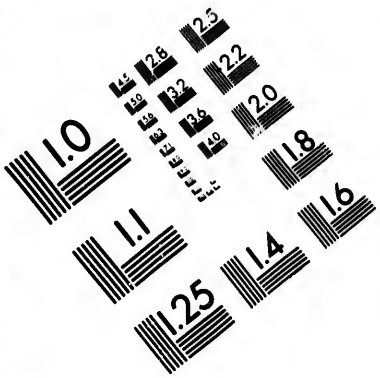

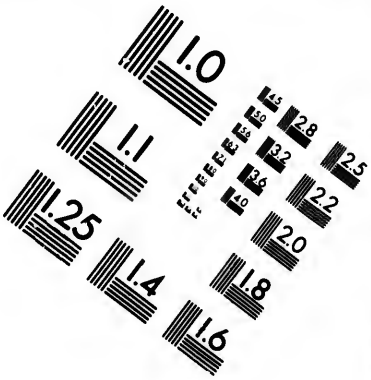

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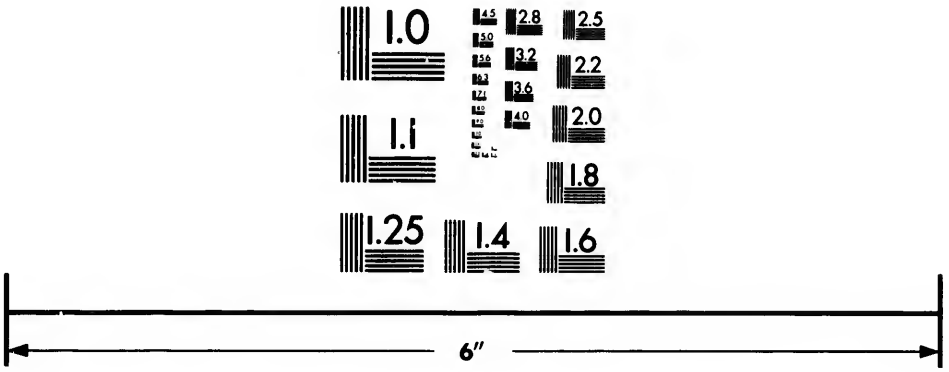

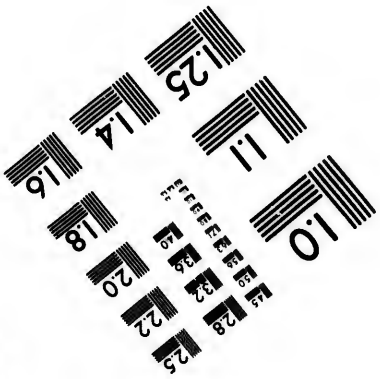

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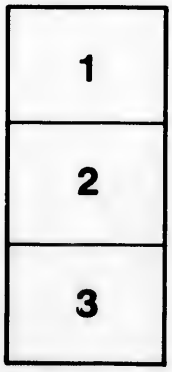

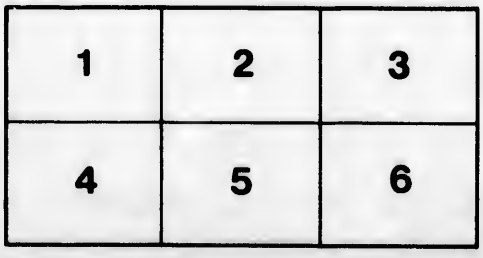

STATEMENT

OF

CHARLES WILKES, A COMMANDER IN THE U. S. NAVY,

OF THE

Survey of the mouth of the Columbia river by the United States exploring expedition.

AUGUST 3, 1846.—Referred to the Committee on Printing.
AUGUST 5, 1846.—Ordered to be printed.

