

4437

Form 504

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

State: N. Car.

31-5513

DESCRIPTIVE REPORT.

Hydrographic Sheet No. 4437

LOCALITY:

Vic. of C. Fear

Offshore

1924

CHIEF OF PARTY:

H.A. Cotton

4437

**REPORT OF THE
COMMANDING OFFICER
U.S.S. LYDONIA**

**Off-shore Hydrography, Coast N. Carolina,
Frying Pan Shoal River
May 6, 1924 to December 20, 1924**

*No descriptive report was
submitted with H. 4437.
This season's report is
submitted in its place.*

Aug 11, 1925 E.P.B.
AUG 5 11 54 AM '25

OFFICE

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SUMMARY OF FIELD WORK

- Instructions dated April 21, 1924.
- Commenced construction of two tall hydrographic signals west of Fort. Caswell May 8.
- Relieved Lieut. J.H. Hawley of command S.S. LYDONIA May 16.
- Established Automatic Tide Gauge at Fort. Caswell May 23.
- Commenced hydrography Frying Pan Shoal June 7.
- Finished observations for the location of Frying Pan Shoal Light-vessel June 14.
- Finished development about the 10 fathom curve July 22.
- Commenced topography and launch hydrography west of Fort. Caswell September 9.
- Finished development beyond 10 fathom curve Sept 26.
- Commenced construction of additional tall hydrographic signals west of Fort Caswell October 3.
- Commenced Precise Dead Reckoning work October 15.
- Finished Precise Dead Reckoning work October 31.
- Finished topography and launch hydrography west of Fort Caswell October 31.
- Commenced ship hydrography west of Fort Caswell Nov. 6.
- Additional work Cassin's Inlet November 12.
- Finished last tall hydrographic signal December 6.
- Finished ship hydrography west Fort Caswell December 20.
- Tidal observations with portable automatic tide gauge at Tabbs, Shalotte, and Lockwoods Folly Inlets during December.
- Log tests frequently throughout the season.
- Swung ship June 4, October 2 and December 18.

GENERAL

The following report covers the field work of the party of the U.S.S. LYDONIA from May 6, 1924 to December 20, 1924 under instructions to the Commanding Officer of the U.S.S. LYDONIA dated April 21, 1924.

This work was a continuation of the off-shore hydrography executed by the LYDONIA off the coast of North Carolina during the season of 1923. The development of the area about Frying Pan Shoals beyond the Light-vessel was to be given prior attention, the instructions requiring fixed position work for the 10 fathom curve while in the immediately surrounding area fixed position work was to be carried as far as practicable.

To the west of Fort Caswell the hydrography was to commence inshore and be carried offshore with the usual control of tall shore signals and offshore buoy signals.

The development of the deeper area to the 100 fathom curve was to be in accordance with the usual Precise Dead Reckoning control

The Instructions also called for the shore topography from Fort Caswell to beyond Tubbs Inlet.

The LYDONIA arrived (from Jacksonville, Fla.) off the Cape Fear river on Wednesday May 1st. An inspection of the working grounds found no tall signals standing west of Fort Caswell. As at least two of these signals were necessary to commence field work, the ship proceeded to Wilmington to secure the necessary material for their construction. On Monday May 6 the LYDONIA returned to Southport and commenced field work with the erection of the tall hydrographic signals OAK and FEN to the west of Fort Caswell.

During the season Wilmington was made the party's base for coal, provisions and supplies, the ship putting into there about every other week. The intermediate ^{week-end} was usually spent at Southport which was quite close to the working grounds and where water, ice and some fresh provisions could be obtained. During hot weather it is scarcely practicable for the LYDONIA to remain in the field two weeks without the latter supplies.

During May the two tall hydrographic signals OAK and FEN were built and Frying Pan Shoal Light-vessel was located by sextant triangulation.

