H10946

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey BASIC HYDROGRAPHIC
SIDE SCAN/MULTIBEAM

Field No. SHEET A

Registry No. H10946

LOCALITY

State SOUTH CAROLINA

General Locality NORTH ATLANTIC OCEAN

Locality WINYAH BAY ENTRANCE

2000

CHIEF OF PARTY
George G. Reynolds, OIC

LIBRARY & ARCHIVES

DATE November 28, 2001

NOAA FORM 77-28 [11-72]

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTER NO. H10946 A & B

HYDROGRAPHIC TITLE SHEET

INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office

FIELD NO. Sheet A ~~OPR-G360-KR-99~~

State *South Carolina*

General Locality *NORTH Atlantic Ocean*

Locality *Winyah Bay Entrance*

Scale *1:~~15~~10,000* Date of Survey *Jan 18 – May 19, 2000*

Instructions Dated *January 22, 1999* Project No. *OPR-G360-KR-99*

Vessel *West Cove – Hull Number 1058025*

Chief of Party *George G. Reynolds*

Surveyed By *Matthew C. Sheridan, Russell S. Watson*

Soundings taken by (*Echo Sounder*) *Reson Seabat 9001*

Graphic Record Scaled by *N/A*

Graphic Record Checked by *N/A*

Protracted by *N/A* Automated Plot by ~~*David F. Somers*~~ HP DesignJet CP2500 Plotter (office)

Verification by ~~*Margaret H. Sano*~~ Atlantic Hydrographic Branch Personnel

Soundings in *Feet(MLLW)*

REMARKS: *All Times Recorded in UTC*
Modification of SVP requirement on 2/25/00
Addition of Item Investigations on 4/18/00
Modification of SSS coverage requirement on 4/27/00
Final Scale Change from 1:20,000 to 1:15,000 on 6/14/00
Contractor: *Ocean Surveys, Inc.*
91 Sheffield St.
Old Saybrook, CT. 06475
Subcontractor: *Sonalysts, Inc.*
215 Parkway North
Waterford. CT. 06385

* Handwritten Notes in the Descriptive Report were made during office processing. AWOIS/SURF ✓ 11/23/01 SJV

THE INFORMATION PRESENTED IN THIS REPORT AND THE ACCOMPANYING PRELIMINARY SMOOTH SHEET REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS INC. BETWEEN 18 JANUARY AND 19 MAY 2000 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

CHARTLET OF SURVEY AREA

Winyah Bay Entrance, South Carolina, Sheet A

H10946

Volume I
Table of Contents

* Data Filed with field records.

Volume II

Table of Contents

*Data filed with field records

DESCRIPTIVE REPORT
HYDROGRAPHIC SURVEY H10946

Field Number OPR-G360-KR-99
Scale 1:15,000
January – May 2000
Ocean Surveys, Inc. - West Cove
Chief of Party: George G. Reynolds

A. PROJECT

A.1 This survey was conducted in accordance with the Statement of Work for OPR-G360-KR-99, Winyah Bay Entrance, South Carolina.

A.2 The original date of the Statement of Work is January 22, 1999.

A.3 The following changes were made to the Statement of Work: 1) Modification of the SVP cast requirements dated February 25, 2000. 2) Item Investigations 1 through 17 dated April 18, 2000. 3) Modification of coverage requirements within the shoal area north of the north Winyah Bay Jetty dated April 27, 2000. 4) Final Preliminary Smooth Sheet scale of 1:15,000 on June 14, 2000.

A.4 This sheet was designated by the Statement of Work as Sheet "A".

A.5 The purpose of this survey is to provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the Winyah Bay Entrance.

B. AREA SURVEYED

B.1 The H10946 survey area encompasses the Winyah Bay Entrance from Buoys "R6" and "G5" eastward for approximately 7 km. The area extends approximately 5 km to the north and 5.5 km south of the entrance channel. Existing depths are between 3 and 41 feet. Part or all of the search radii for 4 AWOIS items are within the survey area. The additional item investigations extend the survey area westerly into the channel to Buoys "R8" and "G7" and easterly approximately 5.8 km to cover several shoals. These items also complete the search radii of 2 AWOIS items that extend outside the limits of Sheet "A".

B.2 The main survey area is encompassed within an irregularly shaped polygon defined by the geographic coordinates tabulated below. The survey limits of each item investigation are included in Section M of this report.

Point #	Latitude (North, NAD83)	Longitude (West, NAD83)
1	33°14′22.6716″	79°06′58.5324″
2	33°14′22.6968″	79°03′38.4264″
3	33°08′22.4160″	79°03′38.4876″
4	33°08′22.3944″	79°06′59.8212″
5	33°09′32.1372″	79°07′53.5584″
6	33°11′28.3920″	79°08′09.6432″
7	33°11′35.1636″	79°08′09.6432″
8	33°14′22.6716″	79°06′58.5324″

B.3 Data acquisition began on January 18, 2000 (JD 018) and concluded on May 19, 2000 (JD 140). This period includes a 38 day hiatus in field work that allowed time for NOAA to develop the Statement of Work for additional work items.

C. SURVEY VESSEL

C.1 All offshore operations associated with this survey were conducted from R/V "West Cove". "West Cove" (registration number of 1058025) is a fiberglass vessel with a 42 foot LOA, 14.5 foot beam, 4.5 foot draft and 29 ton displacement and is powered by an 800 hp CAT 3408 engine.

C.2 During survey operations, both forward and aft side scan tow points were used. Transferring the side scan tow point between these locations represents the only change to the vessel configuration throughout the course of the survey. The tow point locations are discussed in detail in Section E.3. Vessel configuration and system offsets are discussed in H.7.

D. AUTOMATED DATA ACQUISITION AND PROCESSING - See also Evaluation Report

D.1. A Triton Elics International (TEI) ISIS data acquisition system was used to acquire digital multibeam, side scan sonar (SSS), position, heading, and motion information. Coastal Oceanographics "Hypack Max" was used for trackline design, navigation, trackline control, DGPS and SVP quality control monitoring, and provided a backup multibeam acquisition platform.

Both the ISIS and Hypack Max systems logged raw values. For purposes of enhancing the real time displays of both systems, an average value for the water column speed of sound was manually entered as required. Additionally, the side scan sonar operator manually input the "horizontal layback" of the side scan transducer. All corrections and offsets to the raw data were applied in CARIS HIPS/SIPS during post processing. A summary of the applied correctors is included in Section G and the various system offsets are detailed in Section H.7.

D.2. Data processing and review was accomplished employing Universal Systems CARIS HIPS/SIPS software. HIPS was used to process the multibeam information including the application of sensor offsets and correctors along with editing motion, heading, navigation and applying SVP and tide adjustments. The HIPS initial data

cleaning filter, which keys on the Reson sounding quality flag, was used to reject soundings flagged with a quality value of 0 or 1. Each profile was then manually edited. Additional depth checks and edits were accomplished in subset mode, including the comparison of primary line soundings with check line data.

On receipt of the NOAA final tidal zoning information, the edited depth data were merged with the final tides and another round of subset mode quality control checks was made. A CARIS map of shoal biased, 10-meter bin data was created from the tide corrected soundings. Final QA/QC reviews were conducted on the 10 meter bin data. * CARIS-NT used to apply verified tides based upon zoning.
The SSS data were processed using CARIS SIPS. The processing flow included review of layback, heading, altitude and navigation. Navigation was recomputed with sensor layback applied. Images were slant range corrected using an average velocity from the appropriate SVP. Each line was reviewed for data quality, sensor height, and contact identification and correlation. Mosaics at one-meter resolution were generated separately for the odd and even numbered track lines. These two mosaics demonstrate 200% coverage was achieved throughout the survey area.

