3983
3984

Diag. Cht. No. 1240-1.

Form 504

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

11—5613

State: Georgia

DESCRIPTIVE REPORT.

Sheet No. 3983
3984

LOCALITY:

Coast of Georgia

1916-1917

CHIEF OF PARTY:

P. C. Whitney

3983-4

Descriptive Report

To accompany Hydrographic Sheet No. 3983
In two parts. 3984
Off Coast of Georgia,

Surveyed during 1916-1917

by

U. S. S. Bache.

Area-- The field work on this sheet was executed between Feb. 2nd. and May 18, 1916, and between Jan. 20, 1917 and May 23, 1917. The work lay off the coast of Georgia, extending North to Latitude 32°-05', off Port Royal Sound, and from approximately the 3 fathom curve (about 4 miles from shore) to the 100 fathom curve. The Northern limit of the work extends from Lat. 32°-05' N. in an S.E. x E. direction to Lat. 31°-30' N., the Southern limit extends in an E. x N. direction, at lat. 31° 07' N., making an area of about 4,000 square statue miles.

The sounding lines were spaced 1 mile or less apart from three fathoms to include the generalized ten fathom curve, except north of latitude 31° 50', near Tybee River Entrance where lines were run about $\frac{1}{2}$ mile apart. This increase in density of lines was in conformity with the instructions issued for the second season's work. Beyond that depth the lines were spaced two miles apart to the outer limit of the inshore sheet, or approximately thirty miles from shore. Beyond this distance, or on what we designated as the off-shore sheet, the lines were run four miles apart to the one hundred fathom curve, or till they connected with the previous seasons work to the south and north. All the lines were run in a S. E.x E. direction, which is normal to the general coast line in this vicinity. At places where soundings indicated shoals further development was made by running additional lines over the area in question. For the most part,

however, the bottom was very uniform and very little development was necessary.

Control of the Work

In order to carry fixed positions to the greatest possible distance tall hydrographic signals were built by a special signal-building party under Assistant Joachims for the work in the spring of 1916. The signals on the north end of the sheet were erected by a party under Assistant Maher, but during heavy gales the last part of January, 1917 three of these were blown down and considerable time had to be used in this party rebuilding them. On two or three of the signals, as an experiment, were placed curved targets. This increased the area visible to point on from positions up and down the coast relative to the signal. In my opinion curved targets are an improvement over the flat face target and their use is recommended on all signals in the future. It is also essential that there shall be a proper distribution of white and black on the signal to insure maximum visibility under all conditions of light and back ground. Each location should be studied separately taking into consideration the direction the target is to face, the direction the majority of the work is relative to the signal, the amount of sunlight that will fall on the target and the character and height of the back-ground. I believe a little thought placed on these items will insure a greatly increased range of visibility without any increase in cost. For instance, when a hydrographic signal is erected where it is surrounded by trees of various heights it is necessary that the signal carry a great surface of white otherwise at a distance it will be hard and at times impossible to distinguish the signal from the trees. As a rule it is best to put the white target under a black one, the white reflecting sunlight and the black one showing against

the sky.

The locations of these signals depend upon triangulation executed by the signal-building parties. It is presumed that this data is on file in the Office.

In order to increase the distance offshore that fixed positions might be obtained, buoys of the can and whistle type were planted in selected positions about four miles apart in a line 11 miles offshore. These buoys were obtained through the courtesy of the Bureau of Lighthouses and were placed by their tenders under instruction from the Inspector of the Sixth District. The positions of the buoys were quite accurately located by cuts from successive anchorages of the ship. These angles will be found recorded for the 1916 work in the volume of angles and for the 1917 season on page 59 volume one of the sounding records. To increase the range of visibility of these buoys superstructures were built on them and frequently angles were taken on them at a distance of seven miles. The can type buoys had superstructures in the form of light angle-iron quadrupods supporting a 2" x 2" wooden flag-pole on the top of which were placed cylindrical targets covered with ordinary black fly-screening. An additional target was made by fastening screening around the quadrupod. This light structure offered very little resistance to the wind and was visible at a greater distance than the black flags previously used.. The whistle type buoys had superstructures of heavy gas-pipe, that was left over from the previous season. This type of structure was unable to withstand the severe gales which frequently blew, but were blown over and twisted out of shape so that they were of little value.