The development of the area about Frying Pan Shoals required the attention of the whole party from June to September inclusive. Nearly half the time required for this development was devoted to placing and locating buoys. This was especially exposed position and unusual difficulties were encountered on account of buoys breaking adrift, sinking and shifting. The ten fathom curve development was completed during June and July and most of the development beyond the ten fathom curve during September. Practically nothing was accomplished during August on account of the prevailing unfavorable weather.

During October the Precise Dead Reckoning south of Frying Pan Shoal was executed and work commenced to the westward of Fort Caswell. The latter consisted of topography, inshore hydrography and the construction of additional tall hydrographic signals.

November and December ~~was~~ were spent in the continuation of the work to the westward of Fort Caswell.

On December 20, field work was discontinued and the LYDONIA proceeded to Wilmington and on Dec. 27th left Wilmington for Jacksonville Fla. in accordance with Instructions of November 29, 1924 relative to taking up work off the east coast of Florida.

LOCATION OF BUOYS

All the work about Frying Pan Shoals was out of sight of shore signals and the control depended upon the location of the buoy signals over the area to be surveyed. The usual method of locating off-shore buoy signals (cutting them in from anchorage positions of the ship determined by three point fixes from tall signals ashore) could not be used on this work as the buoys could not be seen from any position which could be located by three point fixes from shore signals.

Accordingly in order to secure initial positions it was necessary to ~~extend~~ extend sextant triangulation from shore with buoy signal stations. As the work commenced in the immediate vicinity of Frying Pan Shoal Light-vessel, the latter furnished an excellent initial position being both conspicuous and securely moored. The Light-vessel was moored with 135 fathoms of chain in a depth of ten fathoms which allowed a large swinging arc. To eliminate this possible amount of shifting in the buoy positions, the actual initial position was a hydrographic buoy signal (Eye) planted near by the Light-vessel with relative short scope and double moorings. But during the course of the work, little shifting was ever noticed in the position of the Light-vessel, it was practically always headed Southwest into the prevailing wind from that direction.

Location of Frying Pan Shoal Light-vessel

To locate the Light-vessel, a line of four buoys was placed west of the shoal and parallel to the line Cape Fear Light to Light-vessel. These buoys were about five miles apart, the inner one being directly opposite Cape Fear Light and the outer one nearly opposite the Light-vessel. The Lighthouse Service whistle buoy made an inside point in the scheme of figures.

Directions were observed at Cape Fear Light to all the buoys and to the Light-vessel. It is only on rare occasions of exceptionally clear weather that the Light-vessel and Cape Fear Light are intervisible and considerable difficulty was experienced in observing this line. All angles were observed at each buoy. At the Light-vessel only one angle could be secured, that between Cape Fear Light and the outer buoy; none of the other buoys could be seen.

The inner buoy was well located by three angles to shore signals and two theodolite cuts from shore stations. From this position, two quadrilaterals and one triangle, all strong figures, gave the position of all the buoys. The three outer buoys gave excellent triangles for the determination of the distance from Cape Fear Light to the Light-vessel. The mean of the latter distances with the direction observed at Cape Fear Light gave the position of the Light-vessel.

Seasons's report --cont'd

Location of Net of Buoys on Shoal

For the closer development (450 and 200 meter lines) on Frying Pan Shoals, two lines of hydrographic buoys were placed, one along the approximate line Light Vessel-Whistle Buoy "2A" and the other parallel to it and about five miles distant to the Northeast. These lines of buoys were approximately parallel to and on either side of the center-line of the shoal. Buoys in each line were spaced $2\frac{1}{2}$ - 3 miles apart and placed in opposing positions so that the buoy scheme formed a system of quadrilaterals reaching Southeasterly to Seaward. Sextant angles were observed at all the buoys and two distances between buoys (Eye - Far and Far - Gob) were determined by Precise Dead Reckoning runs with the ship. Using the measured distances as a base, the relative position of all buoys were determined as in a triangulation scheme. Sextant angles at the Lightvessel gave its position relative to the buoys as well as a relative direction to Cape Bear Lighthouse. As the actual position of the Light-vessel and the direction Lightvessel - Lighthouse had already been determined, this common position and direction fixed the position of the outer scheme of buoys.