D.3. SVP Data Acquisition and Processing: SVP casts were processed using the NOAA Velocity program. This software was used to download data, apply calibrations, automatically process data into bins, extend the data to the allowable limits, and generate a CARIS HIPS SVP file. Seabird's Seasave Win32 program was used to provide real time sound velocity data recorded at the multibeam transducer. Seasave applied instrument calibrations, calculated sound velocity, and output the data to the Hypack Max SVP monitoring utility.

D.4. Final Review: Final multibeam data review was accomplished by importing the 10 meter binned shoal biased soundings to AutoCAD 14. The soundings were contoured and shoal points were reviewed to identify shallow fliers. Side scan sonar contacts were plotted on the sounding sheets to identify contact correlation in areas covered by multibeam. After additional edits, the CARIS map was regenerated and the plot suppression routine was run to produce preliminary smooth sheet data at 1:10,000 and 1:15,000 scales. ASCII files of soundings with attributes were generated from the plot-suppressed data. These files were imported to AutoCAD 14 using Quicksurf to post soundings with the required attributes. The AutoCAD files were converted to Microstation for final presentation. No other thinning or decimation was performed.
CARIS → ASCII → ACAD → MS

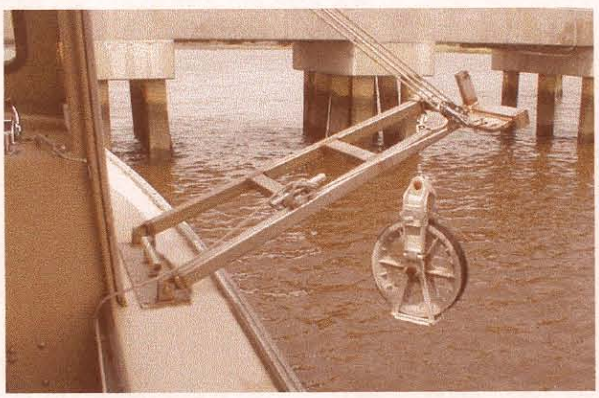
E. SIDE SCAN SONAR

E.1 Equipment: A Klein Model 595 Side Scan Sonar System was used to acquire sonar images of the seafloor throughout the project. The system configuration included a graphic recorder/transceiver unit (S/N 658) and a dual frequency (100 and 500 kHz) tow fish (S/N 19). This tow fish has a vertical beam width of 50.0°, a horizontal beam width of 1.0° and the depression angle set at 20°. During this project, only the 100kHz channel was employed. Imagery was exported to and logged by the ISIS data acquisition

platform. All system annotations were entered in the ISIS XTF notes field. All notes were output to an ASCII file and stored with the raw records.

E.2 Line Spacing: A 40-meter line spacing was used with a range scale of 50 meters in the western half of the project area where water depths were generally less than 30 ft. In the deeper water found in the eastern portion of the study area a range scale of 75 meters was employed with data acquired along tracklines spaced at 65 meters. Item A-1 lines were run at the 50 meter range, with a 30 meter line spacing to develop 200% side scan coverage over this shallow water area.

E.3 Tow Points: Two tow points were used during this study. Tow point A was established from a davit located on the starboard bow (forward and starboard of the navigation antenna). This point was used in shallow water and relatively calm sea conditions. Tow point B was established on the starboard aft quarter (aft and in line with the navigation antenna) and was used for the majority of the survey. When towing from tow point B the fish was flown as deep as possible to minimize surface noise and prop wash interference. The deployment tow point was recorded in the daily survey log. Tow fish altitude was maintained between 8 and 20% of the range scale in all cases except over the shoal area north of the federal channel.



E.4 Confidence Checks: Side scan confidence checks were performed daily to verify proper operation and tuning of the system. The checks were accomplished by towing the SSS sensor over objects in the fish haven, along the jetty, over buoy blocks and over sand waves.

E.5 Coverage: 200 percent coverage was obtained over the required areas, except for the shoal north of the channel. Within the shoal area north of the channel, water depths were too shallow to allow for safe operations most of the time. Ocean Surveys requested and NOAA approved, modification of the side scan coverage requirement within this area. The modification required the area be surveyed using multibeam only, at a line spacing not to exceed 40 meters, in lieu of 200% side scan coverage. Side scan sonar data were collected (50 meter range scale) simultaneously with the multibeam data. The additional side scan data did not provide 200% coverage since fish altitude often was less than 2 meters.

E.6 Examination Methods and Coverage Calculations: Side scan sonar range, fish altitude, data quality and vessel speed were closely monitored during acquisition. Any areas out of specification were rerun. SSS records were reviewed at least three times for contact identification: during acquisition, offline by the field crew and during post processing.

E.7 Data Quality: The data quality is sufficient to accurately identify all bottom features and contacts. Occasionally, SSS records were degraded by weather and/or tidal conditions and operations were adjusted or suspended as needed. .

E.8 Contact Selection: The SSS operator made initial contact identification while the vessel was online. The field crew reviewed all data for both quality and to identify additional contacts. As a quality assurance step, the field team also correlated contacts on adjacent and overlapping lines. A third review of all data was completed during processing. Contacts that were observed only once and/or had low relief were listed as insignificant. Images of all possibly significant contacts were forwarded to NOAA for review. NOAA's review of Ocean Surveys suggestions and input from the Georgetown Harbor Pilots identified 17 items requiring further investigation.

F. SOUNDING EQUIPMENT

F.1 Equipment: The primary echo sounder for this project was a Reson Seabat Model 9001 Multibeam Sounder configured with a 455 kHz transducer. The system includes an onboard Processor Unit (S/N 332219) and a single transducer (S/N 4886). The secondary system was an Innerspace Technology Model 448 operating at 200 kHz, S/N 198 with a 3° transducer. A standard Lead Line, OSI S/N "A", was also used for system confidence checks. All three devices remained in operation throughout the survey. The multibeam system was a key element in all survey operations and was therefore recorded on all logged tracklines. The single beam 448 was specifically employed to facilitate QA/QC checks during acquisition with 448 data logged on most tracklines. The 448 unit was frequently turned off in very shallow conditions to reduce noise on the primary systems.

F.2 Faults: No faults occurred in any of the systems.

F.3 Line Spacing: Main scheme lines were run north-south based on the SSS spacing with tie lines run east-west, in water depths of 3-45 feet. Item investigation line spacing varied from fixed 20 meters to full bottom coverage and individual orthogonal sets.

F.4 Configuration: The multibeam was run at the 25 meter range for most of the survey. The system was occasionally set to the 10 meter range to aid in the collection of high resolution data in shallow areas. The system ping rate is 13.71 PPS at 10 meters and 13.51 PPS at 25 meters, based on the baud rate of 19200. The system has 60 beams, each at 1.5° by 1.5°, creating a 90° swath width. The system resolution is 5 cm. The along track coverage was approximately 3 to 5 pings per meter depending on vessel speed.

F.5 Quality Assurance: On board data quality was regularly monitored using the following techniques. Lead line comparisons were done on any day that weather conditions permitted accurate results. All lead line measurements correlated with both the depth measured by the center beam of the multibeam system and the value recorded by the Innerspace sounder to within 0.1 meters. Single beam (448) soundings were continuously compared to the center beam sounding of the multibeam system during on line operations using the Hypack Max comparison routine. Multibeam center beam readings were occasionally tide corrected and compared to digital copies of the most recent NOAA chart.

F.6 Factors Affecting Soundings: Sounding quality was adversely affected by two ebb tide related phenomena. First, near the entrance channel during an outgoing tide, water column conditions are such that returns from the outer beams were either very weak or not available. Second, along the "tide line" or leading edge of the ebb plume, water column conditions were such that returns from most beams were weak or not available. The survey team kept a careful watch on the location of the tide line as the survey progressed. To maintain production, survey operations often would be shifted to an area with a settled water column velocity. In numerous instances where a waning tide line was crossed, sections of survey lines were rerun to complete the data set. In more severe cases, operations were suspended for several hours as the plume migrated through the site.

