few.	.....	.....	Much....	
Several.	Throo (white).	Great many.	Several.	Great many.	Few....	.....	Much....	

SEA, AND TO ST. GEORGE ISLAND, PRIBILOFS.

Many....	.....	Great many.	Several.	Many....	Few....	.....	.....	Many seals close to rookeries.
Several.	Few....	Many....	Many....	Many....	.....	.....	.....	
Several.	Several.	Great many.	Several.	Many....	Several.	.....	.....	Flock of Aleutian sandpipers.
Several.	Few....	Great many.	Many....	Many....	Several.	.....	.....	

UNALASKA ISLAND, VIA ST. PAUL ISLAND.

Many....	.....	Great many.	Few....	Many....	Many....	.....	.....	Many seals near rookeries.
Many....	.....	Great many.	Many....	Great many.	Many....	.....	.....	
Many....	.....	Many....	Many....	Few....	Many....	.....	Little..	

ISLAND, ON CRUISE IN BERING SEA.

Few....	One....	Many....	Few....	Few....	.....	.....	.....	Many seals near rookeries. Few snipe.
.....	.....	Great many.	Many....	Many....	Many....	.....	.....	
Few....	.....	Great many.	Few....	Several.	.....	.....	.....	Large flock of whale birds.
Few....	.....	Several.	Few....	.....	.....	.....	.....	
Several.	.....	Many....	Several.	Several.	.....	.....	.....	One snipe near Nunivak Island. Few snipe near St. Matthew Island.
Many.	.....	Great many.	Many....	Many....	.....	.....	.....	
Many.	.....	Great many.	Many....	Many....	.....	.....	.....	Observed many varieties of petrels.
Several.	One....	Several.	Several.	.....	.....	.....	.....	
Several.	.....	Many....	Many....	Several.	.....	.....	.....	
Many.	.....	Many....	Many....	Many....	Several.	.....	.....	
Many.	.....	Many....	Many....	Few....	.....	.....	.....	
Few....	.....	Many....	Several.	Many....	Few....	.....	.....	
Many.	.....	Many....	Several.	.....	.....	.....	.....	

Record of animal life, driftwood, kelp, etc.,

FROM DUTCH HARBOR, UNALASKA ISLAND,

Date.	Meridian positions.		Mean temperatures.		Seals.	Whales.	Little auks.	Cormorants.	Ducks.
	Latitude north.	Longitude west.	Air.	Water surface.					
1893.			°	'					
Aug. 8	57 07 00	170 22 00	46	44	Five	Many	Many	Few	Few
9	56 39 00	168 13 00	47	44					
10	55 56 00	163 38 00	51	46		One			
11	54 29 00	165 42 00	53	47	One	Gr o n t many.		Few	
12	Dutch Harbor, Unalaska Island.		55	50					
16	53 58 00	166 33 00	51	46		Many kill-ers.		Several	Few
17	53 51 00	168 00 00	48	46				Few	Few
18	56 19 00	169 32 00	47	45					
19	56 31 00	173 45 00	47	46	Two				Several
20	55 08 00	175 56 00	52	48	Three				
21	55 47 00	172 41 00	50	47	Eight	Many			
22	55 09 00	171 39 00	49	47	Seven	Many			
23	53 42 00	172 44 00	49	47					
24	54 02 00	170 23 00	48	47	One				
25	54 00 00	166 34 00	48	45	One				
26	Dutch Harbor, Unalaska Island.		49	46					
31	54 13 00	165 42 00	52	46		Many	Many	Several	Few
Sept. 1	55 00 00	166 10 00	51	47		Several			
2	56 40 00	170 18 00	48	46	Many	Three			
3	56 48 00	169 23 00	47	45	Many				
4	54 00 00	166 33 00	48	46					
5	Dutch Harbor, Unalaska Island.		50	45					



Record of animal life, driftwood, kelp, etc.,

FROM DUTCH HARBOR, UNALASKA

Date.	Meridian positions.		Mean temperatures.		Seals.	Whales.	Little auks.	Cor-morants.	Ducks.
	Latitude north.	Longitude west.	Air.	Water surface.					
1893. Sept. 8	54 18 00	165 39 00	53	46	.....	One.....	.....	.....	Few.....
9	54 37 00	163 16 00	51	47	.....	.....	.....	Few.....	.....
10	Bailey Harbor, Alaska Peninsula	161 01 00	54	51	.....	Four.....	.....	Many.....	.....
11	55 20 00	161 01 00	51	48	.....	Two.....	.....	.....	.....
12	Portage Bay, Alaska Peninsula.	155 38 00	50	50	.....	.....	.....	Many.....	Several...
13	55 37 00	155 38 00	50	48	.....	Several ..	.....	.....	.....
14	57 20 00	150 57 00	48	47	.....	Several ..	.....	.....	.....
15	57 15 00	140 05 00	55	50	.....	.....	.....	.....	.....
16	57 11 00	140 49 00	56	53	.....	.....	.....	.....	.....
Sept. 17	Sitka Harbor, SE. Alaska.		53	52	.....	Two.....	.....	.....	.....

FROM SITKA, SOUTHEAST ALASKA, TO

Sept. 18	Sitka Harbor, SE. Alaska.		56	51	.....	.....	.....	.....	.....
19	54 18 00	133 55 00	60	53	.....	Two.....	.....	.....	.....
20	51 37 00	131 03 00	59	55	.....	Many.....	.....	.....	Many.....
21	50 29 00	126 15 00	54	49	.....	.....	.....	.....	Many.....
22	Union Bay, Baynes Sound, British Columbia.		54	54	.....	.....	.....	.....	.....
23	49 23 00	124 18 00	61	54	.....	.....	.....	.....	.....
24	Port Townsend, Wash.		61	51	.....	.....	.....	.....	.....

FROM PORT TOWNSEND, WASH., TO

Sept. 26	48 10 00	123 20 00	54	51	.....	.....	.....	.....	.....
27	46 04 00	124 58 21	57	55	.....	Many.....	.....	.....	.....
28	42 39 00	124 39 30	56	54	.....	One.....	.....	.....	.....
29	39 11 00	124 03 00	61	53	.....	.....	.....	.....	.....
30	Raccoon Straits, San Francisco Bay.		64	58	.....	.....	.....	.....	.....
Oct. 1	Navy-Yard, Mare Island, Cal.		68	62	.....	.....	.....	.....	.....



observed from deck of Albatross at sea—Continued.

ISLAND, TO SITKA, SOUTHEAST ALASKA.

Gulls.	Gonies.	Guillemots.	Petrels.	Puffins.	Terns.	Drift-wood.	Kelp.	Remarks.
Few		Several	Many	Several			Much	Small school of porpoises in Akun Cove; also few snipe and geese. One white gony.
Many	Several	Many	Many	Many	Many		Much	
Several			Several		Few			Few geese at Portage Bay. Large flock of whale birds in company with school of whales.
Many					Many			
Several	Few		Many					
Few			Many			Some	Much	
		Few	Several					
		Few	Several					
		Few	Several	Few				

PORT TOWNSEND, WASH.

Several	Few					Little	Little	Several geese in Sitka Harbor.
Several	Several			Many	Few	Little	Much	
Several	Many	One		Many		Little	Much	Land hawk perched in rigging. Porpoise in Seymour Narrows.
Many	Several					Much	Little	
Many	Many					Much		
Several	Many					Much	Much	

NAVY-YARD, MARE ISLAND, CAL.