The first location of these buoys had been by a Precise Dead Reckoning closed traverse, the closure of which was less than half a mile in a total run of thirty-five (35) miles. Hydrography had been started with the adjusted positions of the buoys as determined by this traverse but when fixes were changed from one line of buoys to the other, there were "jumps" of 500-600 meters. Accordingly the Precise Dead Reckoning method of locating the buoys was at once discarded and the sextant Triangulation method used.

To commence the work but eight buoys (four in each line) were located; as the work progressed, the net of buoys was extended. During the course of the work the buoys were continually sinking or dragging or breaking adrift and frequent relocations were necessary. After the location of End (Lighthouse Service Whistle Buoy "2A"), several buoys were located on the base FRY - END (Lightvessel - Whistle Buoy) by observing the angles at END and at the buoy in question.

Location of Buoys South and East of Shoal

About the shoal beyond the 10 fathom curve, the required development was not as close as for the work on the shoal and accordingly the buoys were placed further apart.

To the southward one East-West line of four buoys was placed. The buoy scheme for the determination of positions consisted of three adjoining triangles centering at the Lightvessel which was directly north of the center of the line of buoys. Sextant angles were observed at all the buoys and at the Lightvessel and one distance (FRY - EAR) was determined by a Precise Dead Reckoning Run with the ship. Orientation of the scheme was furnished by an observed direction at the outer buoy to whistle Buoy 2A (DON to END).

To the eastward two East-West lines of buoys furnished the control. In each line the first buoy was located from the base Lightvessel-Whistle Buoy 2A (FRY- END) and the second buoy from the first and Whistle Buoy 2A (END). The third and fourth buoys were located from the second by sextant angle directions and Precise Dead Reckoning distances. The latter distances were not measured directly but by measuring a three mile line from the center buoy normal to the line of buoys and determining the inter-buoy distances by sextant triangulation. In this way a three mile measurement not only gave an effective eight mile distance but the measure was probably more accurate as it could be done in such time as to eliminate a wide range of wind and current conditions.

DEVELOPMENT ABOUT SHOAL

Ten Fathom curve Development.

For the development of the ten fathom curve about the shoal, sounding lines were run in a N.E.--S.W. direction, normal to the axis of the shoal. These lines were spaced a quarter of a mile, every line extending into more than ten fathoms to the north and south and every other line extending two to three miles beyond. The latter half mile lines furnished the development beyond the ten fathom curve as far as it was practicable to carry fixes. Inside the ten fathom curve three cross lines were run, spaced about two miles apart.

Northeast and east of the Light-vessel, the top of the shoal is a large flat area with four to five fathoms. Over this portion of the work, numerous split lines were run, all indications of shoaling being investigated. The outer portion of the top of the shoal is a relatively narrow and steep ridge with depths of six to seven fathoms and running approximately from the charted 5 $\frac{1}{2}$ fathom spot to the Whistle Buoy "2A". This ridge was developed by a diagonal (E-W) system of lines spaced two hundred meters. This development included the search for the charted 5 $\frac{1}{2}$ fathom spot (four miles N.W. of the Whistle Buoy) but no indications of such a shoal spot were found.

The two lines of buoys along the shoal gave excellent fixes for all of this ten fathom curve development. In this work, the sounding lines ran through both lines of buoys; on such occasions, "jumps" in fixes of greater or less extent can usually be expected when passing through a line of buoys and when changing the fix from buoys of one line to buoys of the other line. But throughout this hydrography, no jumps were experienced, fixes and depths checking in a manner comparable to work with fixed signals.

Development Beyond Ten Fathom Curve.

Outside of the ten fathom curve, all lines were spaced half a mile; no indications of shoals were found and no closer development was considered necessary.