G. CORRECTIONS TO SOUNDINGS

~~zoning were applied during~~

G.1 Tides and Water Levels: NOAA provided all tidal information. * Approved tides and zoning were applied during field (See p. 15 and 78)

G.2 Speed of Sound Through Water: All sound velocity measurements were taken with two Seabird Electronics Seacat SBE-19 CTD profilers. Comparison casts were recorded and evaluated daily to verify the proper operation of both SVP units. Casts were recorded at the start of data collection, whenever a variation of 10 m/s was seen in the surface monitoring system, or at a maximum of approximately every 3 hours. The data from all casts were processed through the Velocity program and compared with either the comparison cast or previous data. The main profile velocities were applied to all final multibeam data in the CARIS HIPS processing package except one line on day 2000-043 that uses a comparison cast data set. The instruments used during this project are listed below and copies of both the pre- and post-calibration sheets are included in Appendix E.

Manufacturer	Model	Serial Number	Calibration Date	Functions
Seabird	Seacat SBE-19	505	11/9/99	All Main Profile Casts
Seabird	Seacat SBE-19	2864	11/12/99	Comparison Casts and Deck Monitoring

* Data filed with field records

A total of 206 SVP casts were completed during the survey. The following table lists the 134 SVP casts which were directly used for multibeam data processing. The year, date, time, latitude(north-NAD83), longitude(west-NAD83), maximum depth recorded, and file name for every cast is included. The **Max. Depth** column reflects the actual depth reached by the instrument. In addition to these SVPs, 46 casts were used as QA/QC checks and 26 other casts were recorded but not applied to any lines in the final data set. The tabulated listings of the 46 comparison casts and the 26 other casts can be found in Appendix I.*

SVP Data Applied To Accepted Multibeam Lines					
Year - Day	**Time**	**Latitude**	**Longitude**	**Max. Depth**	**File Name**
2000-027	12:40	33°20'49"	079°16'41"	5.0 m	00027124.SVP
2000-027	15:51	33°14'54"	079°12'30"	9.1 m	00027155.SVP
2000-027	18:58	33°20'55"	079°16'40"	6.5 m	00027185.SVP
2000-031	13:16	33°13'43"	079°04'08"	11.9 m	00031131.SVP
2000-031	15:22	33°13'21"	079°07'54"	7.5 m	00031152.SVP
2000-031	17:15	33°12'54"	079°03'14"	11.3 m	00031171.SVP
2000-031	18:45	33°09'53"	079°03'06"	4.8 m	00031184.SVP
2000-031	19:32	33°09'53"	079°03'07"	11.2 m	00031193.SVP
2000-031	21:08	33°10'22"	079°08'01"	5.7 m	00031210.SVP
2000-031	21:55	33°10'48"	079°03'25"	11.6 m	00031215.SVP
2000-032	13:19	33°11'28"	079°03'07"	10.3 m	00032131.SVP
2000-032	14:23	33°11'22"	079°04'34"	9.8 m	00032142.SVP
2000-032	15:02	33°11'24"	079°06'43"	8.4 m	00032150.SVP
2000-032	18:56	33°12'25"	079°03'31"	11.3 m	00032185.SVP
2000-033	18:50	33°14'35"	079°03'37"	12.6 m	00033185.SVP
2000-033	20:43	33°14'13"	079°03'36"	13.5 m	00033204.SVP
2000-034	13:30	33°14'06"	079°03'29"	14.7 m	00034133.SVP
2000-034	17:08	33°09'05"	079°03'25"	10.7 m	00034170.SVP
2000-034	18:10	33°13'06"	079°03'38"	9.3 m	00034181.SVP
2000-034	18:53	33°13'06"	079°03'38"	11.5 m	00034185.SVP
2000-035	14:58	33°13'07"	079°05'33"	10.7 m	00035145.SVP
2000-035	18:04	33°11'27"	079°05'37"	9.4 m	00035180.SVP
2000-035	19:26	33°14'05"	079°03'25"	13.3 m	00035192.SVP
2000-035	20:10	33°12'15"	079°03'39"	11.3 m	00035201.SVP
2000-037	19:43	33°14'35"	079°07'01"	9.5 m	00037194.SVP
2000-038	13:18	33°09'48"	079°07'01"	11.5 m	00038131.SVP
2000-038	15:10	33°13'11"	079°06'47"	9.7 m	00038151.SVP
2000-038	17:44	33°14'37"	079°06'48"	9.6 m	00038174.SVP
2000-039	12:57	33°09'53"	079°06'49"	11.5 m	00039125.SVP

* Data filed with field records.

SVP Data Applied To Accepted Multibeam Lines					
Year - Day	Time	Latitude	Longitude	Max. Depth	File Name
2000-039	15:13	33°10'09"	079°06'45"	11.7 m	00039151.SVP
2000-039	17:46	33°10'08"	079°06'47"	10.7 m	00039174.SVP
2000-041	12:49	33°10'06"	079°06'42"	11.0 m	00041124.SVP
2000-041	15:16	33°12'40"	079°06'27"	10.6 m	00041151.SVP
2000-041	16:15	33°10'00"	079°06'35"	11.6 m	00041161.SVP
2000-041	19:12	33°10'32"	079°06'31"	11.3 m	00041191.SVP
2000-042	12:54	33°10'11"	079°06'42"	10.9 m	00042125.SVP
2000-042	15:25	33°14'32"	079°06'57"	10.9 m	00042152.SVP
2000-043	12:48	33°10'10"	079°06'37"	10.4 m	D0043124.SVP
2000-043	12:48	33°10'10"	079°06'37"	10.5 m	00043124.SVP
2000-043	15:14	33°09'11"	079°07'02"	10.7 m	00043151.SVP
2000-043	18:46	33°13'58"	079°07'02"	10.5 m	00043184.SVP
2000-047	12:52	33°14'09"	079°03'43"	14.4 m	00047125.SVP
2000-047	17:00	33°14'10"	079°03'43"	13.8 m	00047170.SVP
2000-047	19:17	33°07'53"	079°03'34"	11.7 m	00047191.SVP
2000-049	14:23	33°07'42"	079°05'23"	13.4 m	00049142.SVP
2000-049	17:42	33°12'42"	079°05'55"	10.9 m	00049174.SVP
2000-049	19:19	33°14'08"	079°03'46"	13.7 m	00049191.SVP
2000-049	22:00	33°08'16"	079°03'37"	12.3 m	00049220.SVP
2000-054	17:00	33°10'07"	079°05'48"	10.8 m	00054170.SVP
2000-054	18:34	33°11'52"	079°05'47"	11.7 m	00054183.SVP
2000-054	21:31	33°11'52"	079°05'39"	10.9 m	00054213.SVP
2000-055	12:48	33°11'43"	079°05'47"	11.8 m	00055124.SVP
2000-055	15:45	33°12'15"	079°05'39"	12.8 m	00055154.SVP
2000-055	18:44	33°12'16"	079°05'37"	12.3 m	00055184.SVP
2000-056	12:43	33°12'16"	079°05'40"	11.9 m	00056124.SVP
2000-056	14:26	33°08'11"	079°05'27"	14.0 m	00056142.SVP
2000-056	17:10	33°08'15"	079°05'26"	14.0 m	00056171.SVP
2000-056	19:53	33°08'16"	079°05'22"	13.7 m	00056195.SVP
2000-057	12:54	33°09'51"	079°06'50"	10.4 m	00057125.SVP
2000-057	15:29	33°09'39"	079°07'04"	11.2 m	00057152.SVP
2000-057	18:03	33°09'38"	079°07'04"	11.5 m	00057180.SVP
2000-057	20:06	33°09'30"	079°07'15"	11.3 m	00057200.SVP
2000-058	12:46	33°09'31"	079°07'15"	10.4 m	00058124.SVP
2000-058	14:48	33°09'23"	079°07'22"	10.8 m	00058144.SVP
2000-058	17:33	33°09'15"	079°07'25"	11.6 m	00058173.SVP