	Few					Some	Little	Several blackfish and sharks.
	Many	Several	Many			Large log.	Little	
	Few	Few		Few				
	Few	Few		Few				

*Record of animal life, driftwood,*  
FROM PORT TOWNSEND, WASH., TO DUTCH

Date.	Meridian position.		Mean tem- peratures.		Seals.	Whales.	Auks.	Cormo- rants.	Ducks.
	Lat. N.	Long. W.	Air D. B.	Sea surf.					
1894.	° ' "	° ' "							
May 17	48 55 00	123 20 00	53	50				Few	
18	49 44 30	124 48 00	57	53				Several	Several
19	50 57 00	128 47 00	50	47				Several	Several
20	51 54 00	133 30 00	50	48		Four.			
21	53 07 00	138 24 00	48	45		One.			
22	53 37 00	144 10 00	46	41					
23	54 07 00	149 59 00	41	39					
24	54 30 00	156 49 00	41	38	One.	One.			
25	53 57 00	161 48 00	40	37		Largeschl	Many		
26	54 08 00	166 11 00	38	37		Several	Many	Few	
27	Dutch Harbor.		40	38					

## FROM DUTCH HARBOR, UNALASKA, TO CHICHAGOF HARBOR,

May 31	54 03 00	167 54 00	39	37					Several
June 1	53 44 00	174 24 00	40	38					
2, 3	53 20 00	178 45 00	44	39					
4	Chichagof Harbor, Attu Island.		42	42				Several	Many
5	52 37 00	173 45 00	41	39			Many	Several	Many
6	52 39 00	173 44 00	43	39			Many	Several	Many
7	52 19 00	177 30 00	41	39		Many fin- backs.			Few
8	Kiska Harbor, Kiska Island.		42	40				Few	Few
9	52 07 00	177 43 00	42	39				Few	
9	52 25 00	177 15 00	42	40		Many	Many	Few	
10	Nazan Bay, Atka Island.		43	40		One	Many	Few	Few
11	53 20 00	169 38 00	41	39		Two	Many		
12	Dutch Harbor.		47	40					

## FROM DUTCH HARBOR, UNALASKA, TO NAZAN BAY,

June 13	53 57 00	166 31 00	50	41					
14	53 55 00	167 05 00	42	39		Two		Few	
15	53 27 00	168 14 00	41	39			Many		
16	52 59 00	171 55 00	40	39		Many			
17	52 11 00	173 03 00	41	39		Many	Many	Few	Several
18	54 10 00	167 56 00	44	41					
19	Dutch Harbor.		47	43					

## FROM DUTCH HARBOR, UNALASKA, ON CRUISE IN EASTERN

June 22	55 40 00	168 35 00	40	38				Grt. many	
23	Village Cove, St. Paul Island.		41	37				Grt. many	
24	57 34 00	167 58 00	39	37				Many	
25	56 12 00	165 45 00	40	38		Two			
26	55 33 00	163 23 00	41	39				Few	
27	56 31 00	159 48 00	40	38					Grt. many
28	56 38 00	160 39 00	37	37	Two	Several			
29	57 56 00	166 16 00	41	37	Two	Five			
30	56 59 00	163 02 00	40	39					

kelp, etc., observed at sea—Continued.

HARBOR, UNALASKA ISLAND, ALASKA.

Gulls.	Gonies.	Guillemots.	Petrels.	Puffins.	Terns.	Drift-wood.	Kelp.	Remarks.
Few					Many	Much	Much	Immense flocks of sea fowl following whales and feeding on surface life. Four hawks.
Few					Many	Much	Much	
Many			Few		Many	Much	Much	
Many			Many	Many	Many			
Few			Few					
	Few		Few					
	Several		Several	One				
Few	Several	Several	Several	Few				
Several	Several	Several	Many	Several				
Many	Few	Many	Many	Many	Few		Little	
Few								

ATTU ISLAND, AND RETURN TO DUTCH HARBOR.

Many		Many	Many	Many			Little	Few porpoises.
Many		Many	Many	Few	Few			
Several	1 white	Many	Many	Many				Several species of petrels.
Many	Several	Many	Many	Many			Much	Many jiggers; many geese.
Many		Many	Few	Many			Much	Several jiggers; many geese.
Many		Many	Few	Many			Much	Do.
Many		Several	Several	Many			Much	Few snipe.
Few							Little	
Several	1 white	Several	Several				Little	
Few	Few	Many	Many	Many			Much	Immense flocks of sea fowl following large school of whales, feeding on surface.
Several			Many	Many			Much	Many geese.
Few	Few	Many	Many	Many			Much	
Several		Several		Few			Little	

ATKA ISLAND, AND RETURN TO DUTCH HARBOR.

Few	Few	Many	Several				Little	Several porpoises.
Few		Many	Several	Several			Much	
Few	2 white	Many	Many	Many			Much	
Few	2 white	Many	Several	Several			Much	
Several	1 white	Many	Several	Many			Little	
Several	2 white	Many	Several	Several			Little	

PORTION OF BERING SEA, AND RETURN TO DUTCH HARBOR.

Many	Several	Grt. many	Many		Several		Some	Several species of petrels.
Many		Grt. many	Many	Many	Several		Little	
Several		Many	Many	Many	Several			
		Several	Several					
Many	Many	Many	Many		Many			} Great many geese. } Much floating ice.
Few		Grt. many	Few		Few			
One		Several	Several					
		Few		Few				

Meteorological and cruising record, and seal data.

Date.	Meridian position.		Distance run per log.	Barometer.		Temperature.				State of the weather.	Force and direction of winds.	Rain-fall.	State of sea.	Currents.	Force in knots per hour.	Number of hours sailing weather.	Number of fur seals seen.			
	Lat. N.	Long. W.		Max.	Min.	Air.		Water at surface.												
						Dry bulb.	Wet bulb.													
									Max.									Min.		
1893.																				
July 1	51 32 00	175 52 00	261.0	30.08	29.96	48	41	47	40	49	40	Overcast and foggy; thick.	NW, 2	None.	Smooth	N. 3° W.	0.5	15	0	
2	Bay of Waterfalls, Adak Island.		59.8	29.88	29.78	60	44	58	43	49	45	Clear and pleasant	NE., hauling to NW, 2 to 3.	None.					0	
3	do		30.02	29.84	29.74	53	45	52	44	47	44	Foggy and misty; clearing at times.	NNW, 5; N., 3; W., 2.	Light					0	
4	do		30.23	30.03	29.92	52	46	50	45	48	44	Overcast and foggy; clear at times.	NW, 2, hauling to SSE, 2.	None.					0	
5	51 23 00	176 49 00	19.1	30.29	30.22	52	46	51	45	47	44	Thick and foggy; misty at times.	SE. and NNE., 2.	Light mist.	Smooth			9	0	
6	51 09 00	176 19 00	79.4	30.26	29.97	52	48	51	47	50	44	Cloudy and misty	E'd, 3 to 5.	Moderate mist.	Smooth to moderate.	N. 82° W.	0.15	10	0	
7	50 31 00	174 02 00	144.6	30.12	29.97	53	49	52	48	50	46	Cloudy; misty at times.	NNE., 4-2.	Light mist.	Moderating.	S. 80° W.	1.0	12	0	
8	52 06 00	171 45 00	120.1	30.11	30.06	50	45	49	49	49	40	Foggy, misty, and rainy; wet.	NNW. to W. to NW, 2.	Moderate.	Smooth	S. 54° W.	0.3	17	0	
9	55 06 00	170 10 00	199.7	30.08	29.71	49	45	48	44	48	42	Misty, drizzly, and stormy.	NW. to W., 2-4; WSW., 4-8.	Moderate.	Moderate to rough.	S. 83° E.	0.4	8	3	
10	St. Paul Island, Pribilofs.		137.5	29.88	29.70	46	44	45	43	43	40	Stormy to thick, misty and rainy.	SSW., 9; SW., 3.	Moderate.	Rough to moderating.				0	Many.
11	St. George Island, Pribilofs.		43.2	30.12	29.86	48	42	47	41	43	40	Wet and disagreeable, rainy and foggy.	SSW., 3.	Moderate.	Gentle to smooth.	West	0.5	18	Many.	
12	57 17 00	171 10 00	107.7	30.22	30.12	44	42	43	41	44	42	Overcast and cloudy to foggy.	S'd and W'd, 4-3	None.	Gentle to smooth.	S. 81° W.	0.25	20	9	
13	56 56 00	173 40 00	123.0	30.18	29.86	47	42	46	41	46	43	Overcast, misty, and rainy.	SE., 1; E'd, 4	Moderate.	Smooth to moderate.	N. 62° E.	0.2	14	15	
14	56 34 00	171 18 00	120.5	30.30	29.82	50	44	49	43	46	44	Rainy and overcast to cloudy.	ENE., 5; NNE., 4; N., 3.	Light.	Moderate to smooth.	N. 83° W.	0.7	0	20	
15	St. George Island, Pribilofs.		61.9	30.40	30.31	50	43	47	42	44	40	Fair and pleasant	N'd and W'd to S'd and W'd, 3-2	None.	Smooth			20	Many.	
16	East anchorage, St. Paul Island.		38.7	30.38	30.20	47	44	47	43	44	41	Fair and pleasant to overcast and rainy.	WSW., 3; SSW., 2.	Moderate.	Smooth			16	Many.	