There is a charted 7 fathom spot ten miles east of the shoal but no indication of shoaling was found during the half mile line development to warrant further search or closer development.

In the lines of buoys furnishing control for this work, the buoys were spaced about five miles apart. Sounding lines were run parallel to the buoys. On the sounding line along the line of buoys, no positions could be obtained except alongside the buoys. For this line, the ship had to be kept on line between buoys and soundings spaced proportional to logged distance. For the next lines ($\frac{1}{2}$ mile either side of the buoys), several two angle fixed positions could be obtained while passing opposite the buoys and along the rest of the line a bearing and one angle gave satisfactory positions. For the sounding lines, a mile or more distant from the line of buoys, it was possible to secure two angle fixed positions. Along the outer end of all lines, positions necessarily depended upon a bearing and one angle.

All of this work accordingly had fixed position control. A few of

Season's report-cont'd

the positions were fixed by one angle and a bearing but at no time did the control depend upon Precise Dead Reckoning.

Precise Dead Reckoning.

From the fixed position work about the shoal out to the 100 fathom curve, Precise Dead Reckoning control was used.

The work executed consisted of three runs to the 100 fathom curve and return, giving six lines which were spaced approximately four miles apart. These lines were tied into buoys Port and Star, no other buoys were remaining in position at the time this work was done.

The usual Precise Dead Reckoning methods were employed. Three patent logs were used for distance and the standard compass read every minute for direction. Currents were measured every two hours, sometimes by anchoring the ship and sometimes by anchoring a buoy, the latter appearing to give more satisfactory results. The usual allowances were made for drift and transfer.

WORK WEST OF FORT CASWELL

Tall Hydrographic Signals.

For the control of the hydrography to the west of Fort Caswell, it was necessary to construct four 100 ft hydrographic signals. These were in addition to the two constructed at the beginning of the season, making a total of six constructed by the party during the seasons work. The material for these signals was placed ashore by the ship and the signals constructed by a party working from the ship. Hydrography was in progress during the construction of the signals, each of which was completed in just about time to be available when needed.

Ship Hydrography.

All Hydrography outside the five fathom curve was done by the ship; the outer limit being about ten miles from and parallel to the coast. Lines were run N&S., spaced a quarter mile and crossed by three lines parallel to the coast, the latter being spaced approximately two miles apart.

Launch Hydrography.

The launch was used for all the hydrography inside the five fathom curve, the work being done by a detached party working from Southport and from a camp at Shallotte Inlet. Between the inlets, the lines were spaced a quarter of a mile (the same as done on the ship work) but over the bars and inside the inlets, very close development was made, every effort being made to determine critical depths and the limits of deeper water.

Season's report-cont'd

Topography.

Topography was completed from Fan (about eight miles west of Fort Caswell) to Little River Inlet.

This coast consists of rather narrow stretches of sandy beaches between the numerous inlets. Behind the beaches extends a narrow area of marsh with small meandering creeks and sloughs. Beyond the marshy area there is fast land generally rising to 25-50 feet; this fast land was the inshore limit of the topography. About the inlets, all streams, creeks, etc were surveyed to a point where they definitely lead off inland.

A previous traverse along this coast furnished the control for the topography. Practically all stations of the traverse were recovered. All hydrographic signals (including the tall towers) were located by the topographic party.

The above topography and launch hydrography were done by a detached party with headquarters first at Southport and later a camp in Charlotte Inlet.

TIDES AND CURRENTS

Tides

A large automatic tide gauge was maintained at Fort Caswell throughout the season. This was at first installed in the old well of 1925 but later a new well was put in position.

Tidal observations of three days or more were obtained at Lockwoods Folly Inlet, Charlotte Inlet and Tubbs Inlet. At these stations, the small portable gauge was used and gave very satisfactory service. Simultaneous observations were made at all these stations and at Fort Caswell.

Currents

Routine current measurements were made throughout the season in connection with rating logs and the Precise Dead Reckoning.