SVP Data Applied To Accepted Multibeam Lines					
Year - Day	Time	Latitude	Longitude	Max. Depth	File Name
2000-058	19:00	33°09'07"	079°07'27"	11.4 m	00058190.SVP
2000-059	12:44	33°14'09"	079°03'42"	14.3 m	00059124.SVP
2000-059	16:33	33°08'59"	079°06'23"	10.6 m	00059163.SVP
2000-059	20:43	33°14'51"	079°06'36"	10.5 m	00059204.SVP
2000-061	13:02	33°08'15"	079°05'25"	13.3 m	00061130.SVP
2000-061	15:58	33°08'14"	079°05'31"	12.6 m	00061155.SVP
2000-061	17:58	33°08'18"	079°05'30"	12.8 m	00061175.SVP
2000-062	12:54	33°08'14"	079°05'21"	13.7 m	00062125.SVP
2000-062	16:14	33°08'12"	079°05'20"	13.3 m	00062161.SVP
2000-062	18:59	33°08'09"	079°05'35"	12.5 m	00062185.SVP
2000-064	13:00	33°08'15"	079°05'25"	14.4 m	00064130.SVP
2000-065	13:03	33°08'10"	079°05'22"	14.5 m	00065130.SVP
2000-065	16:26	33°08'07"	079°05'20"	13.3 m	00065162.SVP
2000-065	19:39	33°08'10"	079°05'21"	13.3 m	00065193.SVP
2000-066	12:41	33°11'35"	079°07'35"	10.5 m	00066124.SVP
2000-066	16:09	33°08'56"	079°07'38"	10.6 m	00066160.SVP
2000-066	18:49	33°08'10"	079°05'21"	12.5 m	00066184.SVP
2000-067	12:53	33°08'08"	079°05'21"	14.6 m	00067125.SVP
2000-067	16:19	33°08'06"	079°05'21"	13.5 m	00067161.SVP
2000-067	19:44	33°08'07"	079°05'23"	12.7 m	00067194.SVP
2000-068	13:10	33°11'50"	079°07'07"	10.3 m	00068131.SVP
2000-068	15:58	33°09'09"	079°07'26"	11.3 m	00068155.SVP
2000-069	13:10	33°14'11"	079°03'42"	14.8 m	00069131.SVP
2000-069	16:39	33°14'11"	079°03'39"	14.7 m	00069163.SVP
2000-070	12:51	33°14'00"	079°04'02"	14.4 m	00070125.SVP
2000-070	16:06	33°14'01"	079°04'00"	14.9 m	00070160.SVP
2000-070	18:59	33°14'01"	079°03'57"	14.0 m	00070185.SVP
2000-071	12:51	33°11'39"	079°07'22"	8.7 m	00071125.SVP
2000-074	12:56	33°13'59"	079°04'01"	13.9 m	00074125.SVP
2000-074	15:45	33°12'32"	079°03'59"	11.9 m	00074154.SVP
2000-074	19:00	33°08'15"	079°05'08"	13.4 m	00074190.SVP
2000-075	14:02	33°08'05"	079°05'38"	11.4 m	00075140.SVP
2000-075	17:08	33°08'13"	079°05'34"	12.4 m	00075170.SVP
2000-120	14:01	33°20'45"	079°16'41"	10.0 m	00120140.SVP
2000-120	19:03	33°14'57"	079°12'33"	10.0 m	00120190.SVP
2000-121	12:24	33°12'16"	079°04'17"	12.5 m	00121122.SVP

SVP Data Applied To Accepted Multibeam Lines					
Year - Day	Time	Latitude	Longitude	Max. Depth	File Name
2000-121	15:14	33°12'15"	079°04'19"	12.6 m	00121151.SVP
2000-121	18:17	33°12'26"	079°05'34"	12.6 m	00121181.SVP
2000-121	21:13	33°12'53"	079°04'58"	12.5 m	00121211.SVP
2000-122	12:21	33°09'45"	079°07'10"	10.6 m	00122122.SVP
2000-122	15:25	33°09'44"	079°07'10"	9.6 m	00122152.SVP
2000-122	18:39	33°09'35"	079°07'17"	9.9 m	00122183.SVP
2000-124	12:41	33°09'43"	079°07'12"	10.9 m	00124124.SVP
2000-126	11:53	33°13'43"	079°03'40"	14.6 m	00126115.SVP
2000-126	15:22	33°13'43"	079°03'40"	14.3 m	00126152.SVP
2000-126	18:34	33°13'43"	079°03'41"	12.8 m	00126183.SVP
2000-127	11:54	33°09'46"	079°07'09"	10.5 m	00127115.SVP
2000-127	15:17	33°09'46"	079°07'09"	11.3 m	00127151.SVP
2000-127	19:38	33°10'46"	079°04'13"	10.9 m	00127193.SVP
2000-128	11:44	33°11'29"	079°04'44"	12.0 m	00128114.SVP
2000-128	15:25	33°11'33"	079°07'49"	10.0 m	00128152.SVP
2000-128	17:31	33°10'46"	079°04'12"	11.9 m	00128173.SVP
2000-129	11:50	33°11'43"	079°04'55"	11.8 m	00129115.SVP
2000-129	14:53	33°11'43"	079°04'55"	12.5 m	00129145.SVP
2000-129	18:02	33°11'54"	079°04'57"	12.0 m	00129180.SVP
2000-130	11:57	33°13'10"	079°07'09"	9.3 m	00130115.SVP
2000-130	15:15	33°11'35"	079°06'53"	10.5 m	00130151.SVP
2000-130	18:16	33°11'35"	079°06'51"	10.5 m	00130181.SVP
2000-132	11:40	33°10'46"	079°04'16"	11.5 m	00132114.SVP
2000-132	14:44	33°10'47"	079°04'18"	11.6 m	00132144.SVP
2000-132	17:54	33°09'50"	079°04'02"	13.4 m	00132175.SVP
2000-133	11:57	33°12'22"	079°04'17"	12.9 m	00133115.SVP
2000-133	15:51	33°12'14"	079°05'52"	12.0 m	00133155.SVP
2000-133	20:17	33°09'31"	079°07'38"	9.4 m	00133201.SVP
2000-134	11:51	33°09'50"	079°03'59"	12.5 m	00134115.SVP
2000-134	14:54	33°09'49"	079°04'02"	11.9 m	00134145.SVP
2000-138	11:59	33°10'08"	079°03'11"	12.0 m	00138115.SVP
2000-138	15:00	33°09'30"	079°02'44"	12.6 m	00138150.SVP
2000-138	17:44	33°08'38"	079°00'17"	13.7 m	00138174.SVP

G.3 Instrument Corrections: All instruments were calibrated prior to the survey and no corrections to instrument readings were required, other than SVP processing as described in Section G.2.

G.4 Static Draft: Prior to survey operations, a vessel reference position was established with measurements to all sensors. A separate "reference mark" which was more easily accessible to the surveyors was defined to aid in monitoring vessel static draft during survey operations. Measurements were made from the reference mark to the waterline at the start of every survey day. These values were used to determine and monitor the vessel static draft on a daily basis and were subsequently input to the CARIS vessel configuration file during post processing. A log of the measured values was maintained aboard the vessel to track any variations and compare daily results with known variables such as fuel, personnel and equipment loading. The vessel was held level, based on motion sensor output, to standardize all measurements for varying loads. The vessel vertical zero reference point was established prior to final loading. The median static draft was –0.05 meters with a range of –0.03 to –0.06 meters. The sign of the value is set as required in CARIS. Values were entered into the CARIS VCF daily.