Hon. JAMES A. PEARCE,
Senator of the United States, and chairman
Joint Library Committee of Congress:

SIR: As there seems to be a great effort making, through the instrumentality of Passed Midshipmen Knox and Reynolds, and Midshipman Blair, who were engaged in a subordinate capacity in the survey of the Columbia river, and whose erroneous opinions are now being offered to the Senate of the United States as the correct results of the surveys, (for what reason I know not,) to produce the impression that the entrance of the Columbia river is one of the most *feasible* and *safest* ports in the world, (even a New York pilot, who has never seen or been near Columbia river, has been called upon to give his testimony, in order to add weight to this favorable opinion,) I think it a duty I owe to my countrymen, navigators, and all others interested, to give a succint account of its state and condition at the time I undertook the survey of it with the officers of the exploring expedition, the manner of conducting the survey, and correct sailing directions.

I have no desire to exaggerate the dangers of the entrance of the Columbia river; but as a surveyor and the commander of the expedition, I deem it my duty to give directions agreeably to the truth, and, where dangers do exist, to point them out, that due caution may be observed by those who may follow after us. To add force to my own opinion, I might here appeal to the account of all voyagers who have, from time to time, visited the Columbia since its first discovery. They all, without exception, clothe it with dangers; and none have had the hardihood to attempt its entrance except under the most favorable circumstances; and almost every vessel that has attempted a passage, in or out, has met with some disaster more or less serious: even those who have been deemed the most expert navigators, and, we have reason to believe, had the best information respecting it, have not escaped uninjured. Indeed, all the information the officers and myself received from the masters of the H. B. company's

Ritchie & Heiss, print.

vessels, (men of great experience in the navigation of the river, and able navigators and seamen,) was indicative of the dangers and perils they were surrounded with in entering and departing from the Columbia, at all seasons of the year. One of them used the expression, that it "added to his gray hairs every time he passed in or out of the river, and he should thank his God when he was no longer subjected to it;" but our own operations and experience will be the best to rely upon, which I intend now to give.

The lower part of the Columbia river, it will be seen by the chart, expands into a large and open bay, in the middle of which, and extending from each cape, are extensive sand shoals; part of the middle sands are bare. These shoals form the great obstruction to the entrance of the river; and from the strong currents and westerly winds, extensive breakers are formed, and for the most part conceal the passage between the north and south spits. These two sand spits overlap each other; the south one projecting to seaward of the north one, being in a line almost at right angles with it. These obstructions have been formed by the deposite of the sands brought down the river, or washed by the abrasion of the sea from the neighboring cliffs or capes. The breakers on these spits are usually violent, though there are times when there is little or no break on their outer ends; yet this is seldom the case, and in lieu of these a heavy swell passes over them, but ill defining the danger. The *bar* lies outside of these, and is attended with no particular danger unless the sea is very heavy, when breakers form on it also, and a vessel would be subjected to risk from the heavy swell in passing. The depth of water on the bar at low water is 28 feet. The bar has been erroneously represented as the position of danger; this is a mistake. No accident, to my knowledge, has happened on it. The situation of the south *end* of the north breaker is the point of greatest danger. It is necessary to pass close to it; and as a vessel becomes, on nearing it, subject to the influence of the strong cross tides setting in or out of the two channels, she is comparatively under little control from her helm, and requires great care in the navigator, as the tides have great effect upon her steering, and of which her compasses give no timely notice whatever. On this account the compasses are of no use, and any directions wherein they form a part cannot be relied upon. On this account I have dispensed with their use, and resorted to ranges, which the most casual observer will instantly recognise.

The dangers are, in my opinion, great for large vessels, but there are times when almost any class of vessel might pass in with safety; but they are few and far between, occurring very seldom.

At the change of tide, or slack water, the breakers are very much diminished or lost, and are less violent on the ebb-tide than on the flood.