Frequently measurements were secured by anchoring a buoy instead of anchoring the ship. In such cases the current pole was set adrift at the buoy and allowed to drift about 15 minutes when the ship would come alongside the pole and secure a bearing and distance to the buoy. The distance was secured by a dip angle from the upper bridge. These dip angle from distances as checked by three point fixes were very good up to 700-800 meters.

When currents were measured by anchoring a buoy, the plotted current drift was generally much more regular and reasonable than when making the measurements from the anchored position of the ship.

Strong currents were always encountered about the outer portion of Frying Pan Shoals.

Surveyor's report--cont'dHYDROGRAPHIC BUOYS

The buoys used on this work were constructed about as described in special Publication No. 93, the first of the one barrel buoys described.

During the first part of the work, two concrete moorings were used, each weighing about three hundred and thirty five pounds. These moorings were spread to a forty fathom bridle and the buoys secured to a stray line from the center of the bridle, the stray line being five to ten fathoms long depending upon the depth. In numerous cases scrap freight car couplings were substituted for the concrete moorings. The couplings weighed about one hundred and sixty five pounds; in water their weight was about equivalent to the concrete couplings.

The above type of mooring cable and counter weight had been in use by the party of the Lydonia for some time past and had given generally good service. Similarly during the first part of the present work, little difficulty was experienced with these floating signals; all buoys inside of the Light-vessel and those within ^{1/2} miles outside of it, maintained their position satisfactorily as long as needed. But with buoys further out on the shoal increasing difficulty was experienced, the buoy trouble soon developing into the controlling factor of the work. About the outer position of the shoal, there was scarcely a week but that some buoys had to be replaced and the whole system relocated. Of the numerous buoys placed to the northward of Whistle Buoy "2A" (Bad) none of them maintained their position more than a few days and four disappeared before they could be located. This trouble was about equally divided between shifting (sometimes a mile or more) and disappearing. It is of course difficult to definitely explain the cases of disappearance. Two buoys were observed to sink while numerous buoys picked up during the course of the work contained a quantity of water. Two other buoys were picked up adrift after parting their cable. Much shipping passes over this area and during darkness it is quite probable that some buoys were sunk by colliding vessels. One of the enclosures with this report, gives a detailed account of the party's experience with these buoys; it shows that 45 buoys were planted (not including three Lighthouse Service buoys used), of which four disappeared before they could be located, 45 relocations were made and 331 angles taken for the buoy locations.

The above excessive shiftings, disappearances etc were no doubt more or less due to the following:

(A) Excessive currents in the vicinity of Frying Pan Shoal, the maximum current being between two and three knot instead of the usual half to three quarters knot current experienced in Precise Dead Reckoning.

(B) The heavy swell usually prevailing over the area surveyed. The working of the head and stays of an ordinary barrel very probably results in leaking and eventually sinking.

(C) Frequent rather short but very severe squalls. On several occasions the wind had suddenly shifted and attained a velocity of fifty to sixty miles an hour for a short period.

(D) Buoys being run down by passing shipping.

Season's report - cont'd

In an effort to eliminate some of the buoy trouble the following changes were made. The double moorings were discontinued, one 800 pound concrete mooring being used alone, the top of it being rounded and smoothed to avoid any possible chafing of the cable. The scope of the cable was increased, sixty fathoms being used in a depth of 15 fathoms etc. The counter-weight was changed from a 335# concrete block to a 200# concrete block. With the heavier block, the buoy had little reserve buoyancy while with the lighter block, the buoy barrel reached about 10 inches above the surface of the water and the possibility of the barrel being dragged under was correspondingly reduced.

The exposed positions in which these buoys were used required a sturdier type of barrel than the ordinary oil barrel usually employed. No such barrels were available in the vicinity of Wilmington and the work about the shoal was completed before they could be located elsewhere. Such a sturdier barrel would give good promise of remaining afloat and would warrant the use of iron mushroom anchors and heavier cable, the whole making a dependable buoy, which could be used again and again. The lack of such a dependable buoy, seriously jeopardized the completion of the survey about the outer portion of the shoal, and correspondingly increased the time and expense necessary for the work.