G.5 Settlement and Squat: Dynamic draft was determined using a variation of the shore based leveling technique where a stadia rod is placed over the transducer and observed from shore with an optical level. OSI employed a Trimble Navigation 7400MSi on-the-fly Kinematic DGPS system in place of the standard leveling system. Operationally, a reference station was set on-shore near the test area and the ship's GPS antenna was placed over the transducer. The ship's antenna was maintained in the plumb position over the multibeam transducer to allow the direct measurement of the vessel's dynamic draft. A series of draft measurements was recorded while running a trackline in opposite directions at varying speeds and fuel load levels. Tidal variations were monitored by recording the static elevation of the vessel while at rest, before and after each pair of runs. Final values were obtained by averaging tide corrected values from each pair of runs.

G.6 Heave, Pitch, Roll Biases and Navigation Timing Errors (patch test): Patch test data were collected on day 2000-027. A TSS DMS-05 Motion Sensor was used for heave, pitch and roll measurements. Multibeam data were acquired along specifically selected alignments to develop the required test information for each parameter. These data were processed in accordance with the calibration guidelines discussed in the project specifications and deliverables. Several data samples for each parameter were analyzed. The final correctors were determined by averaging the results of the individual tests. The final correctors were then verified by acquiring another set of test data and post processing this information using the predetermined corrector values. As a QA/QC check, all calibration data were reviewed by several members of the vessel and post processing teams. To confirm that all systems were operating correctly after the stand down period, an additional round of patch test and verification lines were collected on day 2000-120. The results from these tests were consistent with the information developed during the initial patch test. The corrector values used during processing are included in Appendix E.*

* Data filed with field records

G.7 Unusual Instruments and Methods: The only non-standard procedure was the use of on-the-fly kinematic DGPS to establish the dynamic draft of the vessel. This method is described in section G.5.

G.8 Specific Areas, Vessels and Depths: No specific correctors are needed other than the established tidal zoning. The same vessel, equipment, mounting offsets and equipment calibrations were used throughout the project. Depth ranges surveyed do not require special handling or variable corrections.

G.9 Source of Correctors: All tidal data were provided by NOAA. All predicted and final tides were obtained from the CO-OPS server. Final tide zone correctors were received from the COTR in an e-mail dated June 22, 2000 included in *Appendix D. (See page 78)

G.10 Other Factors: In the early part of the year there was a pronounced thermal difference in the ebbing waters. This created the need for frequent SVP casts when running in and around the ebb tide plume during January and February. The effects of the ebb plume were greatly reduced in the latter part of the survey as temperatures equilibrated throughout the water column.

*H. HYDROGRAPHIC POSITION CONTROL - See also Evaluation Report

H.1 Horizontal Datum: The horizontal datum for this project is the North American Datum of 1983 (NAD83). All project data are referenced to Latitude/Longitude and Universal Transverse Mercator (UTM) Zone 17, in meters.

H.2 Method of Position Control: Position information was obtained and monitored with two independent systems. Each system consisted of a Global Positioning System (GPS) receiver coupled to a U.S. Coast Guard Differential beacon receiver. The primary system was tuned to receive DGPS correctors from station Charleston, SC and the reference system was tuned to station Fort Macon, NC. The primary position data were fed to both the Hypack Max track line control and monitoring computer and the TEI ISIS logging system simultaneously. The Hypack system also received position data from the reference system. A utility within Hypack continuously reported difference values between the primary and reference GPS data. Settings in both the GPS equipment and in the Hypack software allowed for monitoring of all quality parameters required by the specifications and deliverables.

H.3 Position Accuracy: The primary positioning system functioned without interruption with the exception of brief periods (less than 15 minutes) when differential correctors broadcast from the Charleston, SC station were not received. Survey operations were suspended during these outages and recommenced when a high quality broadcast signal was reacquired. As discussed in H.6, navigation confidence checks never exceeded 2 meters.

*Data filed with field records

H.4 Positioning Equipment: Positioning system components used throughout this survey are tabulated below. No positioning systems or system components were substituted or modified at any time during the course of the survey. All system components were manufactured and calibrated by Trimble Navigation.

Primary System		
Unit	**Model**	**Serial Number**
GPS Receiver	7400MSi	3623A15961
GPS Antenna	L1/L2	220021497
Beacon Receiver	ProBeacon	0220181937
Beacon Antenna	Ant	0220168038

Reference System		
Unit	**Model**	**Serial Number**
GPS Receiver	7400MSi	3608A14636
GPS Antenna	L1/L2	220051664
Beacon Receiver	ProBeacon	0220181939
Beacon Antenna	Ant	0220180793

H.5 Control Stations: The following table lists DGPS broadcast stations and control points used during survey operations and confidence checks.

Type	Name	Frequency or PID
Primary DGPS Corrector	Charleston, SC	298 KHz
Reference DGPS Corrector	Fort Macon, NC	294 KHz
Control Point	George	DD0299

H.6 Confidence Checks: System horizontal positioning accuracy was verified prior to and on a daily basis during the course of the survey. The following paragraphs briefly describe the confidence check procedures employed. The results of these checks are tabulated in *Separate IV of this report.

Prior to the survey the primary navigation system antenna was deployed over NGS control point "George" (PID DD0299) located in downtown Georgetown, SC to verify both the raw geographic position information and the computed UTM coordinate values. The NGS data sheet for point "George" is included in *Separate III of this report. Static position information was logged for several minutes using the Hypack Max navigation computer. The position information was averaged and compared to the published data. The averaged position differed from the published coordinates by 0.132 meters east and 0.600 meters north.

Navigation checkpoint "USCG Dock" was installed on the dock used to berth the survey vessel. The coordinates of this point were established employing "OTF" GPS techniques based on Point "George". With the primary navigation equipment installed aboard the vessel, the system antenna was deployed over "USCG Dock" to verify system accuracy.

*Data Filed with field records.

Point "USCG Dock" was occupied periodically during the project to verify system operations.

The primary navigation antenna was installed on the vessel. With the vessel secured to the dock a "Vessel at Dock", navigation check position was recorded. The vessel was secured in approximately the same location every day. Navigation confidence checks were carried out at the beginning and end of a survey day by comparing the real time secured position values with coordinates of "Vessel at Dock".