17	56 02 00	169 30 00	87.7	30.25	30.20	52	40	50	45	47	42	Overcast and foggy...	SW, 3; squalls (9 to 11 p. m.), 6.	None.	Smooth to increasing.		16	6	
18	54 34 00	167 14 00	130.4	30.18	30.01	60	50	58	49	50	47	Cloudy and boisterous to overcast and rainy.	S'd, 8	Moderate.	Moderate to rough; choppy.	X. 11° E.	0.9	0	1
19	Dutch Harbor, Unalaska Island.		51.2	30.10	29.90	63	50	61	47	51	48	Fair and pleasant	SE., 3; S. by W., 4; squalls, 6.	None.	Smooth				
20	do		30.12	30.08	29.88	58	49	54	47	51	47	do	S. by W., 3; (mid. and p. m. watches) squalls, 6.	None.					
21	do		30.14	30.08	29.57	50	56	49	52	48	48	do	SSW, 2; SW, 1.	None.					
22	do		30.13	30.07	29.54	50	52	49	51	49	49	Cloudy; partially clear in forenoon.	S., 1; NW, and N., 1.	None.					
23	do		30.16	30.06	29.58	49	57	48	52	49	49	Foggy to fair and pleasant.	Variable, 1; calm; SSE, 3.	None.					
24	do		30.05	29.88	29.70	57	69	55	53	52	52	Cloudy and rainy	Calm; S'd, 1; calm	Moderate.					
25	do		29.96	29.81	29.68	47	66	45	54	43	43	Fair and pleasant; windy.	S., 4; squalls, 0; SW, 6.	None.	Moderate		0	0	
26	55 33 00	168 05 00	125.6	30.09	29.60	48	46	47	45	46	43	Overcast and stormy; heavy rain middle and first watches.	S'd and W'd, 7-4	Moderate.	Rough to moderate.	S. 73° E.	0.7	0	1
27	East anchorage, St. Paul Island.		130.2	29.86	29.66	48	45	47	44	44	42	Overcast and foggy; drizzly at times.	SW, 4 till noon; NW, 5-7.	Light	Moderate		0	Many.	
28	57 05 00	170 04 00	9.1	29.99	29.86	54	44	53	45	45	42	Fair and pleasant	NW, and WNW, 3.	None.	Smooth	None	10	3	
29	57 41 00	164 58 00	171.3	30.00	29.76	50	43	49	41	43	41	Overcast and misty to fair and pleasant.	NW, 3; NNW, 3; SE., 3.	Light mist.	Smooth	N. 13° E.	0.2	16	2
30	58 12 00	167 29 00	160.0	29.71	29.24	40	42	45	41	43	41	Overcast and stormy; driving mist.	E'd, 9; SE., 6	Heavy mist.	Rough		0	1	
*31	57 01 00	169 44 00	112.8	29.57	29.21	58	45	55	44	46	42	Misty and rainy; thick.	S'd and E'd, 4-3	Moderate.	Rough to moderating.	S. 58° E.	0.7	0	3
Aug. 1	57 20 00	169 33 00	61.2	30.00	29.58	49	43	47	42	45	42	Fair generally; foggy 4 to 9 p. m.	NE'd, 4-6; N'd to NW, 3-4.	None.	Moderate	South	0.04	8	1
2	60 03 00	167 55 00	155.5	30.02	29.98	43	40	42	39	44	40	Overcast and misty	NW, to W	Moderate.	Moderate	S. 65° E.	0.4	4	0
3	59 58 00	171 17 00	157.8	30.05	29.85	45	41	44	40	44	41	Overcast to rainy	W, 3; S'd and E'd, 2-4.	Moderate.	Smooth	S. 47° W.	0.6	14	0
4	57 48 00	170 04 00	146.0	29.80	29.66	47	44	46	43	45	42	Overcast and rainy	SE., 4-6; SW'd, 4; SE., 4.	Moderate.	Moderate	N. 48° E.	0.6	4	1
5	57 53 00	171 28 00	96.1	29.66	29.50	50	46	49	45	45	43	Overcast, foggy, and misty.	SW, 3	Light mist.	Smooth; swell S'd and W'd.	None	0.08	6	Many.
6	59 54 00	174 18 00	154.9	29.49	29.34	52	44	50	43	46	43	do	Variable, 1; N'd, 3	Light mist.	Smooth	N. 70° E.	0.4	16	16
7	57 57 00	175 19 00	179.6	29.64	29.44	51	44	49	43	47	44	Cloudy, but pleasant	N'd, 4-5	None.	Moderate; long swell	N. 60° W.	0.3	13	1
8	57 07 00	170 22 00	182.2	29.78	29.63	48	44	46	43	45	43	Fair and pleasant to overcast and cloudy.	NNW, to WNW, 5-3	None.	Moderate to rough.	West	0.5	0	5

\* Distance steamed during month, 2,513.5 knots; days under way and steaming, 23.

Meteorological and cruising record, and seal data—Continued.