The opinion I have formed is, that both the north and south spits are increasing; this is corroborated by those with whom I conversed, and whose experience extended some years back. In the memory of many, Cape Disappointment itself has been worn away some hundred feet by the abrasion of the sea and the strong currents that pass by its base. The middle sands are subject to great changes. During the survey a large portion of what was dry sand was washed off and carried away, and every spring the usual marks or channels throughout the course of the river are lost or changed. Of late years the south channel has become much more

marked, and is believed to be on the increase, as a large portion of the water appears to set through it by the accumulation of the upper sands. If this should be the case, it will become considerably enlarged and improved; at the same time, we may look for a corresponding increase in the length of the south spit.

As an endeavor has been made to deprive the officers who were engaged in the survey of the Columbia river of the credit due them, and to place it where it does not belong, I think it proper now to give a full account of that duty, by whom and how it was performed, lest my silence might be construed as assenting to the erroneous statements that have been put forth by Passed Midshipman Reynolds and Midshipman Blair.

The survey was originally begun by Captain Hudson and his officers on the 22d of July, four days after the wreck of his ship, in a most praiseworthy manner, while many of them had scarcely clothes to their backs, and was persevered in until the 7th of August, when I arrived off the mouth of the river with the Vincennes and Porpoise. Circumstances rendered it necessary for me to take command of the Porpoise, and to send the Vincennes, (after the necessary exchanges of officers had been made,) under Lieutenant Commandant Ringgold, to San Francisco.

After the departure of the Vincennes, I examined the progress that had been made in the survey, and saw the necessity of changing the whole plan of it, in order to expedite the duties we were required to perform. Orders were given accordingly to erect signals at suitable points for the triangulation, which occupied us some six days.

A part of the middle sands being bare, and occupying nearly the centre of the bay, offered a most excellent *point d'appui* for a survey of the harbor. This was taken advantage of, and chosen as my principal station, forming the apex to several triangles that embraced the whole extent of the bay. When all was prepared, on the 16th August, Lieutenants Perry, Maury, North, and De Haven, and acting Masters Baldwin and Sinclair, were ordered to occupy the main points of the triangles, with instruments and bombs for measuring angles, and obtaining bases by sound. These points had been chosen particularly with reference to the facility for being observed upon by the sounding parties to be employed in the bay, on the bar, and in the north and south channels. In order to effect the most direct communication between the one in Baker's bay and the cape, a long avenue was cut through the trees on Cape Disappointment.

The whole material, including measurement of angles, sides, astronomical observations for latitude, longitude, and azimuths, was obtained in a few hours, and under the most favorable circumstances. The stations chosen by Captain Hudson and Lieutenant Perry were also incorporated into the survey, and the measurements by sound compared, and found to agree with their measured base by a chain, on ground favorable for the purpose. By the following day this work was all calculated and projected. From this, the survey of the Columbia river began.

Now as respects the duties performed by acting Master Knox, in charge of the Flying Fish, with two boats of the Peacock, they are embraced in the following instructions; and two skeleton charts of the river, containing all the points established, were with them handed to him, to fill up the soundings and establish the minor shoals and points. The following is a copy of these instructions:

Copy of orders to Passed Midshipman Knox.

UNITED STATES BRIG PORPOISE,
Off Astoria, August 16, 1846.

SIR: Accompanying this you will receive two skeleton charts, embracing the mouth of the Columbia river, and as far up as Tongue point.

Although I have pointed out to you, verbally, the duty that is to be performed, and the manner in which I wish the work you are intrusted with executed, I think it proper to give written directions as to your manner of carrying it on.

1st. You will be very particular to prevent any unnecessary risk to your vessel, her crew, or boats, for you must be well aware that on her and their preservation much of the future duties of the expedition depend. Although the Flying Fish is well adapted to the performance of the duties you are about to undertake, yet it is very necessary to be cautious in not risking too much, even in her.

2d. The points of the main triangulation have been conveniently located, and can be easily distinguished from the bar, and in the north and south channels, and will be seen whenever the weather will permit you to work there.