Method of Sounding

The methods of sounding in both seasons were similar to that used in the previous season of 1915. To a depth of about 15 fathoms the hand lead

was used exclusively. Beyond that depth and to a depth of about 30 fathoms sounding were taken with a trolley rigged along the side of the vessel, the lead being carried forward by gravity, tripping by striking a boom and the sounding being taken the instant the ship came over the lead upon the bottom, that position being indicated by the vertical lead-line. The intervals of sounding were regulated to the various depths of water, sufficient time being given in each case for a vertical sounding. In greater depths than 30 fathoms the Sigsbee sounding machine was used, the ship being stopped for each sounding.

Survey Methods

The work consisted of:-

(1) Inshore Hydrography.

(2) Offshore Hydrography.

(1) The inshore hydrography consisted of all work wherein sextant angles fixed the location of the ship on the sounding line. It extended offshore to a short distance outside of the buoys. However, at times a continual spell of hazy weather would necessitate offshore hydrographic methods of locating the ship. The hand lead was used exclusively for this work and the speed of the ship regulated as nearly as possible to 5 miles per hour. The work was plotted in the usual method with a three arm protractor.

(2) Offshore hydrography consisted of all work not classed under (1), being lines run by dead reckoning over that part of the area covered east of the line of buoys.

Every precaution was taken in this class of work to eliminate every source of error possible. To insure as complete a knowledge of the log factors as could be obtained, log tests were made at the beginning of each season.

For the first season the logs were calibrated in St. Simon River. A course was laid out approximately a mile in length on the Turtle River Lower Range, with the red Nun No. 20 as a marker at one end and a small marker buoy placed at the other end . These buoys were located by sextant angles on triangulation stations and their positions plotted on a 1/10,000 projection. The exact length of course was obtained by scaling the distance between them. As the tidal current on this range sets fair with the course, no side set of the current had to be made to the mean of each double run. Two tests were made at full speed and three at sounding speed and excellent agreements were obtained. These tests are found recorded in the volume of angles already sent to the Office. For log coefficients for the second season similar tests were made off the entrance of the Savannah River. These observations were recorded on page twelve
58, and volume ~~xxx~~ of the sounding records.

To insure that proper allowances were made for currents, the vessel was anchored at the beginning and ending of every line and at two hour intervals, to observe the velocity and direction of this factor. These observations were obtained by means of the familiar current pole and line, used in connection with a pelorus and the quarter-deck compass. Every effort was made in this work to get as nearly perfect an observation as possible. A longer time interval than thirty seconds was experimented with, such as one or two minutes for the run out and it is thought that accuracy can be gained this way. For observations in the Gulf Stream, a buoy was anchored with 300 fathoms of braided wire. A small boat was with the observing party in it was brought alongside of this buoy and the velocity of the current measured by the current pole and line.

The direction of the current was measured from the ship by taking a compass bearing when the current pole and buoy were on range with the ship. To do away with the inaccuracies attendant upon picking up the buoy and its anchor, they were left in place. In this way departure from this current station was made from the exact spot where the barrel was put over at the end of the line. The small cost of the anchor and buoy was more than compensated by the increased accuracy of this method. The current observations were all recorded in the record of Current Observations.

The deviations of all compasses were determined by means of a ship swing at St. Simons Sound in 1916 and off Wassaw Sound in 1917. Attention was paid to the quarter-deck compass as upon it depends the direction of the currents.

Wind velocities were observed at every anchorage, for the purpose of determining our leeway and the effect that the different strengths of wind had on the direction and rate of current flow. The direction and velocity of the wind at times would produce marked changes in the tidal currents, upsetting entirely our predictions. The resultant current produced from a combination of the tidal effect and the wind was very hard to predict, and this was one of the big sources of error we had to contend with in the work.

Leeway was estimated, partly from previous leeway made under known conditions and partly frequent observations of the angle between the keel and the wake-line. To aid us in those observations a method was used of pouring a few drops of heavy oil on the water. This would cause a "slick" which could be seen at quite a distance astern and from this "slick" an angle of leeway would be estimated. It was assumed that the

wind had very little effect on the film of weir for a short time, the oil being only influenced by the movement of the surrounding water.

