Diag. Cht. No. 9370

U. S. COAST AND GEODETIC SURVEY.

Henry S. Pritchett, Superintendent.

State: Alaska

DESCRIPTIVE REPORT.

Hydrographic Sheet No. 2440 -41

LOCALITY:

Kwiklowak Bar Channels

1899.

CHIEF OF PARTY:

G. R. Putnam

2441

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Department of Commerce and Labor

COAST AND GEODETIC SURVEY

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DESCRIPTIVE REPORT.

Hyd c *Sheet No* 2441

LOCALITY:

See

2440

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~~1900~~

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Kwiklowak Bar Channels
Alaska

Descriptive Report to accompany the following sheets
Hydrographic sheets No. 2470 and 2441.

General description. A preliminary examination of the Kwiklowak mouth of the Yukon River was made by the party of Assistant J. W. Pratt in 1898, and this was much extended in 1899. A summary of the information obtained is contained in the notes below, cut from "Alaska, Coast Pilot Notes", Bulletin No. 40, pages 45 and 46 (second edition). (See also descriptive reports of "Kusilvak" mouth sheets, J. W. Pratt, 1899).

THE KWIKLOWAK* BAR AND PASS.

This outlet is by far the largest of any of the passes leading to the Yukon. The entrance is 125 miles by water from St. Michael, and about 80 miles by way of the flats from the Apoon mouth. The nearest harbor for vessels under medium size is Scammon Bay, a distance of 60 miles from the entrance and about 42 miles from the Kwiklowak Bar crossing. About 6 feet, at mean low tide, can be carried in over the Kwiklowak Bar through the **Acharon Channel.** The crossing place is about 16 miles southwest from the entrance, and about 4 miles off the low shore, which can not be seen until within 3 or 4 miles of it. When once well inside the entrance, the pass has remarkably good channels, which are easy of navigation and free from rocks and snags. Its minimum depth between the entrance and the head of the delta is 20 feet, and this depth can be carried up the Yukon as far as the survey of 1899 extended, to near Andreafski. There are several stretches where the depth is more than 50 feet, and at some places depths as great as 84 feet were found.

The lower portion of the Kwiklowak, which is confined between continuous banks, is about ¾ mile wide, after leaving which there is a very abrupt physical change in its condition by spreading out northward and westward, with numerous minor channels, while the main river widens to about 1¼ miles; beyond this it spreads out over the flats, through which its main channel is only fairly well defined at extremely low tides. All the shoals and flats are covered at high water, and there are no islands or bare shoals off the entrance at high tide. Besides the Acharon there are four other channels at this mouth leading out on the bar in widely divergent directions. Some of these carry across the bar slightly greater depths than the Acharon, but all are narrow, crooked, and bordered by shoals bare at extreme low tides. None of them afford a practicable entrance for deep-water vessels at the present time.

The main channels are everywhere free from snags, though trees are sometimes seen temporarily lodged on the bars, and quantities of driftwood are piled along the shores in places. Undoubtedly the ice freezes in and carries off the snags when it goes out each season. The channels and banks show indications of changing rapidly both from erosion

*On the older charts called Kusilvak.

and deposit. Very probably much of this is effected each year during the breaking up of the ice, its consequent jams, and the great floods following.

The land along the outer shores is only a foot or two above high water, is covered only with low marsh grass, and is entirely lost to view when but a few miles offshore. The only landmarks visible in clear weather are the sharp peaks of Kusilvak Mountain and the Askinuk Mountains back of Cape Romanzof, all very distant and often obscured by clouds or mist. The extreme flatness of the land and the remarkable mirage effect, often seen over the shoals when bare, make the whole region deceptive at times. When well inside the confined banks of the Kwiklowak, the country on each side is covered with an almost continuous growth of willow and alder bushes. The water has a brownish-white appearance, something like glacial water, without its fine, sharp grit. It has no unpleasant taste, and is always fresh in the inner channel.

Inhabitants.—No white men live in the delta south of the Apoon except the Catholic missionaries at a summer fishing station. There are large Eskimo settlements at the mouths of the Kwiklowak and Kripniyuk rivers. The natives are friendly and honest, and will attempt to pilot boats, with more or less success.

Currents.—None were observed to exceed 3 knots per hour. In the delta channels currents were observed varying from 0.5 to 1.6 knots. The velocities were greater in the bar channels and up the river.

Weather.—The prevailing winds in summer are northeasterly, easterly, and southeasterly; the strong blows are believed to come from the same directions. Fogs were unusual, but there was a good deal of thick mist and rain.

The following (from my preliminary report of March 14, 1900), gives a more detailed summary of the conditions found at the Kwiklowak Mouth of the Yukon River in 1899;

The Kwiklowak Pass divides at its mouth into five channels flowing out in directions varying from southwest to north. Beginning with the most southerly these are;

The Acharon Channel was sounded for 22 miles (nautical) from the mouth of the river. The shoalest part of the bar was found 16 miles from the mouth and 4 miles from the coast (so low as to be invisible at this distance; maximum depth found on the bar 6½ feet at mean low water (mean range of tide on bar about 3½ feet). About 8 miles from shore 4 fathoms were found. About 6 miles with a depth less than 3 fathoms must be crossed in passing from Bering Sea into the Acharon Channel, from whence slightly more than 3 fathoms can easily be carried up the Kwiklowak Pass and Yukon River as far as the surveys of 1899 extended. The Acharon appears to be the

largest channel at the Kwiklowak mouth. Near the end of this channel there is a parallel tidal channel carrying about 10 feet out to sea, but no connection could be found between this and the Acharon; it was the supposition that these channels were identical that led to a somewhat greater depth being stated in 1898.