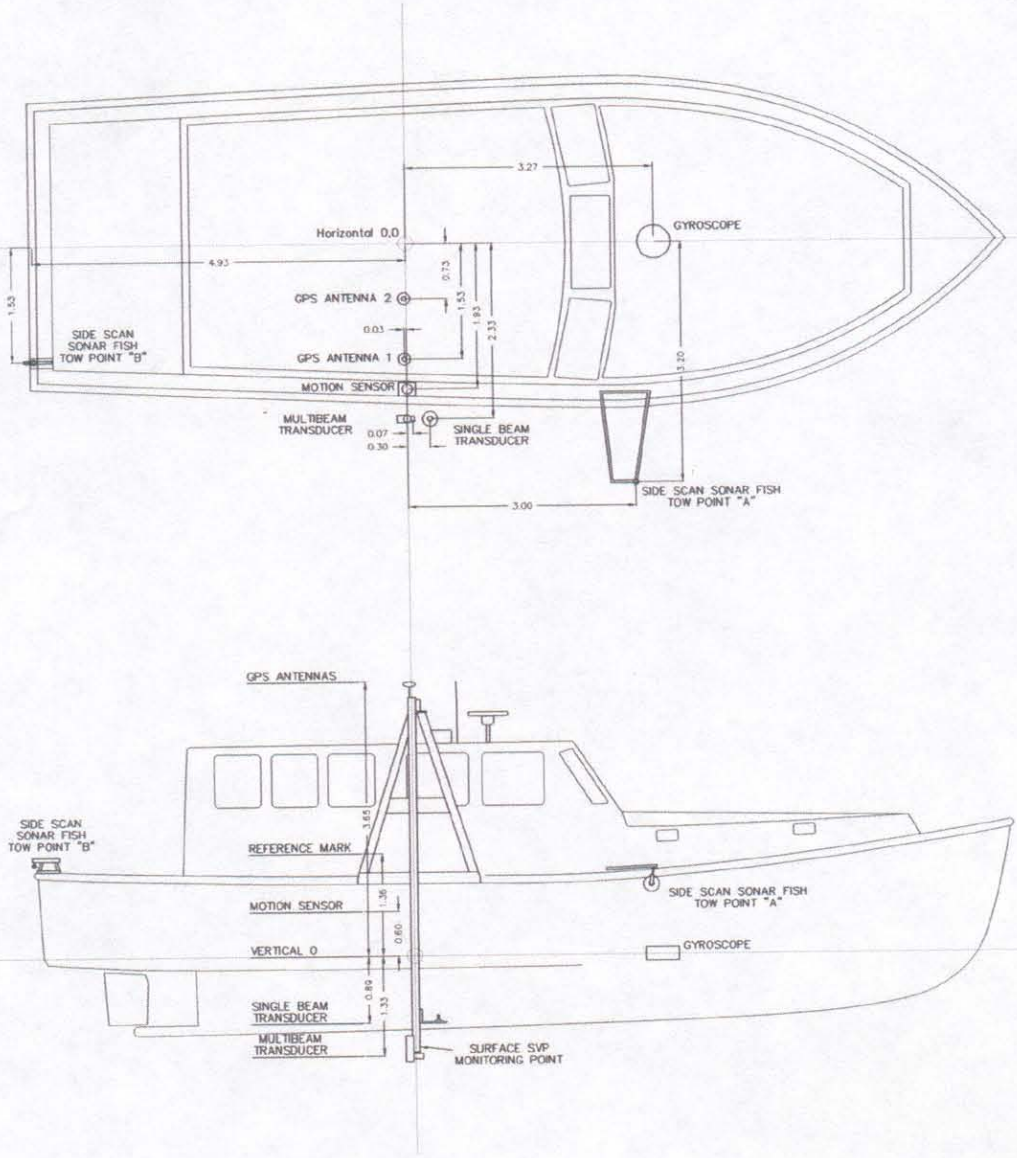
These checks, along with the real time position comparisons made between the primary and secondary navigation systems, provided a high level of confidence that the navigation system consistently performed within project specifications. As an additional confidence check, navigation charts of local waters were displayed by the navigation system. These displays allowed for the "on line" visual verification of the relative position of channel markers and seabed features to current position of the survey vessel.

H.7 System offsets. Several reference points were established to determine offsets of the various sensors as required by the acquisition systems.

A vessel reference point located near the vessel's center of mass and perpendicular to the multibeam transducer was established for use with the CARIS software. The X-axis crossed the beam of the vessel along a line passing through the multibeam transducer. The Y-axis was located along the vessels fore/aft centerline. The Z-axis reference was established near the vessel's water line. Relative sensor positions were determined as offsets from this point. A copy of the CARIS VCF file detailing this offset information is included in Separate V of this report. It should be noted that no offset values were input to ISIS and that the CARIS Vessel Configuration File was used to apply all variables during post processing. The figure below illustrates the relative positions of the various sensors on the vessel.

Several reference points were established for use by the Hypack Max platform. Briefly, Hypack trackline guidance information is computed based on the relationship between the 0,0 reference point and the intended trackline. The perpendicular distance from the intended trackline to the 0,0 point is displayed as offline error. Therefore, to facilitate towing of the side scan transducer along an intended track line it was necessary to locate the Hypack reference 0,0 on a point in line with the tow point in use (i.e. tow points A, B, or MB). A complete table of Hypack offsets is included in Separate IV.

*Data Filed with field records



Research Vessel *West Cove*
Equipment Configuration

I. SHORELINE

Not Applicable. Shoreline verification was not required.

J. CROSS LINES

J.1 Soundings along twelve (12) east-west lines were acquired for use in cross line comparison analyses. The total of cross line miles surveyed was approximately 5.6% of the total main-scheme sounding line mileage. All cross lines were collected using the same vessel and equipment as was used along main-scheme lines.

J.2 As part of the standard processing QA/QC, all intersections of cross lines and main-scheme sounding lines were compared using the mean and standard deviation surfaces of CARIS HIPS subset mode.

J.3 CARIS HIPS Quality Control Reports (QCRs) were generated and analyzed for 193, or 12% of the main scheme intersections. All QCRs showed that 100% of the soundings met the allowable depth standards for this survey. Of the more than 5200 points analyzed, only one point exceeded 0.3 meters.

J.4 QCR reports were also generated for every item investigation that required a cross line. Only 1 point out of 1,026 tested in A-4 and 1 point out of 1,802 tested in A-6 failed to meet allowable depth standards. All other points of the more than 9,900 tested met the required accuracy.

*K. JUNCTIONS - See also Evaluation Report

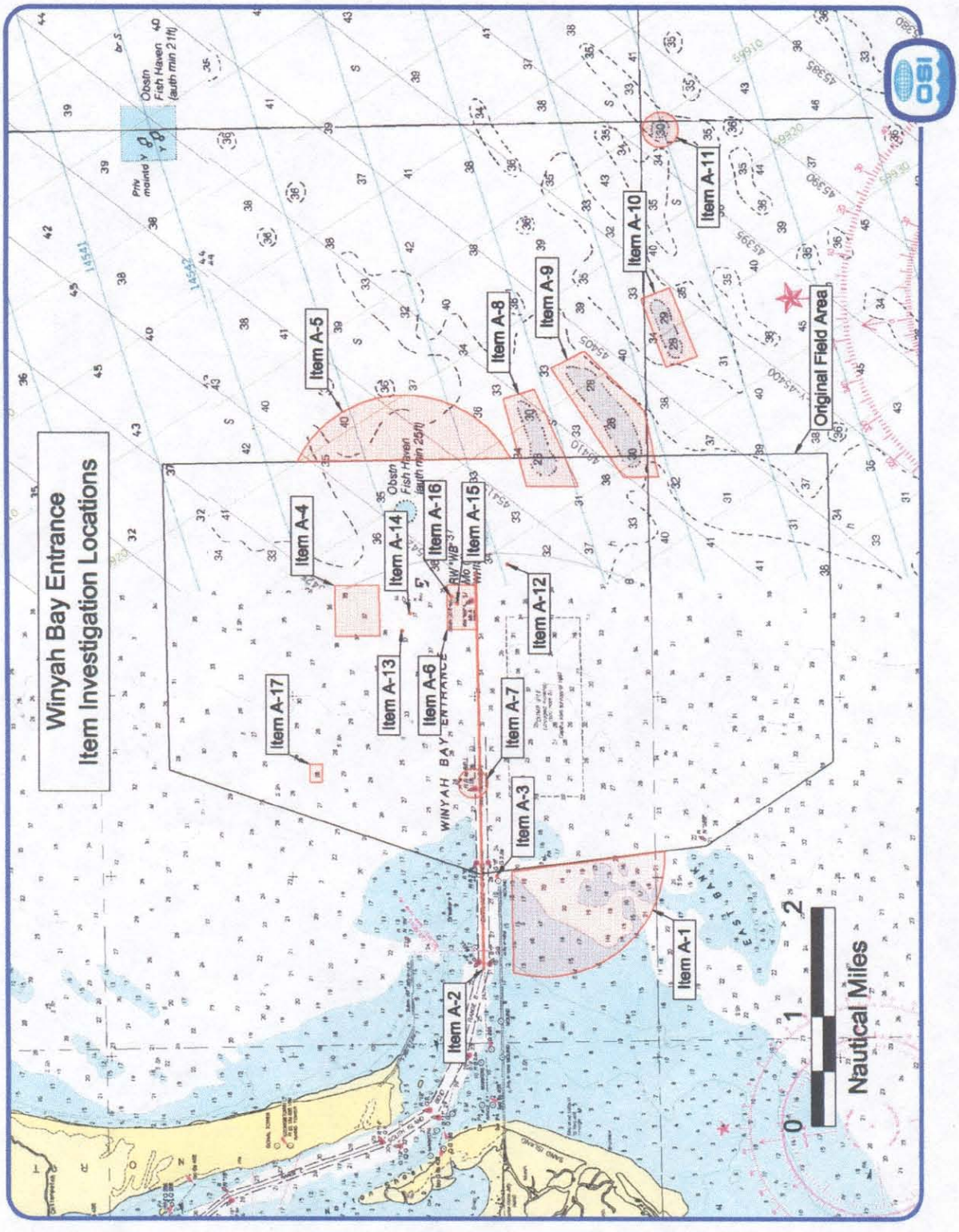
Survey operations for project OPR-G360-KR-99 were restricted to Sheet "A", no relevant junctions are available. Concur w/ condition