METHODS OF SOUNDING

All development about the ten fathom curve was with the handlead which was used up to depths of 13-15 fathoms.

Beyond 13-15 fathoms and up to 30-35 fathoms the electric sounding machine was used. This machine reeled the lead in forward; attached to the lead was a hand line with which up and down soundings were secured by the leadsman stationed in the after sounding platform. The first ten or twenty fathoms of the handline consisted of one or two (depending upon the depth) 10 fathom sections of stranded sounding wire used because it sank so much more quickly than the sash cord. From the sounding machine the wire lead directly through a fairlead set opposite on the end of a 10 foot boom. The fairlead consisted of two rollers (4" dia-6" long), the inner one set vertical and the outer one horizontal. This method of sounding gave exceptional satisfaction; it certainly seems to be the best method yet used, securing up and down casts while underway.

Beyond 30-35 fathoms, the ship was stopped to secure up and down casts.

GOINGSUCK INLET

Under supplemental instructions dated July 16th additional hydrography was executed at Goingsuck inlet.

The area to be surveyed was small, the sounding lines were short and close together and the water shallow. In order to secure the particularly good control which seemed desirable, ranges were set up on shore for the guidance of the sounding party and the ends of each line were located by the Plane Table.

Practically no deeper water was found than originally, although the depth curves were considerably rectified.

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Season's Report—cont'd

Weather.

Steady S. W. winds prevailed during the summer until September; occasionally this S. W. wind was of such strength as to interfere with the work. Storms generally came from the N. E. and were rather frequent. There were frequent severe squalls from the N. W., the wind at times suddenly rising to 45-55 miles per hour for a short period.

After Sept., the prevailing wind was N. E. and the severe storms came from the S. West. The N. E. wind of this period was generally too strong for work off shore but to the west of Port Caswell, the work was well protected from it.

August was decidedly the worst month for field work. During the first part of the month a strong N. E. wind either prevented or interfered with the work and during the latter part of the month a severe tropical storm passed the coast.

The worst storm of the season was one from the S. W. during the first part of October. No buoy work was in progress at this time and accordingly this storm did not interfere with the work as much as the one in August.

Log tests—Ship swings etc.

	May 27	May 28	June 4	July 21	Aug 6	Aug 9	Oct 2	Dec 18	Dec 20
Log test—Fuel speed	✓			✓	✓	✓	✓	✓	
" " Half speed	✓	✓		✓			✓		✓
" " Full & Stop			✓				✓		
Transfer				✓					
Leeway				✓					
Ship swung for Deviation.				✓			✓	✓	

Log tests, ship swings etc were made as indicated in the above table.

Previous to Aug. 6, the log tests were made by running back and forth over a four mile course, determining positions by three point fixes and reading currents at either end of the line.

On Aug. 6 and after the tests were run on a one mile course, a range and two intersecting angles so as to give a true mile. No currents were read, the effect of current being eliminated by making reverse runs immediately. This is the method used by Lieut. Borden.

List of Officers.

The following Officers were attached to the party during the portion of the season indicated. Throughout the season one Officer and generally two were absent on leave.

Harold A. Cotton	H. & G. Engineer	Entire season
R. P. Eymen	" "	" "
R. D. Horne	" "	" "

Season's report , con

List of Officers (con)

H. H. Bernstein	H. A. G. Engineer	Until August 18th.
W. C. Craib	Jr. H. A. G. Engineer	After July 26th.
H. J. Petersen	Aid	Entire season
S. B. Grenell	Deck Officer	After June 28th
W. M. Gibson	" "	After Sept 6th.
John Wyer	Chief Engineer	Entire season

The detached party working from Southport and Shallotte Inlet was in charge of Lieut. R. D. Horne who executed all the launch hydrography with Mr Grenell assisting. The topography was also done by Lieut. Horne with Mr Petersen assisting. Lieut Bernstein built the first two tall hydrographic signals while the last four were built by Mr Petersen.