3d. In taking up a position with the Flying Fish, you will always place her, by angles, on three or more points of the main triangulation. When fixed, you will at once mark the stations on the chart; then you will radiate the lines of soundings with the boats from the schooner, establishing the radiating lines of the boats by observations from the schooner, either by azimuths, or angles, or signals. The officers in the boats will fix the end of the lines sounded by the height of the mast of the Flying Fish, when at a short distance; and when more remote, by three or more points, the schooner being one of them.

4th. The soundings must be transferred to the chart as soon as possible after they are taken, in order that you may see the actual progress you are making, and to allow you to verify any points, or fill up any omissions.

5th. When the sounding lines reach the shore or sand banks, they must be fixed by three points of the triangulation. These minor points will enable you to trace the shore line with accuracy, and sketch in from station to station. I need not say to you that it is of importance they should be accurately observed, attended to by yourself, and as numerous as possible.

6th. I apprehend much difficulty in your work in the north and south channels, as the tides are extremely rapid, and it will be seldom that the boats can be used, except near slack-water. Slack-water, though of short duration, will afford you time to effect much in, if properly improved. You must at all times be cautious in using the boats when the tide is strong.

7th. You must not remain at anchor outside the capes, in either channel, over nightfall. You will either anchor in Baker's bay, inside Cape Disappointment, or within point Adams, on the Clatsop shore.

8th. The bar and channels outside the capes will claim your earliest attention. Every favorable opportunity that the weather presents must be improved to complete those parts of the work. When the weather

proves unfavorable for that part of the work, you will be able to employ yourself in the river above the middle sands, or about Astoria.

9th. A tide staff will be kept at Astoria; but you will, while employed in sounding, note particularly the variation of the depth of water alongside, and the time; your soundings will be reduced accordingly.

10th. You will apprize me of your proceedings from time to time, and immediately if any accident should befall you.

Mr. Eld and his party are daily expected from Gray's harbor; you will render him all the aid in your power. Mr. Colvocoresses is ordered to report to you for duty. If you have duty for him, detain him; if not, let him join me at Vancouver.

Wishing you success in carrying out these instructions, I am, with respect, yours, &c.,

CHARLES WILKES,
Commanding Exploring Expedition.

Acting Master SAML. R. KNOX,
Commanding Flying Fish.

In obedience to these orders, acting Master Knox proceeded to fill up the soundings. Having found that he has given an erroneous impression (probably from memory) relative to the entrance and harbor, I herewith give copies of his reports to me; which, being written at the time and during the progress of his work, give a different impression, and, no doubt, a correct one.

Mr. Knox to Captain Wilkes.

SCHOONER FLYING FISH,
Fort George, August 28, 1841.

SIR: Mr. Eld, with his party, arrived yesterday, and I came up to this place with them in the afternoon. He will leave for Vancouver to-day, if possible.

I have been obliged, while awaiting his party, to work in the vicinity of Cape Disappointment, and have sounded and laid in the shores from the cape as far up the bay as a line between the Sand island and the small river emptying into the bay. The weather, excepting four days, has been rough, so that I could accomplish very little. I anchored once in the passage outside the cape, but was obliged, by the setting of the sea, to leave it very soon afterwards. Last Tuesday night, while at anchor on the northern side of the Sand island reef, the tide running very strong, the two boats swamped; and the Polly broke adrift, and probably went to sea. I did not leave to communicate the loss to you, as the weather proved so fine up to yesterday that I thought it best to get on as fast as possible with the remaining boat. I have taken the Pearl, and have required some oars from Mr. Birnie. I shall be able to use her inside.

Dr. Palmer has advised that I should leave William Fenno on shore, (sick,) and he has given me a man in his place. It is calm now, and the tide flood. I shall leave as soon as possible, and sound through the Clatsop channel, which I hope to finish in a day or two.

I am at present sick, but can get on with the work. I send Mr. Colvocoresses up, as I have no duty for him.

Very respectfully,

SAM'L R. KNOX,
Acting Master, commanding Flying Fish.

CHARLES WILKES, Esq.,
Commanding U. S. Exploring Expedition.