Date.	Meridian position.		Distance run per log.	Barometer.		Temperature.				State of the weather.	Force and direction of winds.	Rain-fall.	State of sea.	Currents.	Force in knots per hour, per 10 fathoms sailing weather.	Number of fur seals seen.			
	Lat. N.	Long. W.		Knots.	Max.	Min.	Air.		Water										
							Dry bulb.	Wet bulb.	at surface.										
						Min.	Max.	Min.	Max.										
1893.	0	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
Aug. 9	56 39 00	163 13 00	80.9	30.65	29.78	45	47	44	46	43	Fair and pleasant	SW, 2-3	None	Smooth	East	0.03	16	0	
10	55 56 00	163 38 00	181.0	30.09	29.74	55	48	53	47	45	do	SE, 3; SSE, 10	None	Smooth to moderate.	N, 1° W	0.3	14	0	
11	54 20 00	165 42 00	126.2	29.81	29.68	57	49	55	48	46	Overcast, foggy, and drizzly.	SE'd, 10-5, N, 1	Light	Moderate to smooth.	None	0.0	6	1	
12	Dutch Harbor, Unalaska Island.		50.0	29.84	29.37	61	49	60	48	48	Overcast and cloudy; fair midday.	Variable, 1; SE, 4 (squalls, 6)	None						
13	do			29.60	29.30	56	50	54	49	50	Clear and pleasant	S'd, 3	None						
14	do			29.86	29.62	57	51	54	48	50	do	S'd, 3; squalls, 6	None						
15	do			29.87	29.60	62	54	59	52	50	Fair and pleasant	SE, 3	None						
16	53 58 00	166 33 00	5.9	29.79	29.63	57	45	55	44	44	Fair to overcast and boisterous.	S'd, 2; SW, 6; S'd, 2	Light	Rough to moderate.		0	0	0	
17	53 51 00	168 00 00	105.1	29.76	29.70	49	47	48	46	45	Overcast and misty; fair at midday.	Variable, 1; W'd, 2 and 3	Light mist	Smooth swell S'd and W'd.	No account	13	0	0	
18	56 19 00	169 32 00	166.8	29.72	29.61	49	46	48	45	43	do	N'd and W'd, 3	Moderate mist	Smooth swell N'd and W'd.	S. 38° W	0.5	16	Many.	
19	56 31 00	173 45 00	168.1	29.82	29.66	48	46	47	45	45	Overcast and cloudy, but pleasant.	WNW, 4	None	Moderate	S. 24° E	0.4	12	2	
20	55 08 00	175 56 00	175.1	29.81	29.69	56	48	55	47	50	Drizzly to fair and pleasant.	N'd, 3	Light drizzle	Smooth	S. 9° W	0.2	16	3	
21	55 47 00	172 41 00	156.5	29.80	29.74	52	48	51	47	49	Clear and pleasant; sunny.	N'd and W'd, 4; W, 5	None	Swell from N'd; gentle.	S. 38° W	0.3	8	8	
22	55 09 00	171 39 00	164.2	29.81	29.12	50	46	49	47	49	Fair to stormy	SW, 3; E'd, 9	Light	Smooth to rough.	S. 17° E	0.1	14	7	
23	53 42 00	172 44 00	124.7	29.03	28.81	50	48	49	47	48	Stormy, driving mists.	ENE, 10; N'd, 5; NW'd, 9	Much mist	Rough	No account			0	
24	54 02 00	170 23 00	139.3	29.68	29.02	49	48	48	47	46	Stormy and squally; misty.	W'd, 8-9	Much mist	Rough	No account			0	
25	54 00 00	166 34 00	179.2	29.84	29.66	51	46	50	45	47	Overcast and boisterous; rainy.	W'd, 7-5; S'd, 3; N, 1	Moderate	Rough	S. 38° W	0.4	0	1	
26	Dutch Harbor, Unalaska Island.		8.5	29.93	29.74	52	47	50	46	47	Overcast and cloudy; rainy at midday.	W, 4-3	Light						

27	do	29.97	29.80	52	45	50	44	47	45	Fair and pleasant; showery at midday.	S. 2; NNE, 1	Light					
28	do	29.87	29.75	53	45	51	44	49	44	Cloudy, but pleasant.	Variable 1	None					
29	do	30.11	29.86	51	45	50	44	47	45	Fair to overcast and cloudy.	Calm; S'd, 2; E, 1; calm.	None					
30	do	30.30	30.12	55	46	53	45	49	45	Fair and pleasant.	Calm; N, 2	None					
* 31	54 13 00 165 42 00	45.5	30.28	30.22	55	49	53	48	47	Fair and pleasant; cloudy after sunset.	S. 2-3	Light	Smooth	No account	12	0	
Sept. 1	55 00 00 166 10 00	104.6	30.21	29.66	54	48	52	47	49	Misty; fair middle of day.	E., 4; NNE, 5	Much mist.	Moderate	N. 53° W.	0.3	0	0
2	56 40 00 170 18 00	191.8	29.77	29.64	50	46	48	45	48	Cloudy, but pleasant.	N. 5; NNE, 3	None	Moderate	S. 65° E.	0.4	0	Many.
3	56 48 00 169 26 00	75.0	29.77	29.68	49	45	48	44	46	Drizzly and rainy; disagreeable.	NE'd 4-5	Moderate.	Moderate	No account		8	Many.
4	54 00 00 166 33 00	216.5	30.40	29.73	50	47	49	46	47	Overcast to cloudy, but pleasant.	N'd, 4; WNW, 2	None	Moderate	N. 64° W.	0.5	0	0
5	Dutch Harbor, Unalaska Islands.	8.0	30.47	30.42	53	47	51	46	47	Fair and pleasant.	SW, 2 to 3; squalls, 5	None					
6	do	30.46	30.18	55	48	53	47	48	46	do	SW, 2; NE, 3	None					
7	do	30.13	29.92	61	51	59	49	49	46	Cloudy and blustery.	SW, 4; squalls, 5 and 6	Light					
8	54 18 00 165 39 00	48.0	30.24	30.08	57	50	55	48	47	Fair to overcast and rainy.	WSW, 6; SSW, 3	Moderate.	Moderate	No account		0	0
9	54 37 00 163 16 00	101.7	30.06	29.90	54	48	52	46	49	Rainy and foggy to fair to foggy.	WSW to SE, 2	Light	Smooth	No account	12	0	0
10	Bailey's Harbor, Alaska Peninsula.	61.9	29.32	29.32	58	51	57	50	55	Foggy to fair to overcast.	SSW, 2-1	None	Smooth	No account		4	0
11	55 20 00 161 01 00	52.6	29.80	29.64	53	50	52	48	50	Drizzly, foggy, and overcast.	SE, 2; SSE to S, 4-3	Light	Moderate	No account		0	0
12	Portage Bay, Alaska Peninsula.	26.0	29.88	29.62	53	48	51	46	51	Fair and pleasant.	S to SSW, 3; W, 4	None	Smooth	No account		4	0
13	55 37 00 155 38 00	193.9	30.07	29.90	53	48	50	47	49	do	N'd, 4-2	None	Longswell S'land F'd	Tidal	0.16	12	0
14	57 20 00 150 57 00	206.0	30.24	30.02	50	47	49	46	46	Rainy and misty.	N'd, 2-4	Moderate.	Moderate	West	6.3	0	0
15	57 15 00 146 05 00	178.4	30.45	30.26	61	50	60	49	54	Clear and pleasant.	N'd and W'd, 5	None	Rough to moderate.	S. 45° W.	1.2	0	0
16	57 11 00 140 49 00	171.0	30.41	30.17	60	53	58	51	56	do	WNW, 4; W, 3	None	Moderating.	N. 48° E.	0.1	6	0
17	Sitka, S. E. Alaska	174.0	30.15	29.98	59	48	57	47	55	do	N'd and W'd, 3; SW, 2	None	Smooth	N. 70° E.	0.3	6	0
18	do	3.6	30.24	30.10	65	48	64	47	54	do	N, 2; N'd and W'd, 4	None	Smooth	No account		3	0
19	54 18 00 133 55 00	187.5	30.10	29.92	67	54	64	53	55	do	WNW, 4	None	Moderate	Tidal	0.15	0	0
20	51 37 00 131 03 00	210.8	30.02	29.95	62	56	58	54	57	do	N'd, 4	None	Moderating.	N. 36° E.	0.2	10	0
21	50 29 00 126 15 00	207.1	30.20	30.04	63	45	61	44	53	do	S'd and E'd, 1; calm	None	Smooth	No account		0	0
22	Union Bay, Baynes Sound, B. C.	124.9	30.25	30.20	60	49	59	48	58	do	Calm generally	None	Smooth	No account			
23	49 23 00 124 18 00	27.8	30.25	30.16	71	53	68	52	59	do	Calm generally	None	Smooth	No account			
24	Port Townsend, Wash.	102.8	30.24	30.10	72	50	70	49	53	do	W'd, 1-2	None					

\* Distance steamed during month, 3,010.4 knots; days under way and steaming, 24.