All the other officers were engaged upon ship work (hydrography and general office work).

Results

On and about Frying Pan Shoals, the hydrography was completed as outlined in the instructions. The northern limit was a junction with the previous season's work and the eastern limit was the meridian about three miles east of the eastern limit of the previous seasons work. The southern limit of close development was the parallel about two miles south of the outer buoy (Frying Pan Shoal Whistle Buoy 2A) while the Precise Dead Reckoning was an area about twenty miles wide reaching from the close development south to the 100-fathom curve. The lines in this latter work were spaced four miles apart but as depths of 15 to 20 fathoms were found through the northern portion of it, short split lines will have to be run over this area. (Note:- The party was instructed to discontinue this work and make every effort to complete the work to the west of Fort Caswell before the close of the season)

West of Fort Caswell, launch and ship hydrography was continued as far west as Little River Inlet and to a distance of 10-11 miles offshore. All of this work was fixed position with shore signals.

There is enclosed with this report, a Cost Apportionment Sheet showing the unit costs etc for the survey. The control of the present season's work required the placing and maintaining of a large number of hydrographic buoys much further offshore than usual and in exceptionally exposed positions; it further required the building of all the tall hydrographic signals for the survey. But the unit costs are less than for the previous seasons work with the exception of the launch hydrography. During the previous season the launch work included a large area of shoal water while this season's work was a narrow strip along the outside coast.

The following enclosures accompany this report:

Statistics of Field Work
 Cost Apportionment Sheet
 Progress Sketch
 Buoy Data

Respectfully submitted

HAROLD A. GORTON

ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY

AND REFER TO No. 4-78c-HRE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
WASHINGTON

July 17, 1925.

REPORT ON HYDROGRAPHIC SHEET 4437

A. L. Giacomini

It was assumed and agreed by F. H. Hardy and that the field men were in a better position to verify the location of the buoys than the office, therefore they were accepted as plotted on the smooth sheet.

There is no descriptive report for this sheet.

~~The positions of the beginning and endings of the lines were not given in the sounding records.~~

The time intervals were not carefully adhered to in the plotting of the soundings.

The drafting conforms to the general instruction for field work.

The difference in depths at the crossings of the lines is probably due to the moving buoys. (See review)



H. R. Edmonston

April 8, 1925.

~~Division of Hydrography and Geodesy~~

Division of Charts:

Tide reducers are approved in
11 volumes of sounding records for

HYDROGRAPHIC SHEET 4437

Locality: **Frying Pan Shoals, E. Coast of North Carolina**

Chief of Party: **H. A. Cotton in 1924**

Plane of reference is **mean low water and is
3.0 ft. on tide staff at Fort Caswell, North Carolina.**

For reduction of soundings, condition of records satisfactory
except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks



Chief, Division of Tides and Currents.

S.P.S.

ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY

AND REFER TO No. 4-DRM

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

WASHINGTON September 11, 1925.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet H. 4437

Vicinity of Cape Fear, North Carolina

Surveyed in 1924

Instructions dated April 21, 1924.

Chief of Party, H. A. Cotton.

Surveyed by H. A. C.

Protracted by H. J. Petersen.

Verified and inked by H. R. Edmonston.