Mr. Knox to Captain Wilkes.

U. S. TENDER FLYING FISH,
At the Bar, September 8, 1841.

SIR: Your letter of 2d instant has just reached me. Since I wrote by Mr. Eld, I have filled up the Clatsop channel and the passage leading from the cape, out as far as that leading to sea.

I have done nothing more to the bay than what I mentioned in my last.

I have only been able to sound on slack water, as the tide runs with such force that the boats can do nothing in it. I also experienced great difficulty in getting the schooner to the stations necessary for operating, and find it impossible to remain in the outer passage with the flood-tide and sea breeze.

I do not think I shall be able to finish this part of the work in less than ten days, should I have good weather all the time.

I shall give my whole attention to this, until it is finished.

Respectfully, &c.,

SAM'L R. KNOX,
Acting Master, commanding Flying Fish.

CHARLES WILKES, Esq.,
Commanding U. S. Exploring Expedition.

It will th[illegible]e be seen what the experience of Mr. Knox was, from his own lett[illegible]n his letter published a short time since in the "Union," he has attempted to give directions for entering the river. These are both *incorrect* and *incomplete;* they do not correspond, and cannot be used with the chart, which all acknowledge to be correct. For instance, he speaks of Point Ellice as synonymous with Young's Point, when they are in fact on opposite sides of the river; and takes no notice whatever of the position of the greatest danger, viz: the end of the north spit. On this spit the greatest danger exists; nearly all the accidents have happened on it, or on the middle sands. Thus much for the share he took in these duties.

The survey up the river was conducted with six boats. They were separated into three divisions, viz: van, middle, and rear. One of each division was ordered to confine its operations to the same side of the river.

All the signals on the right hand side of the river were made numerical, while those on the left side were alphabetical; thus the officers had no difficulty in recognising a signal, and naming it at once. The two van boats were employed in putting up the signals, and observing the back angles; the middle division, both the forward and back angles; and the rear division, the forward angles. The van and middle divisions were also provided with bombs for the measurement of bases by sound, which

they were all to note. I superintended the whole, and took astronomical bearings at the several points that I deemed most effective to establish the lines of bearing.

The river was triangulated in this way. As a further check upon the operations, the two brigs anchored alternately in sight of each other. Guns were fired by them, and the distance by sound ascertained; the astronomical bearing being observed at each station, and a round of angles measured on all the signals in sight. Besides this, they were brought into the series of triangles by the boats, and became fully incorporated into the survey.

Under these regulations the operations were easily governed; each officer knew what he had to perform; and if I wished to change the order of duty, or establish any point more carefully, I had only to leave a memorandum to that effect at one of the signals, or observe with my theodolite.

Some little difficulty was at first experienced in turning the sharp bends of the river; but this was easily overcome, by creating what I termed *flying stations*, either by ordering a boat or one of the brigs to anchor, and connecting the whole together by two or three small triangles.

The signals were all left standing, until our return down the river, for filling in the soundings.

On our arrival at Vancouver three boats were sent with Lieutenants Walker, Maury, and acting Master Sinclair, to carry on the survey in a similar manner forty miles above that place, to the head of navigation of the Columbia; and also another party, consisting of Lieutenants Perry, De Haven, and acting Master Baldwin, as far up the Willamette as the falls.

On our return down the river, a diagram from the original projection was pricked off, and the lines drawn on it that each boat was required to sound out. These in the evening were returned, and others substituted the next morning; so that each day's work was distinct and perfect within itself. The sketching in of the shores was generally done by myself; though each officer was required, if he did not happen to strike a station at the end of his line of sounding, to fix his position by angles on three or more points, and to sketch in the shores in the vicinity.

As we proceeded up the river I occupied three stations, at a distance of about thirty miles apart, and determined their latitude, longitude, and variation.