Plotting Methods

As every line of soundings in the off-shore hydrography started from some known point, i.e., a three point location or bearings on one of the buoys with an estimated distance, which distance was always small, this point was plotted on the sheet and the line was supposed to originate from it. The course steered was than plotted as a straight line and the distance run plotted from the log readings corrected by the log factor (Note: two logs were read during 1917 and the mean of the two were used). This new point was corrected for leeway. (Note: in 1917, the leeway was combined with the deviation and variation and plotted at once). The cuurent offset was next plotted, the average current being determined by making a graph of the current at the start and end of the two hour run, taking a common initial point from which each value obtained is plotted in true direction and amount and passing a smooth curve through their ends. A mean direction and amount was then estimated and used for the current drift during the two hours. This was applied in the proper direction and amount to the point aforsaid and the new point was considered the new known point and the process repeated until the end of the line. The finish of the line always was a known point similiarly located as the beginning of the line as just described. The final error of closure, which was the difference between the location of the end of the line by the best process of dead-reckoning and the true location by angles, was then adjusted in proportion to the time consumed in actual running and the final adjusted line plotted as the best known value. After this final line was laid down on the sheet a new log factor was determined for that

line, by comparing the total adjusted distance with the distance by log and each log reading plotted as a position and given a number on the smooth sheet corresponding to that recorded in the records. The preliminary lines were then erased to avoid confusion.

Other Details

Astronomical observations were made at intervals when conditions were favorable. These were recorded and plotted in a separate volume. I have not made any detail study of them to compare the results of location given by them and dead-reckoning. The method used in computing these sights is the Marcq Saint Hilaire.

Surface temperatures were obtained every hour while sounding to thirty fathoms and at every sounding from that depth to the one hundred fathom curve. Bottom temperatures were obtained at every current station and every sounding outside the thirty fathom curve. Psychrometer readings were made every hour while sounding. Bottom specimens were taken usually every half hour to the thirty fathom curve and then at every sounding. All these observations will be found recorded in the sounding records.

Accompanying this sheet, which consists of two parts, one on a scale of 1/80000 and the other 1/200000, are twenty volumes of sounding records, one volume angles, seven volumes current observations, two volumes offshore logs, one cahier tidal observations, Tybee Knoll, three volumes Tide, St. Simons Sound, one volume, Leveling Record and one volume Sights. In the off shore logs will be found a digest of all the dead-reckoning work and was used by this party to assist in plotting that character of hydrography.

Tidal data for the reduction of the hydrography was secured as follows:- during the 1910 season we had an observer reading tides onthe

wharf St. Simons Island. The staff was set from the Coast Survey Bench Mark on St. Simons Lighthouse. These observations were duly recorded in three volumes of Tides. By office letter I was instructed to read tides at this station during the day only. For tidal reductions of hydrography executed at night recourse was to be made to the predicted curve at Fernandina, Florida. During the season of 1917 tidal data was obtained from the automatic gauge of the U. S. Army Engineer's, located offthe end of the southern jetty, Savannah River Entrance and Known as the Tybee Knoll Gauge. A cahier of Hourly Heights from the marigrams of the Gauge forms part of the original records of this sheet..

Respectfully submitted

Chief of party, C. & G. Survey.

U.S.COAST & GEODETIC SURVEY STEAMER BACHE

STATISTICS FOR HYDROGRAPHIC SHEET NO. 3983 3984

OFF COAST OF GEORGIA 1916 - 1917

ST.SIMONS SOUND TO PORT ROYAL SOUND

TIDE GAUGES AT:- St.Simons Island Ga. for 1916
Tybee Knoll, Savannah River Ga. for 1917.

Day	Letter	Volume	Positions	Soundings	Miles of Soundings (statute)	Bottom Specimens	Bottom Temperatures	Surface Temperatures	Psychrometer Observations
Feb-16-'16	A	1	27	267	22.0	-	3	8	5
" 17 "	B	1	43	505	46.0	-	5	19	18
" 18 "	C	1	28	272	26.3	-	3	7	7
" 23 "	D	1	41	439	38.0	-	5	12	10
" 24 "	E	1	32	342	30.4	-	3	9	9
" 28 "	F	2	29	292	27.5	-	4	9	9
" 29 "	G	2	22	189	18.0	-	3	5	5
Mar-10-'16	H	2	36	339	34.5	-	4	8	8
" 13 "	J	2	27	303	30.5	-	3	7	7
" 14 "	K	2	66	652	75.0	1	8	15	15
" 17 "	L	3	70	591	45.0	1	2	9	9
" 21 "	M	3	70	801	33.0	2	3	8	8
" 22 "	N	3	56	383	27.5	1	1	4	3
" 27 "	P	3&4	104	935	47.1	9	-	-	-
" 28 "	Q	4	151	1192	62.0	7	-	-	-
" 29 "	R	4	61	461	30.5	8	3	4	4
" 30 "	S	5	32	323	29.5	2	-	-	-
Apr- 3-'16	T	5	51	391	19.0	-	-	-	-
" 4 "	U	5	66	517	23.0	5	-	-	-
" 5 "	V	5	44	435	50.5	12	4	19	18
" 6 "	W	5&6	54	578	54.0	11	3	11	11
" 10 "	X	6	94	668	36.0	11	-	-	-
" 11 "	Y	6	152	1064	55.0	23	-	-	-
" 12&13 "	Z	7	111	1316	112.0	29	11	25	28
" 17 "	A'	7	49	315	13.8	7	-	-	-
" 18 "	B'	7&8	149	1154	50.6	16	-	-	-
" 19 "	C'	8	57	457	35.8	17	4	8	8
" 20 "	D'	8	29	251	29.0	8	4	8	8
" 25 "	E'	8	80	621	37.5	13	4	8	7
May- 3 "	F'	8&9	131	1064	57.5	20	-	-	-
" 4 "	G'	9	31	276	29.0	10	3	7	7
" 5 "	H'	9	78	648	50.0	18	2	6	6
" 9&10 "	J'	9&10	140	1041	148.0	55	29	22	33
Carried forward			2211	19080	1423.5	286	109	288	243