## Meteorological and cruising record, and seal data—Continued.

Date.	Meridian position.		Distance run per log.	Barometer.		Temperature.						State of the weather.	Force and direction of winds.	Rein-fall.	State of sea.	Currents.	Force in knots per hour.	Number of hours sealing weather.	Number of fur seals seen.			
	Lat. N.	Long. W.		Max.	Min.	Air.		Water.		Dry bulb.	Wet bulb.									Max.	Min.	Max.
1893.	° ' "	° ' "	Knots.																			
Sept. 25	Port Townsend Wash.			30.19	30.06	76	52	73	51	54	50			Clear and pleasant	W'd, 2	None.						
26	48 10 00	123 20 00	27.0	30.29	30.20	55	53	54	51	52	50			Foggy to fair and pleasant.	Calm; SW, 2; WSW, 3.	None.	Smooth	No account		0	0	
27	46 04 00	124 58 21	210.0	30.26	30.18	59	55	58	54	59	52			Fair and pleasant generally.	S'd, 2-1	Light.	Smooth	None	0.0	13	0	
28	42 39 00	124 39 30	211.0	30.19	29.99	50	54	57	53	57	52			Fair to overcast and rainy.	S'd, 2-1	Light.	Smooth	N. 56° E.	0.5	12	0	
29	39 11 00	124 03 00	208.6	30.12	29.95	68	54	65	52	55	51			Overcast and rainy to fair.	NW, 4-5	Light.	Moderate.	S. 76° W.	0.2	0	0	
* 30	Raccoon Straits, Bay of San Francisco.		123.7	30.08	29.97	76	53	72	51	64	52			Clear and pleasant	NW, 4-2	None.	Smooth	No account		0	0	
Oct. 1	Navy-yard, Mare Island, Cal.		16.7	30.18	30.00	77	60	69	58	65	59			do.	NW, 2; SW, 2.	None.						
2	do.			30.22	30.05	77	60	72	58	66	60			do.	Calm; SSW, 2	None						
3	do.			30.15	30.01	78	55	74	54	65	59			do.	W, 2	None						
4	do.			30.10	30.60	80	59	77	58	64	60			do.	WSW, 2	None						
5	do.			30.13	29.99	80	55	79	54	66	55			do.	Calm; S'd and W'd, 1-2.	None.						
6	do.			30.14	30.04	78	53	74	57	66	59			do.	Calm; S'd and WSW, 1	None.						
7	do.			30.21	30.08	73	58	70	55	66	59			do.	S'd and W'd, 2-1	None.						
8	do.			30.11	29.98	72	60	69	59	63	60			do.	WSW, 1-2.	None.						
9	do.			30.20	28.93	69	56	66	53	65	59			Drizzling to clear and pleasant.	S, 2, to W, 3.	Light						
10	do.			30.30	30.19	70	53	67	52	66	59			Clear and pleasant	W, 1, to SW, 2	None						
11	do.			30.36	30.20	68	54	63	53	60	56			do.	Calm; SW, 2	None						
12	do.			30.29	30.01	79	55	76	53	66	58			do.	Calm generally; SW, 1.	None						
13	do.			30.07	29.88	80	55	76	55	66	59			do.	Calm; SW, 1 (6 a. m., 5 p. m.); calm.	None						
14	do.			30.02	29.94	71	53	68	56	63	59			do.	Calm; SW, 2	None.						
15	do.			30.22	30.00	64	56	60	54	63	59			Fair generally; sun showers middle of day.	SW, 2	Light						
16	do.			30.30	30.15	67	50	61	48	62	58			Clear and pleasant	Calm; WSW and SW, 2-3.	None.						



17	do	30.22	30.04	69	47	65	46	68	57	do	WSW, 2	None
18	do	30.12	29.98	67	48	65	47	62	58	Clear generally; fog 5 to 8 a. m.	Calm; WSW, 2	None
19	do	30.11	30.02	64	51	60	53	69	55	Clear and pleasant	WSW, 2	None
20	do	30.24	30.10	66	52	62	50	61	53	do	WSW and SW, 2	None
21	do	30.24	29.95	66	53	64	51	63	57	do	W, 1, to WSW, 2	None
22	do	30.00	29.80	65	53	63	51	61	58	do	SW, 1 (occasionally)	None
23	do	30.11	30.02	71	55	69	53	61	59	Fair and pleasant	Calm; W, 1 (7 a. m., 3 p. m.); calm.	None
24	do	30.26	30.10	67	57	64	56	61	59	Cloudy and drizzly to fair.	SW and SSW, 1	Light
25	do	30.38	30.26	66	54	63	53	60	58	Fair and pleasant	SW, 1-2	None
26	do	30.22	30.14	67	52	64	52	60	54	Overcast and foggy to fair.	S'd and W'd, 1-2	None
27	do	30.19	30.01	75	52	70	52	60	57	Foggy to clear and pleasant.	Calm generally; E, 1	None
28	do	30.20	30.08	61	53	59	52	60	57	Fair and pleasant; cloudy.	S'd and W'd, 1-2	None
29	do	30.25	30.18	65	55	62	54	60	57	do	SW, 2	None
30	do	30.24	30.12	64	54	63	54	60	57	Rainy to fair and pleasant.	SW, 2	Light
31	do	30.16	30.08	63	50	61	48	60	56	Fair and pleasant; cloudy.	Calm; SW, 1-2	None
Nov. 1	do	30.20	30.10	65	55	64	53	60	57	Fair and pleasant	Calm; SW, 2 (2 to 7 p. m.); calm.	None
2	do	30.28	30.19	63	47	59	46	58	55	Fair to clear and pleasant.	Calm; W, 2	None
3	do	30.37	30.19	62	47	60	44	59	56	Fair generally; mist 8 to 10 a. m.	W, 2; calm; SW, 2	Light mist
4	do	30.24	30.01	65	52	62	51	60	55	Foggy and misty to fair.	S'd and W'd, 1-2	Light mist
5	do	30.09	30.02	60	54	58	53	53	56	Cloudy to overcast and rainy.	Calm; WSW to SSW, 2-3.	Light mist
6	do	30.32	30.04	64	56	62	54	50	57	Overcast and rainy to clearing.	SW, 2	Moderate.
7	do	30.41	30.27	61	51	59	49	58	53	Foggy to clear and pleasant.	Calm generally; SW, 1	None
8	do	30.42	30.28	61	49	58	48	58	54	Foggy to fair and pleasant.	Calm; SW, 1	None
9	do	30.31	30.22	63	53	61	53	59	55	Cloudy to overcast, then clearing.	SW, 2; calm	None
10	do	30.35	30.19	65	51	62	50	58	55	Fair generally; mist 4 to 6 a. m.	SW, 2	Light mist
11	do	30.37	30.22	70	55	64	51	59	55	Clear and pleasant	W, 2 to SE, 2	None
12	do	30.44	30.29	69	44	63	47	58	54	do	Calm; NE'd, 2 (9 a. m., 5 p. m.); calm.	None
13	do	30.35	30.20	67	49	65	48	60	54	do	Calm; variable 1 (10 a. m., 3 p. m.); calm.	None
14	do	30.38	30.22	71	52	66	51	58	55	do	E. 1-3; ENE, 3; calm	None
15	do	30.34	30.13	69	48	64	47	58	54	do	Calm generally; E, 1	None

\* Distance steamed during month, 3,454.2 knots; days under way and steaming, 27. † Distance steamed during month, 16.7 knots; days under way and steaming, 1.