*L. COMPARISON WITH PRIOR SURVEYS - See also Evaluation Report

Comparison with prior surveys was not required.

M. ITEM INVESTIGATION REPORTS

M.1 Item Investigations: Preliminary survey operations identified numerous contacts that were submitted to NOAA for consideration as additional work items. Also, conversations with the local pilots association identified several areas of concern. Based on this information, seventeen items were selected for additional investigation. All data pertaining to item investigations are contained in this report. A diagram of item locations is included below and the individual reports follow.


Winyah Bay Entrance
Item Investigation Locations
Item A-1
Item A-2
Item A-3
Item A-4
Item A-5
Item A-6
Item A-7
Item A-8
Item A-9
Item A-10
Item A-11
Item A-12
Item A-13
Item A-14
Item A-15
Item A-16
Item A-17
Original Field Area
WINYAH BAY ENTRANCE
Obstn
Fish Haven
(auth min 21ft)
Obstn
Fish Haven
(auth min 25ft)
0
1
2
Nautical Miles

Item Investigation Report

Item Reference: A-1 **Type of Feature:** AWOIS 10189, Wreck (PA)

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°11'00.00"N **Datum:** NAD83
079° 08'00.00"W
Center as listed in AWOIS 10189

Reported Least Depth: Not Reported **Datum:** MLLW

Source & Description: AWOIS 10189 - Charted partially submerged wreck S/V Rosainante, a 34 foot sloop. Reported in 1992 on LNM 38/92. According to Capt. Edwin Jayroe of the Georgetown Pilots Association, most of the wreck had washed up on shore and been salvaged a few years ago (per conversation with LT Eric Sipos, NOAA on March 8, 2000).

Investigation

Date(s)/Day Number(s): 122, 124 &127-2000 **Survey Vessel Name:** West Cove

Survey Requirements: SSS coverage shall be 200% coverage encompassing the portion of the 2000 meter search radius, centered at the above coordinates, that fall outside the H10946 survey limit, except that no coverage is needed north of 33 °11'18.00"N. Multibeam data shall be collected concurrently with the SSS.

Survey Method: A fixed line spacing of 30 meters and SSS range of 50 meters were used to provide adequate coverage at the expected survey depths. All H10946 SSS and multibeam requirements, as well as item investigation work order requirements were followed during survey operations.

Line, Time, Profile, Beam: N/A

Surveyed Position: N/A

Least Depth: N/A

Position Determined By: N/A

Comparison with Prior Survey: No prior surveys were provided.

Comparison with Chart: No wreck (PA) was located. This area appears to be very dynamic, with several changes between the charted and surveyed depths noted. In

general the northeast corner of A-1 appears to agree with charted soundings, while the southern section shows the greatest variance. Very large sand waves and significant changes in the 18 foot contour were noted in the southern region. The other notable change is within the limits of H10496 main scheme data. There is a 16 foot soundings reported in the vicinity of the wreck symbol with the associated 18 foot contour. The current survey data indicate that there is no 16 foot shoal, the shoalest sounding is19 feet. ← H10946

Investigation Results: Numerous small contacts were identified during preliminary review of SSS data, however most exhibited low relief and were deemed insignificant. Contacts FC-178 and FC-179 were originally thought to be the same target seen on adjacent lines. Orthogonal lines showed no multibeam correlation. Upon further review FC-179 was determined to be distinct from FC-178, and is located approximately 17 meters to the west. No multibeam data is available for FC-179. Its height, measured from SSS is about 1 meter (3.3 feet). FC-169, correlated to FC-168, has a height of 0.5 meters (1.6 feet) from SSS however no target was identified from orthogonal multibeam lines run over the location. OC-017, correlated to FC-170, FC-171 and FC-172, is a small object approximately 1.1 meters (3.6 feet) high. Multibeam data over the contact indicate a target height of 0.7 meters (2.3 feet).

This item does not pose a danger to navigation and should be considered resolved.

Charting Recommendation: Delete Wreck (PA) charted at latitude 33° 11'00.00"N, longitude 079°08'00.00"W. Concur Delete HAA

Refer to accompanying preliminary smooth sheet for depth and contour modifications.

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use:

Item Investigation Report

Item Reference: A-2 **Type of Feature:** Potential Shoaling

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: From: 079° 09'11. 81"W **Datum:** NAD83
To: 079° 04'51. 91"W
Along center of channel as defined by range markers.

Reported Least Depth: Project depth is 27 feet **Datum:** MLLW

Source & Description: NOAA: Based on a conversation with Capt. Edwin Jayroe of the Georgetown Pilots Association, NOAA has learned that natural shoaling often occurs in the channel, especially from buoy R "4" to R "8", between the scheduled 5 year dredging cycles.

Investigation

Date(s)/Day Number(s): 128-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Full bottom multibeam coverage along the centerline of the channel defined by the above coordinates.

Survey Method: Centerline coordinates were based on channel location obtained from the U.S. Army COE and range light location from the U.S.C.G Aids to Navigation Division of Station Georgetown. Both multibeam and SSS data were collected along the centerline and two 90-meter offset tracklines. These were run to aid in the definition of the portions of the channel that are inside the limits of H10946.

Line, Time, Profile, Beam: N/A

Surveyed Position: N/A

Least Depth: N/A

Position Determined By: N/A

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: Depths along the centerline and southern offset line are generally 27-29 feet, consistent with tabulated depths on Chart 11532. Depths from the north offset line, along the northern edge of the channel are more variable, 19-27 feet. These findings are in agreement with the tabulated depth of 19.1 feet for the right outside quarter of the entrance channel.

Investigation Results: Shoal depths encroach on the channel limits along the north side of the channel between buoys "R4" and "R8". The shoalest area is from about 213 meters east of buoy "R6" to 91.5 meters west of buoy "R6". A 17 foot sounding located at latitude 33°11'37.150"N, longitude 079°07'52.261"W lies along the northern channel limits.

This item presently does not pose an unknown danger to navigation, however this is an active depositional area that should be monitored. This item should be considered resolved.

Charting Recommendation: No recommended changes. Concur - 19' depth outside channel limits

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use:

Item Investigation Report

Item Reference: A-3 **Type of Feature:** Mound, eastern extent of jetty in ruins.

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°11'25.50"N 079°08'14.10"W Scaled from chart **Datum:** NAD83

Reported Least Depth: N/A **Datum:** MLLW

Source & Description: NOAA: Capt. Edwin Jayroe of the Georgetown Pilots Association reported to NOAA that there has been multiple loss of life and significant loss of property over the years as a result of numerous, non-local boaters being unaware of the unmarked, submerged jetty in ruins located just south of the channel. The Pilots Association very strongly recommends that NOAA consider revising the current chart depiction of the submerged jetty in ruins to better warn mariners of the danger. AHB cartographers have stated that in order to provide a better depiction, it is necessary to verify the position of the eastern end of the jetty.