1. The records conform to the requirements of the General Instructions except that they failed to note in every case when the method of sounding was changed from the hand lead to the special method. The general statement in the season's report would seem to indicate that the diagonal system of lines was executed with the hand lead while the horizontal system was executed by the special method described in the Chief of Party's season's report (page 9).
2. The plan and character of development satisfy the specific instructions.
3. The control for the survey was obtained by planting a number of buoys offshore and locating them by a system of sextant triangulation. Considering the difficulties that the work was fraught with, the results obtained, as evidenced by the sounding line crossings within the diagonal system of lines, are excellent. However, towards the outer portion of the sheet, or where the horizontal system overlaps the diagonal system the discrepancies in crossings vary from 1 to 11 feet, the horizontal system being consistently deeper. As well as could be determined from the records the deeper lines were run using the special apparatus for sounding described in the season's report. On the face of it there seems to be some inherent defect in this method of sounding, and this is now being investigated by the Section of Field Work. No changes are to be made in this sheet and so far as charting is concerned the ordinary rule of charting the minimum depth will be followed.
4. The information is sufficient for drawing the usual depth curves.

See #6
review of
H-4523
A.L.S.

5. The usual field plotting was done by the field party, but the time intervals were not carefully adhered to. The locations of the buoys used as signals were not verified in the office, but the customary verification was given to all the other work.
6. The only contemporary survey that joins this sheet is H. 4468. The junction with that sheet will be taken up when that sheet is completed.
7. The abrupt changes in depth to the north and northeast of Frying Pan Light Vessel is due to the narrow ridge formation of the southern end of Frying Pan Shoals. This is clearly brought out on the adjoining sheet, H. 4313.
8. There are ^{no} indications of dangers within the area of this survey except possibly the 34 ft. sounding in lat. $33^{\circ} 32'$, long. $77^{\circ} 38'$.
9. Attention is called to the fact that the development showed no indication of the $3 \frac{3}{4}$ fathom spot now charted in lat. $33^{\circ} 33'$, long. $77^{\circ} 38 \frac{3}{4}'$. The source of this sounding is a report from a steamship in 1904 (See letter 152, 1904, Chart Division files). Previous to this report $4 \frac{3}{4}$ fathoms was carried on the charts from an examination made by Lt. Pillsbury in 1886 (See note on H. 1517). The letter to which this note refers cannot be found but a history of the examination was found in the Coast Survey Report for 1886, page 52. As a result of a conference between the Section of Field Records and the Drafting Section it was decided to expunge the $3 \frac{3}{4}$ from the charts.

The area surrounding the 7 fathom spot in lat. $30^{\circ} 30 \frac{1}{2}'$, long. $77^{\circ} 23 \frac{1}{2}'$ was covered by this survey without any indication of such shoal. The 7 fathom sounding does not appear on any of the survey's field sheets and was probably placed on the chart from some report. Considering the fact that the location as given by such report could at best be approximate and the fact that the present survey shows no indication of such shoaling it was unanimously agreed by the Chief of Field Work and members of the Section of Field Records that the 7 fathom spot should be expunged from the charts.
10. No further surveying is required within the limits of this sheet.
11. This survey is a shining example of what is possible in the way of development in so exposed and dangerous a locality as the Frying Pan Shoals when miles beyond the visibility of shore signals. The Chief of Party is to be commended for the excellent results obtained.
12. Character and scope of surveying - excellent; Field drafting - good.

Reviewed by A. L. Shalowitz, September, 1925.



DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

The finished Hydrographic Sheet is to be accompanied by the following title sheet, filled in as completely as possible, when the sheet is forwarded to the Office.

U. S. Coast and Geodetic Survey.

Register No. 4437

State NORTH CAROLINA
 Vicinity of C. Fear
 General locality Entrance to Cape Fear River
Offshore
 Locality
 Chief of party H. A. COTTON
 Surveyed by H. A. COTTON
 Date of survey June 1924--October 1924.
 Scale 1:40,000
 Soundings in Feet
 Plane of reference Mean Low Water
 Protracted by H. J. Petersen Soundings in pencil by H. J. Petersen
 Inked by Verified by
 Records accompanying sheet (check those forwarded):
 Des. report, Tide books, 6 Marigrams*, 2 Boat sheets*,
11 Sounding books*, Wire-drag books, Photographs.
 Data from other sources affecting sheet

Remarks:
Positions of buoys fixed by Harold A. Cotton, as shown on accompanying tracings.