Meteorological and cruising record, and seal data—Continued.

Date.	Meridian position.		Dis- tance run per log.	Barometer.		Temperature.				State of the weather.	Force and direction of winds.	Rain- fall.	State of sea.	Currents.	Force in knots per hour.	Number of hours sealing weather.	Number of fur seals seen.
				Max.	Min.	Air.		Water at surface.									
	Lat. N.	Long. W.		Max.	Min.	Dry bulb.	Wet bulb.	Max.	Min.								
1893.	0 10 0 10		Knots.														
Nov. 16	Navy-yard, Mare Island, Cal.			30.17	29.95	57	48	56	47	57	54	Fair generally; foggy and misty 6 a.m. to 12 n.	W., 1; SW., 2	Light mist.			
17	do.			30.17	30.00	56	47	54	46	55	51	Clear, but squally.	N'd and W'd, 2-6.	None.			
18	do.			30.14	29.99	63	49	61	47	55	53	Clear and pleasant.	Calm generally; variable, 1.	None.			
19	do.			30.32	30.15	58	47	55	45	51	50	do.	Calm; E., 3 (5 a.m., 5 p.m.); calm.	None.			
20	do.			30.34	30.24	58	46	56	39	54	49	Fair; cooler.	Calm; SW., 1.	None.			
21	do.			30.25	30.12	56	49	55	48	53	50	Overcast and threaten- ing to fair.	Calm; S'd and W'd (8 a.m., 6 p.m.); calm.	None.			
22	do.			30.26	30.16	62	49	60	48	54	51	Cloudy and cool to overcast and drizzly.	SW., 2-1	Light.			
23	do.			30.25	30.11	63	54	60	53	55	53	Fair to misty and driz- zly.	Calm; SW. to SE., 2.	Light.			
24	do.			30.08	29.90	61	54	60	53	54	53	Overcast and rainy to cloudy.	Calm; SE. and S., 3-2.	Moder- ate.			
25	do.			30.22	30.06	58	52	57	51	54	52	Cloudy and unsettled; showery.	WSW., 1; SSW., 2	Light.			
26	do.			30.22	30.12	61	51	59	50	56	51	Overcast and stormy; rainy.	ESE., 1; SE., 2-3	Heavy.			
27	do.			30.25	30.17	61	52	59	51	55	52	Overcast, drizzly, and rainy.	ESE., 1; S'd and W'd, 2-3.	Moder- ate.			
28	do.			30.34	30.21	64	52	62	50	55	52	Cloudy to fair; drizzle 4 to 5 a.m.	Calm; SE., 3-2; calm	Light.			
29	do.			30.38	30.29	60	54	59	53	55	52	Overcast and rainy.	Calm; SE., 2	Moder- ate.			
30	do.			30.34	30.29	61	57	60	56	56	52	Overcast, misty, and rain.	SSW., 1.	Moder- ate.			
Dec. 1	do.			30.41	30.33	61	54	62	53	56	52	Cloudy and unsettled; showery in forenoon.	Calm; SW., 1	Light.			
2	do.			30.41	30.31	67	52	65	50	56	51	Foggy to fair and pleasant.	Calm; NW. to E., 2	None.			
3	do.			30.51	30.40	64	51	62	50	55	51	Clear and pleasant.	E., 3; NE. to S., 2; calm.	None.			

4	do	30.48	30.33	63	51	60	50	55	51	Fair to clear and pleasant.	Calm; ENE, 2-1; calm.	None
5	do	30.40	30.26	66	50	64	49	56	50	Clear and pleasant.	Calm; E and ENE, 2	None
6	do	30.44	30.32	67	49	61	48	54	51	do	NE, 3 (squalla 5); ENE, 3	None
7	do	30.29	30.18	68	50	66	49	54	50	do	Calm generally; SW, by 1	None
8	do	30.29	30.17	70	56	67	55	62	51	do	E., 1-2; calm at times.	None
9	do	30.27	30.11	65	54	63	53	55	52	do	E., 2; calm.	None
10	do	30.16	30.03	61	50	59	49	55	51	do	Calm; E, 2	None
11	do	30.19	30.08	57	46	55	45	53	50	Fair and pleasant; fog 4 to 8 a.m.	Calm generally; W, 1	None
12	do	30.13	30.04	56	48	55	47	54	50	Overcast and cloudy; rain 10 to 11 p.m.	Calm generally; SW, 1	Light
13	do	30.16	30.08	58	51	57	50	do	Dry dock.	Cloudy; frequent rain showers.	Calm; S'd and W'd, 2	Moderate
14	do	30.45	30.11	59	46	57	45	do	do	Overcast and rainy to fair.	SW, 2-3	Moderate
15	do	30.57	30.47	58	42	57	41	do	do	Clear and pleasant.	SW, 1; E, 2	None
16	do	30.55	30.43	61	44	50	42	do	do	do	E'd, 2-3	None
17	do	30.46	30.28	59	49	58	48	do	do	Fair to overcast and rainy.	E'd, 2; calm.	Light
18	do	30.32	30.22	61	50	59	49	do	do	Rainy to clearing.	Calm; SW by 1; calm.	Light
19	do	30.27	30.19	54	50	53	49	do	do	Fair and pleasant to overcast.	Calm; S'd and W'd, 1	None
20	do	30.26	30.18	55	52	59	51	do	do	Overcast and threatening.	NW, 1; NE, 2	None
21	do	30.20	30.10	58	53	56	52	do	do	Overcast, rainy, and drizzly.	E'd, 1; calm.	Moderate
22	do	30.29	30.06	57	47	56	46	do	do	Overcast and drizzly to clearing.	Calm; WSW, 3	Light
23	do	30.18	30.00	52	44	52	42	51	46	Fair to overcast and rainy.	SW., 1-2; S'd and E'd, 2	Light
24	do	30.24	29.93	53	46	52	45	51	46	Rainy and drizzly to clearing.	S'd and W'd, 2	Light
25	do	30.30	30.00	46	44	45	43	49	45	Cloudy to overcast and disagreeable.	NE, 2-3	None
26	do	29.02	29.78	59	46	48	44	49	45	Overcast and drizzly.	XNE, 3; ESE, 2; NE, 2	Light
27	do	30.49	29.91	51	44	49	43	48	44	Fair generally; showers 1 to 2 p.m.	Calm; E'd, 1-2	Light
28	do	30.53	30.43	49	41	48	39	47	43	Foggy and disagreeable.	Calm	None
29	do	30.50	30.33	46	35	45	34	46	40	Cold and disagreeable; heavy fog.	Calm generally; variable, 1	None
30	do	30.44	30.38	44	37	43	36	46	42	Cloudy and cold; disagreeable.	N'd, 2-3	None
31	do	30.39	30.18	44	42	43	41	46	41	do	ENE, 2-3	None

Meteorological and cruising record, and sea data—Continued.