Day	Letter	Volume	bPositions	Soundings	Miles of Soundings (statute)	Bottom Specimens	Bottom Temperatures	Surface Temperatures	Psychrometer Observations
Brought forward			2211	19080	1423.5	286	109	288	243
May-12-'16	K'	10	58	541	58.0	19	5	12	11
" 17 "	L'	10&11	64	564	56.5	19	6	13	13
" 18 "	M'	11	59	485	55.3	18	4	13	13
Jan-26-'17	A''	12	104	767	39.0	-	-	-	-
" 27 "	B''	12	57	375	20.0	-	-	-	-
Mar-15-'17	C''	12	30	322	31.0	12	4	9	8
" 16 "	D''	12	18	210	14.0	6	1	4	4
" 22 "	E''	12&13	24	177	7.5	3	-	-	-
" 28 "	F''	13	93	536	31.5	10	-	-	-
" 29 "	G''	13	175	1446	70.0	15	-	-	-
" 30 "	H''	14	58	585	59.4	17	5	10	10
" 31 "	J''	14	85	614	33.0	9	-	-	-
Apr-17-'17	K''	14	56	483	45.0	10	2	5	5
" 18 "	L''	14&15	127	974	47.4	11	-	-	-
" 19 "	M''	15	64	469	20.6	7	-	-	-
" 20 "	N''	15	25	287	31.0	5	3	5	5
" 23 "	P''	15	79	605	30.0	5	-	-	-
" 24 "	R''	15&16	124	1119	63.3	16	-	-	-
" 25 "	S''	16	132	1328	72.5	22	-	-	-
" 27 "	T''	16	40	410	49.0	11	4	8	8
" 28 "	U''	16&17	63	475	31.5	4	-	-	-
" 30 "	V''	17	30	251	30.0	7	3	4	4
May- 1-'17	W''	17	55	413	22.0	5	-	-	-
" 2 "	X''	17	130	853	62.5	14	-	-	-
" 3 "	Y''	17&18	37	390	47.0	12	4	9	9
" 4 "	Z''	18	40	326	21.4	5	-	-	-
" 9&10 "	A'''	18	121	656	109.0	33	38	48	17
" 11 "	B'''	18	63	544	56.0	19	5	8	8
" 15 "	C'''	18	55	486	32.2	9	-	-	-
"15&16 "	D'''	19	124	483	123.0	49	32	38	16
" 17 "	E'''	19	58	571	57.5	17	6	14	9
" 18 "	F'''	19	65	574	51.0	16	2	10	9
" 22 "	G'''	19	13	120	8.5	-	-	-	-
" 23 "	H'''	20	81	658	40.0	6	-	-	-
TOTALS			4628	38177	2949.1	697	233	498	392

SHIP SWING

March 9,1917.
Off Entrance to
Warsaw Sound

Lat. 31°- 52' N
Long. 80°- 50' W

Deviation	Ship's Head By Standard Compass	True Course (Declination -10')
(-) 0-49	0	359
(-) 1-08	10	8-1/2
(-) 1-22	20	18-1/2
(-) 1-28	30	28-1/2
(-) 1-32	40	38-1/2
(-) 1-31	50	48-1/2
(-) 1-18	60	58-1/2
(-) 0-55	70	69
(-) 0-32	80	79-1/2
(-) 0-05	90	90
(+) 0-23	100	100
(+) 0-50	110	110-1/2
(+) 1-14	120	121
(+) 1-36	130	131-1/2
(+) 1-53	140	141-1/2
(+) 2-03	150	152
(+) 2-06	160	162
(+) 2-03	170	172
(+) 1-57	180	182
(+) 1-47	190	191-1/2
(+) 1-37	200	201-1/2
(+) 1-25	210	211
(+) 1-15	220	221
(+) 1-07	230	231
(+) 1-02	240	241
(+) 0-58	250	251
(+) 0-57	260	261
(+) 0-57	270	271
(+) 0-56	280	281
(+) 0-54	290	290-1/2
(+) 0-50	300	300-1/2
(+) 0-40	310	310-1/2
(+) 0-25	320	320
(+) 0-08	330	330
(-) 0-09	340	339
(-) 0-28	350	349-1/2
(-) 0-49	360	359