In order to guard against liability to sickness from the exposure of the officers and men, I gave orders that no boat should leave the vessels before 9 a. m.; and that all should return half an hour before sunset, at which time the awnings must be spread, and curtains drawn close around. This course was adhered to during the whole time we were engaged; from which precaution, and insisting upon their having dry clothes on, and the great care of Dr. Holmes, (to whom I feel much indebted for his exertions,) I impute in a great measure their preservation from sickness during the sickly season.

These arrangements also afforded ample time for the work to be calculated and projected before the next day, and enabled me to see that nothing had been omitted or overlooked. The progress we were enabled to make each day was from ten to fifteen miles, and proved very satisfactory.

Surveying duty, to be conducted in this manner, requires practice on the

part of the officers, and much attention. The emulation among the men serves to obtain their utmost efforts, and the regularity of working hours enables all to have time, avoid hurry, or confusion. The crews every morning were inspected before going to work, and in the evening after their return.

It affords me great pleasure to acknowledge the spirit and manner in which both officers and men conducted the work; at the same time carrying on all the duties appertaining to the repairs and outfit of the brigs, &c.

Those engaged in the survey were: Captain Hudson; Lieutenants Walker, Perry, Maury, North, and De Haven; acting Masters Baldwin, Sinclair, and Knox; Passed Midshipmen Harrison and Reynolds, and Midshipman Blair; Drs. Palmer and Holmes; Pursers Waldron and Speiden; and Clerks Howison and Stuart.

The survey of the Columbia to the highest point navigable, one hundred and twenty-five miles from its mouth, with its various branches and inlets, together with the Willamette and Cowlitz, occupied from the 16th of August till the 10th October, a period of fifty-five days.

The following are the sailing directions given by me to Commodore Dallas, in 1843:

SIR: Although I cannot offer you the full sailing directions for the bar and entrance of the Columbia river, I send you the following abstract of my *notes*, from which they will be drawn up.

The entrance to the Columbia river may be considered at all times dangerous, owing to the heavy breakers, cross tides, their velocity, and the influence of an under current on a vessel drawing much water, besides the distance of any thing like sailing marks for the channel, which not unfrequently become more or less indistinct when the state of the weather will permit of entrance; and from a want of due attention to them, a vessel may be swept ashore without receiving any notice whatever from the compasses. Compass-bearings are, in short, of but little, if any use, in entering the river.

It is safest to enter on the ebb-tide, with the usual northwest wind, which sets in about ten or eleven o'clock, a. m., during the summer months. The entrance should never be attempted with a flood-tide and northwest wind, unless the Clatsop channel is followed, and the sea is smooth.

After making Cape Disappointment, which is easily distinguishable by the dark hummocks and tall pines, trimmed up, with the exception of their tops, you may lead in for it on a northeast bearing, if to the southward; if to the northward, you may run in until you have that bearing on. A hummock, or saddle-hill, to the northward, on with the outer part of the cape-land, will give you notice that you are on the bar, in 4½ or 5 fathoms water: in ordinary weather, the outer line of the north spit is readily perceived by the rollers breaking; the inner line is always perceptible: when Young's Point is open with dead trees on Point Adams, you will be to northward of the end of the north spit, and may run down along it until those two points are on range; then haul in for Point Ellice, or the green patch on Chinook hill; if intending to take the channel by the cape or old channel, watch the opening of *Leading-in cliff*, with the inner point of the cape, and, as it comes on, haul up directly for it, (the cape,)

and steer in; you will then have doubled close round the north breaker, in 7 fathoms water; and it is better to keep the north spit close aboard if the wind is not so scant as to oblige you to beat up for Cape Disappointment: on opening Green Point, you must go about; it is not safe to go nearer the middle sand. On ordinary occasions, there will be scarcely ever a necessity to tack; the ebb-tide on your lee bow will keep you sufficiently to windward.