Date.	Meridian position.		Dis- tance run per log.	Barometer.		Temperature.				State of the weather.	Force and direction of winds.	Rainfall.	State of sea.	Currents.		Number of hours scouting for seals.	
	Lat. N.	Long. W.		Max.	Min.	Air.	Water.	Dry bulb.	Wet bulb.					at sur- face.	Setting to the (true).		Force in knots per day.
1894.																	
May 1	Port Wash.	0 11 0 11	21.8	30.53	30.44	51	42	50	40	47	45	Cloudy to clear and pleasant; showery 6 to 8 a. m.	SW., 2; NE., 2; W., 2.	Light	Smooth	No account	
2	do.	do.	do.	30.52	30.36	53	42	47	45	45	45	Cloudy, but pleasant generally.	SW., 2; NE., 2; W., 3	Light			
3	do.	do.	do.	30.36	30.02	53	46	52	44	47	45	Overcast, drizzly, and rainy.	W., 4; Sd and E., 3;	Heavy			
4	do.	do.	do.	30.10	29.93	51	47	50	46	47	46	Overcast and rainy; disagreeable.	Variable, 1; Sd and W., 2-3	Moderate			
5	48 13 00	122 51 00	9.8	30.15	30.03	53	45	52	44	48	46	Overcast, gloomy, and unsettled.	E., 3; NW., 1-3; Sd, 3	Light	Smooth	No account	
6	48 43 00	122 57 30	56.7	30.34	30.16	59	45	57	43	48	45	Fair, but cool	Sd and W., 4-3	None	Smooth	No account	
7	Port Townsend.	do.	55.1	30.26	30.01	54	45	52	44	48	46	Overcast and rainy to clearing.	Variable, 1; SE., 3-4; NW., 3; SW., 1-6	Moderate			
8	48 40 00	122 33 00	52.7	30.49	30.26	54	45	52	43	52	46	Clear and pleasant	WSW., 6; SW., 2; Sd, 2	None	Smooth	No account	
9	Port Townsend.	do.	49.9	30.58	30.28	54	45	52	43	52	46	Fair and pleasant	Sd and W., 2; N., 2; SW., 2; calm.	None			
10	do.	do.	do.	30.24	30.04	54	43	52	42	47	45	do.	Ely., 1; W., 2-4	None			
11	do.	do.	do.	30.21	30.12	58	45	57	44	51	46	Overcast to fair and pleasant.	Nd and W., 1	None			
12	do.	do.	do.	30.20	30.11	50	44	48	43	48	45	Fair to overcast and drizzly.	Calm; W., 1-3	Light			
13	do.	do.	do.	30.16	29.99	52	45	50	43	48	45	Cloudy, but pleasant; showers 4 to 6 a. m.	Sd and W., 2	Light			
14	do.	do.	do.	29.97	29.89	53	44	50	42	47	45	Overcast and cloudy	SW., 2; W., 4-3; WSW., 2-3	None			
15	do.	do.	do.	30.19	29.90	50	45	48	44	47	46	Overcast and disagree- able; rainy.	WSW., 2; SE., 28; calm.	Heavy			
16	do.	do.	do.	30.30	30.20	57	46	55	45	48	46	Overcast and cloudy	Sd and E., 2-1; calm	Light			
17	48 55 00	123 20 00	66.8	30.30	30.17	58	48	57	46	54	46	Clear and pleasant	Wly., 1; calm	None	Smooth	No account	
18	49 44 30	124 48 00	83.1	30.16	29.86	64	50	61	49	57	49	Clear and pleasant generally.	Calm; W., 2; calm; W., 2	None	Smooth	No account	
19	50 57 00	123 47 00	176.7	30.02	29.88	53	48	52	47	49	46	Fair and pleasant gen- erally; showery to 8 a. m.	SW., 3-2	Light	Smooth	No account	

20	51 54 00	133 39 00	197.2'	30.04'	30.00'	53'	48'	52'	47'	50'	47'	Fair and pleasant.....	SW., 2-1.....	None ...	Smooth ...	S. 42° E....	2.7	16	0		
21	53 07 00	138 24 00	209.8'	30.13'	29.99'	51'	46'	50'	45'	48'	42'	Foggy for overcast and cloudy.	SSW., 2; E'd, 2.....	None ...	Smooth ...	N. 75° E....	23.5	16	0		
22	53 37 00	144 10 00	217.5'	30.16'	30.01'	48'	44'	47'	42'	43'	40'	Overcast and foggy...	N'd and E'd, 3; E'd, 4.....	None ...	Smooth ...	No account.....			0		
23	54 07 00	149 59 00	230.2'	30.08'	29.83'	43'	40'	42'	39'	40'	38'	Foggy and misty.....	S'd and E'd, 4.....	Light...	Smooth ...	S. 85° E....	21.2	16	0		
24	54 30 00	156 49 00	241.4'	30.06'	29.81'	44'	39'	43'	38'	38'	38'	Foggy and thick.....	SE., by E., 4; E., 2.....	None ...	Smooth ...	No account.....			1		
25	53 57 00	161 48 00	206.0'	29.77'	29.19'	43'	37'	42'	36'	39'	36'	Gloomy, threatening, and stormy.	E., 4, to NE., 0.....	Moderate	Moderate to rough.	East.....	20.6	0	0		
26	54 08 00	166 11 00	167.5'	29.16'	29.16'	40'	37'	39'	36'	39'	36'	Stormy, overcast, and gloomy.	NE., 9; NNW., 3; NE., 2-1.	Moderate	Rough to smooth.	No account.....			0		
27	Dutch Harbor, Unalaska Island.		22.5'	29.23'	29.16'	41'	39'	40'	37'	39'	37'	Overcast and stormy; snowing at times.	S'd and W'd, 1-3; squalls, 6.	Moderate							
28	do.		29.69'	29.29'	41'	38'	40'	37'	38'	38'	37'	Overcast and boisterous; snow, rain, and sleet at times.	W., 2; squalls, 6.....	Moderate							
29	do.		29.76'	29.70'	51'	38'	50'	37'	39'	37'	37'	Cloudy, but pleasant, to overcast.	S'd and W'd, 1-2.....	None ...							
30	do.		29.73'	29.67'	41'	38'	40'	37'	39'	37'	37'	Overcast and gloomy; snow in a. m.; rain in p. m.	NE., to NNW., 1.....	Moderate							
June 1	54 03 00	167 54 00	65.3'	29.88'	29.72'	40'	38'	39'	37'	38'	37'	Overcast and drizzly.	S'd, 1; W., 2-3.....	Moderate	Smooth ...	No account.....			13	0	
	53 44 00	174 24 00	239.7'	30.06'	29.90'	42'	38'	40'	37'	41'	36'	Rainy and misty to cloudy, but pleasant.	W'd, 4; S'd, 4; SSE., 4.....	Light...	Smooth ...	East.....	28.8	18	0		
		East.																			
2, 3	53 20 00	178 45 00	272.6'	30.01'	29.83'	49'	39'	48'	38'	41'	38'	Cloudy, but generally pleasant.	SSE., 3; variable, 1; NW., 3.	Light...	Smooth ...	N. 77° E....	26.6	18	0		
4	Chicago Harbor, Attu Island.		229.6'	30.12'	29.92'	46'	39'	45'	38'	46'	38'	Fair and pleasant.....	NW., 3; N'd, 1; calm.....	None ...	Smooth ...	S. 78° E....	22 hrs. 20.3.	8	0		
5	52 37 00	173 45 00	31.9'	30.14'	30.03'	46'	37'	45'	36'	41'	38'	Fair to overcast, thick, and stormy.	Calm; S'd and W'd, 2-5.....	Moderate	Smooth ...	No account.....			5	0	
6	52 39 00	173 44 00	55.1'	30.14'	30.04'	45'	41'	43'	40'	40'	39'	Rainy, misty, and boisterous.	S'd and W'd, 7-3.....	Heavy ...	Rough ...	No account.....			0	0	
7	52 19 00	177 30 00	164.5'	30.14'	29.91'	44'	39'	43'	39'	40'	39'	Overcast and gloomy...	SW., 3; SE., 3-5.....	Light...	Moderate to smooth.	None ...			0	12	0
8	Kiska Harbor, Kiska Island.		28.0'	29.85'	29.60'	44'	41'	43'	40'	41'	39'	Stormy, thick, and rainy.	S'd and E'd, 5; squally, 8; S'd and E'd, 2.	Moderate	Smooth to moderate.	No account.....			4	0	
9	52 07 00	177 43 00	23.3'	29.62'	29.58'	43'	41'	42'	40'	40'	39'	Thick, foggy, and rainy.	SE., 1; E'd, 3.....	Moderate	Moderate to rough.	No account.....			2	0	
9	52 25 00	177 15 00	189.1'	29.58'	29.41'	43'	41'	42'	40'	41'	39'	Thick, foggy, and drizzly.	E'd, 2; N'd and E'd, 2-3.....	Moderate	Moderate to smooth.	S. 26° E....	7.4	10	0		
10	Nazan Bay, Atka Island.		161.5'	29.32'	29.38'	44'	42'	43'	41'	41'	40'	Stormy, thick, and rainy.	S'd and W'd, 4-7; S'd and W'd, 4.	Moderate	Smooth to moderate.	No account.....			0	0	
11	53 20 00	169 38 00	183.5'	29.81'	29.52'	42'	41'	41'	40'	40'	39'	Overcast and cloudy; misty at times.	S'd and W'd, 5.....	Light ...	Moderate	South.....	7.1	0	0		
12	Dutch Harbor, Unalaska Island.		133.5'	29.85'	29.38'	54'	41'	53'	40'	42'	39'	Cloudy to misty, stormy and rainy.	SW., 3-1; S'd and E'd, 2-4; squalls, 7.	Moderate	Smooth ...	No account.....			0	0	
13	53 37 00	166 31 00	4.7'	29.55'	29.28'	57'	43'	55'	42'	44'	39'	Stormy, partly clear to overcast and misty.	SE., 4; squalls, 6; S., 8; S., 4.	Light ...	Rough ...	No account.....			0	0	
14	53 55 00	167 05 00	110.3'	29.91'	29.56'	44'	41'	43'	40'	40'	39'	Stormy, misty, and rainy.	S., 3-7; SSW., 5.....	Moderate	Rough ...	No account.....			0	0	