The Taku Channel (first traversed by steamer "Taku" in 1898) was sounded for 15½ miles from the mouth, where a maximum depth of 7 feet was found at a distance of 5½ miles from the coast. Apparently this was about the shoalest part of the crossing.

The Kutmunkunk Channel was sounded for 12 miles from the mouth, where a maximum depth of 6½ feet was found, at a distance of 6½ miles from the coast. Apparently this was about the shoalest part of the crossing. Both this and the Taku Channels are narrow and crooked, and bordered by numerous shoals bare at extreme low waters. They both branch off from the Acharon.

The Kwiklowak Channel was sounded for a distance of 6 miles in which the minimum depth was found to be 12 feet; and the Kurukomarot Channel was sounded for 13 miles with minimum depth of 13 feet. Both these channels are narrow and crooked and they do not appear to carry a large volume of water. They were examined and surveyed by Lieut. Flower with the steam launch, and it was not considered safe to follow them across the bars with this small boat. There seems to be no reason to expect that they carry across the bar any greater depth of water than the three channels which were examined with the steamer "Yukon".

The conclusion to be drawn from the above is that there is no likelihood under present conditions, of direct deep water navigation into the Yukon at this, its main outlet. There is also no likelihood that the Kwiklowak will be used as an entrance for river steamers. There is to be sure much more water than on the Apoon bar, but there is the great disadvantage that the crossing is out of sight of land

and far less convenient to a transhipping harbor than is the Apoon to St. Michael.

Diagrams giving cross sections of the various channels near their heads, were attached to my report of Apr. 30, 1900.

The bottom and bars are entirely alluvial, fine blueish mud and fine sand. It is usually harder and more compact than was often found along the shores in the Kwiklowak Pass.

~~This mouth of the Apoon was in~~ 1899 used by no commerce except that of the native Eskimos in their skin boats and an occasional white or half-breed trader in sailing boats. These all prefer the Kwiklokchun and Kwemeluk Passes in going out of the river from the Kwiklowak Pass.

Outline of methods of survey.

The desire was for a more systematic examination of these channels than the short time at the close of the preceding season had permitted. The control of this work was based on the triangulation of 1898, nearly all the signals of which were found standing. This triangulation was extended by several additional land stations, and a larger number of water signals. Additional astronomical observations were also made, to strengthen the latitude and longitude for this work, but after completing and computing the connection with St. Michael through the work of the party of Assistant Faris, the St. Michael data was used in plotting all the Delta work, at the suggestion of the Computing Division. The field results were used in the projections; to make them accord with the final Office values, all latitudes must be increased 0."18 (or parallels moved south 5.5 metres) and all longitudes must be diminished 0."56 (or meridians moved west 8.0 metres). This is a uniform correction to be applied to the projections of all the Yukon River and Delta work of 1899. The projections of work of party of Assistant Pratt in 1898, were made on different data, and a correction must be applied to join these to 1899 sheets.

Wooden tripod signals built in shoal water having proved unsatisfactory, the combined effect of wind, waves and buoyancy being generally to destroy them, in 1899 iron gas pipe signals were used quite successfully. They were made of three 20 foot lengths of $\frac{3}{4}$ inch pipe with cross fittings at the top, through which they were bound together with several turns of telegraph wire. Flag sticks were stuck in the upper sockets of the crosses, and broad banners of black cloth fastened across between strips of wood bound to the legs. The signals were made ready on the deck of the "Yukon," and it took only a few minutes to place them in position; the steamer was anchored and the signal put over from the bridge, each leg being given a few taps with a sledge to fix it firmly in the bottom. With but three exceptions these signals stood as long as needed. They are cheaper, lighter, less bulky and quicker to handle than

wood for the same purpose. A few signals were put in with a single pipe driven in the mud, but the diameter of the pipe ($\frac{3}{4}$ in.) was too small. One of these signals stood successfully for some time, while others doubled up. Angles to these water signals were measured from some of the triangulation stations ashore, but the majority of them were located by sextant angles taken when they were set out.

The hydrographic work on the bar was divided, the north channels being surveyed by the launch under Assistant Flower, and the south channels by the steamer "Yukon". No attempt was made to go over the region that was sufficiently covered in 1898, at the immediate river mouth and in the inner part of the Acharon Channel. The work in the outer part of Acharon Channel was repeated and extended, because not satisfactorily located the previous season. ~~An exact joining of different seasons' work is scarcely to be expected~~, as there is every reason to expect changes in this alluvial bottom from time to time, and these changes are doubtless most marked at the time of the break up of the ice and the spring floods.

It was often found exceedingly difficult to even follow these narrow and tortuous channels with the steamer, and especially to run transverse lines in them. The hydrography might have been better developed with a pulling boat, but this would have required a great increase in the number of signals, which did not appear practicable. Signals could be observed with much greater facility from the bridge of the steamer, than from a boat at the water level. The "Yukon" often grounded, but generally worked off without difficulty.

A self-registering tide gauge was kept in operation at Avozon, Kwiklowak Mouth, from July 14 to Aug. 11, which was connected by water levels with the gauge of the previous season at Kwiklokchun. Tidal observations for the south channels work were made at Wakiarok, and limited observations of tides were also made at three outside points, to obtain some idea of the relation between the time and range of tides on the bar and those at the mouth. A few current observations were made

in the bar channels, showing currents from 1 to 1.5 knots per hour. There are places however where the currents run stronger than this.

The outer line of soundings on O day (sheet No. 2441) and on M day (sheet No. 2440) ran out of sight of signals, and are plotted mostly from compass and log readings.

G. R. Putnam
Assistant

May 25, 1900