The cape will be required to be passed close aboard, in order to avoid the *sand spit* making off from the *middle sands* towards the cape; the two outer bluffs of the cape, in range, will strike it: after you have passed this range, you may steer into Baker's bay, and, having passed an opening in the wood on the cape, you may anchor in from 7 to 10 fathoms: in passing the cape, care must be taken not to be becalmed by it; if this should happen, the only resource is to down anchor at once, and wait a favorable tide; the current will be found very strong; it sometimes runs from 5 to 6 knots an hour—a perfect mill-race—and no boat can make way against it when at its strength.

If desirous to proceed up to Astoria, and one of the native pilots is not to be had, the only precaution necessary in proceeding up is to keep the small islet in the *cove* of the cape open until you have the *dead trees* nearly S. S. E., (compass,) and then steer over for them; as it will be probably young flood, it is necessary to keep the starboard or sand island side of the channel, and if near high water, this island, in running up, must be kept open on the starboard bow; otherwise, the approach to it would be too near for safety: on reaching the Clatsop channel, steer up for Young's Point, keeping in 5 or 6 fathoms water; the sand-shoals on either side are very bold; when abreast of Astoria, moor with an ebb and flood anchor, with open hawse, to the northward and westward.

If the intention be to take the Clatsop channel, the same directions are to be observed in passing the north spit. When the Leading-in cliff is open, instead of hauling up for the cape, steer direct for the Clatsop village on Point Adams, which will take you into fair channel-way; the breakers on each side will be visible: keep in the middle and steer up for Young's point, following the directions as before given.

In coming out, the state of the bar may be distinctly seen from the top of the cape, but due allowance must be made for the distance: the surf beating on the cape is a good guide; if there is much of it the swell will be very heavy and sharp between the north and south spits, if it does not actually break: the best time is with a northwest wind and about half ebb; you will then have tide enough to carry you to sea.

I look upon it as always dangerous to drop anchor in the channel between the cape and the end of the north spit; if it is done, it should only be in case of absolute necessity, and not a moment is to be lost when possible to proceed out or in: if the ship gets off with only the loss of an anchor, she may consider herself fortunate. The sea breeze or northwest and westerly winds blow at times very fresh; a sure indication of them is a thick hazy bank in the west, to seaward.

I hope these directions may be of use to you. After any one has gone into the Columbia river and out again, he will be very lucky if both his patience and anxiety are not worn out; I know of no place where it is so likely to be tried.

The end of the south spit is less distinctly marked than that of the

north, but generally a deep swell will be perceived to form on it without breaking; avoid at all times to approach it too close.

The sea is much heavier on the bar with the flood-tide. The second sheet of the Columbia river shows the new and direct channel above Tongue point, explored by the expedition; it is convenient, and avoids all detention as to tide and liability to ground; the pilots are unacquainted with it. From off Tongue point steer direct for Bare bluff, until up with west end of Termination island, and then for the dead tree on that island. The chart will, however, be your best guide.

I am, very respectfully, &c., &c.,

CHARLES WILKES.

Com. A. J. Dallas, *U. S. N.*, *Washington.*

Washington, *April* 20, 1843.

Since these directions were written, I have little to add except some general cautions. 1. The entrance should never be attempted when the passage between the north and south spits is not well defined by the breakers on them; it is equally dangerous, whether it be concealed by the sea's breaking all the way across, or so smooth as not to show any break.

2. With a moderate breeze, the wind is apt to fail, or fall light, in the passage between the north and south spits, and leaves a vessel at the mercy of a strong tide and heavy swell.

3. The best time to enter and depart is after half ebb and before quarter flood; the tide then runs direct through the channels, and is confined to them: with the prevailing westerly winds, for those intending to take the north channel, the best time to enter is after half ebb, though the wind may be scant; yet the ebb tide, acting on the lee bow, will enable the vessel to keep to windward and avoid the spit on the middle sands. The south and southeast winds seldom prevail—they blow during the winter season; the anchorage in Baker's bay during the gales from this quarter is rough and much exposed.

I am, repectfully, your obedient servant,

CHARLES WILKES.

Washington City, *August* 2, 1846.