LOG TEST

March 9,1917
Off Tybee Light

True Dist

$$= \frac{\text{Log Dist}}{\text{Log Factor}}$$

Log Factors:

Number 117
Sounding Speed
= 0.994
Full Speed
=0.994

Number 119
Sounding Speed
= 1.014
Full Speed
=0.992

U.S.S.BACHE

QUARTER DECK COMPASS

Compass Heading	Deviation	Correct Mag. Heading
0	-9	351
10	-9	1
20	-9	11
30	-9	21
40	-8-1/2	31-1/2
50	-8	42
60	-8	52
70	-7-1/2	62-1/2
80	-7	73
90	-6-1/2	83-1/2
100	-5-1/2	94-1/2
110	-4-1/2	105-1/2
120	-3-1/2	116-1/2
130	-2	128
140	0	140
150	+2	152
160	+5	165
170	+8	178
180	+10	190
190	+12-1/2	202-1/2
200	+13-1/2	213-1/2
210	+14-1/2	224-1/2
220	+14-1/2	234-1/2
230	+14	244
240	+13	253
250	+11	261
260	+9	269
270	+6	276
280	+4	284
290	+2-1/2	292-1/2
300	-1	299
310	-3	307
320	-5	315
330	-7	323
340	-7-1/2	332-1/2
350	-8-1/2	341-1/2
360	-9	351

Ship Swing
Feb. 10, 1916
St. Simons Sound
Lat. 31° 08' N.
Long 81 50' W

Deviation	Ship's Head By Standard Compass	Magnetic Course
(-) 0-47'	0°	359° 13'
(-) 0-51	10	9 09
(-) 0-54	20	19 06
(-) 0-53	30	29 07
(-) 0-49	40	39 11
(-) 0-41	50	49 19
(-) 0-30	60	59 30
(-) 0-15	70	69 45
(+) 0-02	80	80 02
(+) 0-20	90	90 20
(+) 0-38	100	100 38
(+) 0-56	110	110 56
(+) 1-10	120	121 10
(+) 1-18	130	131 18
(+) 1-21	140	141 21
(+) 1-19	150	151 19
(+) 1-11	160	161 11
(+) 0-57	170	170 57
(+) 0-41	180	180 41
(+) 0-20	190	190 20
(+) 0-00	200	200 00
(-) 0-19	210	209 41
(-) 0-37	220	219 23
(-) 0-51	230	229 09
(-) 1-01	240	238 59
(-) 1-07	250	248 53
(-) 1-09	260	258 51
(-) 1-06	270	268 54
(-) 1-01	280	278 59
(-) 0-55	290	289 05
(-) 0-50	300	299 10
(-) 0-45	310	309 15
(-) 0-41	320	319 19
(-) 0-39	330	329 21
(-) 0-40	340	339 20
(-) 0-43	350	349 17
(-) 0-47	360	359 13

ADDRESS
U. S. COAST AND GEODETIC SURVEY
WASHINGTON, D. C.

REFER TO No. 5-VEC

HYDROGRAPHY ETC., (HT) J.S.L.J.

CHARTS (H)

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON

March 5, 1918.

Chief, Division of Hydro. & Topog.: HCG

Chief, Division of Charts: ✓

LIBRARY

Place with descriptive report of hydrographic sheet No. 3983

DFT

Drawing Section.

Tidal reductions have been approved in 20 volumes of Sounding records for

HYDROGRAPHIC SHEET 3983 &
" " 3984.

Coast of Georgia
P.C.Whitney in 1916-1917.

Plane of reference is
Mean low water, reading

2.9 ft. on tide staff at Fernandina, Fla.
3.1 " " " " " St.Simon Island, Ga.
0.0 " " " " of U.S.A.Engineers staff at Tybee Knoll, Savannah River entrance.

Note:- Allowance was made for the difference in time of tide at the place of sounding.

L. P. Shidy

Acting Chief, Section of
Tides and Currents.

Applied to Chart 1240 Dec 1 1964 O. Svendsen