\*2, 133 knots per log; 18 days under way.

Meteorological and cruising record, and seal data—Continued.

Date.	Meridian position.		Distance run per log.	Barometer.		Temperature.			State of the weather.	Force and direction of winds.	Rainfall.	State of sea.	Currents.		Force in knots per day.	Number of seals.		
	Lat. N.	Long. W.		Max.	Min.	Air.		Water at surface.					Setting to the (true).	Force in knots per day.				
						Dry bulb.	Wet bulb.										Max.	Min.
1894.																		
June 15	53 27 00	168 14 00	85.0	30.01	29.94	43	40	42	39	40	38	Stormy, misty, and thick.	SSW., 4-8; S, 6; S'd and W'd, 6-5.	Moderate	Rough	No account	0	0
16	52 59 00	171 55 00	168.7	30.18	29.98	42	39	41	38	39	39	Overcast and misty; boisterous.	SW., 6-2	Moderate	Rough to moderate.	N. 56° E.	14.5	0
17	52 11 00	173 03 00	171.8	30.16	29.94	43	40	42	39	40	39	Overcast to foggy and misty.	SW., 3; S. to SSE, 3-4	Light mist.	Smooth	No account	12	0
18	54 10 00	167 56 00	211.3	29.93	29.63	47	41	46	40	44	39	Foggy and rainy, thick and disagreeable.	S., 4; SW., 4; S., 2-3	Moderate	Smooth	S. 17° E.	19 hrs.	15
19	Dutch Harbor, Unalaska Island.		60.6	29.76	29.60	50	45	49	43	44	43	Rainy to cloudy and pleasant.	S'd and W'd, 3; squalls, 5-6.	Light				
20	do.		29.78	29.70	52	43	50	43	45	42	42	Cloudy, but pleasant.	S'd, 3-5; NE., 3; XW., 3; ESE., 3-5.	None				
21	do.		30.11	29.80	56	41	55	40	44	40	40	Fair and pleasant; foggy outside.	S'd, 4; squalls, 6; S., 4; variable, 2.	None	Smooth			
22	55 40 00	168 35 00	134.7	30.10	29.94	41	39	40	38	40	36	Misty, drizzly, and foggy; thick.	Variable, 1; XNE., 4-6; ENE., 4-6.	Moderate	Smooth to choppy.	S. 13° W.	15 hrs.	6
23	Village Cove, St. Paul Island.		129.0	29.99	29.90	44	39	43	38	39	36	Misty and foggy; thick.	SE., 2-4	Light mist.	Smooth	No account	0	0
24	57 34 00	167 58 00	127.6	29.97	29.76	41	38	40	37	38	36	Misty, drizzly, and foggy; thick.	SE. and SSE, 3; SW., 3-4.	Moderate	Smooth	N. 39° W.	17 hrs.	14
25	56 12 00	165 45 00	185.4	30.00	29.91	41	39	40	39	39	38	Foggy, misty, and rainy; thick.	SW., 4; SSE, 4; S., 4	Moderate	Smooth sea; SW. swell.	No account	16	0
26	55 33 00	163 23 00	184.0	30.03	29.91	43	40	42	39	40	38	do.	S., 4; S'd and W'd, 4	Moderate	Smooth to moderate.	N. 14° E.	48 hrs.	12
27	56 31 00	159 48 00	202.9	30.17	30.04	43	37	43	36	41	35	Foggy and misty; thick.	W., 3; WSW., 4; W., 3; SW., 4.	Light	Smooth	No account	14	0
28	56 38 00	160 39 00	194.4	30.10	29.96	39	35	38	34	41	34	Foggy to fair to foggy and misty.	SSW., 2; W'd, 1	Light	Smooth	No account	16	2
29	57 56 00	166 16 00	198.2	30.07	29.91	45	38	44	37	38	37	Misty and foggy to fair.	W'd., 2-3	Light	Smooth	N. 22° E.	8.6	14
*30	56 59 00	163 02 00	177.1	30.15	29.93	46	35	45	34	41	37	Foggy to fair and pleasant.	SW., 2; calm; SE., 2; NW., 3.	None	Smooth	N. 56° E.	5.3	18

\*4,117.9 knots steamed per log; 28 days under way.