Investigation

Date(s)/Day Number(s): 071-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Position the eastern extent of the submerged jetty (toe of the slope) using DGPS and side scan sonar.

Survey Method: Obtained multibeam and SSS data over the submerged portion of the jetty.

Line, Time, Profile, Beam: L500, T1529, P2035, B12 for multibeam
L500, T1529, P1918 for SSS pick 1
L500, T1523, P1543 for SSS pick 2

Surveyed Position: 33°11'26. 00"N, 079°08'11. 00"W Average of picks.

Least Depth: N/A

Position Determined By: Multibeam soundings and DGPS, with comparison to SSS positions.

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: The surveyed position of the jetty is approximately 16 meters north and 80 meters east of the charted location. Part of this distance maybe due to the new position referencing the toe of the jetty while the old position might be the top of the exposed mound.

Investigation Results: Multibeam and SSS operations adequately depict the breakwater toe as required. The adjacent data also show several contacts less than 1 meter (3.3 feet) high scattered around the end of the jetty. Based on their proximity, these items are considered debris associated with the jetty. For reference, the following is a list of contacts associated with the end of the jetty and nearby debris:

OC-015
FC-194 and 196
FC-014 and 192
FC-191 and 016

The following text is from the Coastal Pilot "Some vessels, mistaking Winyah Bay Range B Lights for Range A Lights, have approached the entrance too closely at night and only with difficulty have cleared the outer end of the south jetty. Mariners are advised to familiarize themselves with the characteristics of these ranges before making the approach."

The survey requirements of this item have been achieved.

Charting Recommendation: Delete "mound" charted at latitude 33°11'25.50"N, longitude 079°08'14.10"W, and chart a "mound" at latitude 33°11'26.00"N, longitude 079°08'11.00"W. Improve/highlight danger symbols indicating "jetty in ruins". Concur w/ Cond'ts (see below)

Consider placement of surface marker to aid safe vessel transit.

Charts Affected: 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use:

Delete mound charted in Lat - 33-11-25.50N Long - 79-08-14.10 W

Add mound in Lat 33-11-26.00N Lon 79-08-11.00

Jetty Note and symbolization to Revise Return to Submit Jetty in ruins

Item Investigation Report

Item Reference: A-4 **Type of Feature:** Debris Field
Fish Haven - region of actual dumping

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°12'45.61"N **Datum:** NAD83
079°05'20.68"W
As listed in Danger to Navigation Report

Reported Least Depth: N/A **Datum:** MLLW

Source & Description: NOAA: Preliminary SSS information from H10946 indicates a region of artificial reef dumping located approximately 2000 meters west-northwest of the charted fish haven location described in AWOIS 10191.

Investigation

Date(s)/Day Number(s):056, 062,121 & 133-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Acquire additional multibeam coverage, so that when combined with existing multibeam coverage, full bottom coverage multibeam is obtained within the region of actual dumping as defined by the following coordinates:
33°12'51.00"N, 079°05'33.00"W
33°12'27.00"N, 079°05'33.00"W
33°12'27.00"N, 079°05'00.00"W
33°12'51.00"N, 079°05'00.00"W
In addition, acquire orthogonal multibeam lines near nadir over the three shoal depths.

Survey Method: Multibeam only tracklines were run following H10946 data quality requirements, with line spacing sufficient to provide for overlapping data within the coordinates provided. Vessel speed was less than 5 knots during collection of orthogonal lines over shoal points. All available data were reviewed while determining the shoal sounding.

Line, Time, Profile, Beam:

West Barge	2000-121, L135, T1711, P777, B7
Center Barge	2000-133, L988, T1419, P373, B55
East Barge	2000-133, L992, T1259, P430, B3
Unknown	2000-121, L141, T1704, P1780, B9
Private Buoy	2000-062, L237, T1327, P27850 SSS pick

Surveyed Position:

West Barge	33°12'45.539"N,	079°05'20.611"W
Center Barge	33°12'45.276"N,	079°05'18.128"W
East Barge	33°12'43.816"N,	079°05'11.458"W

	Unknown	33°12'41.753"N,	079°05'18.900"W concur
	Private Buoy	33°12'39.400"N,	079°05'11.600"W
Least Depth:	West Barge	24.8 feet	
	Center Barge	28.9 feet 27.52 FT	
	East Barge	24.8 feet 24.678 FT ✓	
	Unknown	24.3 feet	
	Buoy	N/A	

Position Determined By: Multibeam and DGPS for 4 shoal points, SSS for buoy.

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: No fish haven, buoy symbols, or shoal soundings are charted in the immediate area specified above. However, AWOIS 10191 is charted approximately 2000 meters to the ESE and a private buoy is charted approximately 800 meters to the south. Surrounding depths (excluding debris) are generally within one foot of the depths plotted on existing charts.

Investigation Results: This item appears to be a fish haven with active dumping. AWOIS 10191 notes contain a reference to scaled coordinates from a DNR chartlet which fall within the present debris field. A yellow DNR buoy was found moored within the present debris field. The buoy is marked with the following text:

Artificial Reef
South Carolina Department of Natural Resources
Sport Fish Restoration

The tug Island Trader was observed depositing "reef units" within the present debris field on day 2000-056. According to the tug captain, 200 units were randomly dropped at this site as the barge circled the buoy. The units are pre cast concrete 3 feet tall by 4 feet wide at the base and 2.5 feet wide at the top. The captain reported dropping 200 more units at another offshore location. This tug was seen in the entrance channel of Winyah Bay on day 2000-130, loaded with additional units

Survey operations identified three large obstructions, one small obstruction with significant height, and numerous smaller objects within the survey area. All three large obstructions appear to be barges and are approximately 6-10 feet high. The smaller obstruction was observed on two separate lines with 5 to 10 multibeam hits per line. This object was part of the 3/24/00 Dangers to Navigation report, (Item 4, Obstruction discovered 29 feet). During A-4 investigations an additional multibeam line was run over the object. The new data indicated a shoal sounding of 24 feet for this obstruction. The smaller objects are mostly reef units, as detailed above, and various other pieces of unidentified debris. The position and depth information of all three barges and the isolated object mentioned above are provided due to their proximity of both location and

least depth. It should be noted that the shoal point of the center barge, at its northeast corner, is masked in the 1:10,000 and 1:15,000 data set by the west barge. Both data sets contain a sounding from the eastern section of the center barge, which does not represent its shoal point.

The DNR website, http://www.scfishnet.com/screefs.htm, presently lists the fish haven at the original AWOIS 10191 coordinates.

The Coastal Pilot states that there is not an official anchorage for large vessels in the bay or at the entrance. The information does say that the local pilots suggest anchoring 0.5 miles north of the WB buoy. This information would place large ships dangerously close to several shoal points located within the limits of A-4, an active area of dumping.

It is recommended that this item not be considered resolved due to discrepancies in reported positions and the active nature of dumping. It is suggested that this item be resurveyed to determine least depths after any additional dumping and that this item be monitored to ensure proper resolution of all charts, AWOIS lists, and published positions.

The items discussed in this section represent significant dangers to navigation. Several of which were identified in the 3/24/00 Dangers to Navigation report submitted to Jeffery Ferguson of NOAA, which is enclosed in *Appendix A of this DR. The positions and depths of the three wrecks and the isolated object are listed in the revised Report of Dangers to Navigation, also in *Appendix A.

See also E&A Report Section N.1, and Section G.1.

***Charting Recommendation:** Chart a Wreck (25 feet) at latitude 33°12'45.539"N, longitude 079°05'20.611"W. Concur

Chart a Wreck (~~29~~ 27 feet) at latitude 33°12'45.276"N, longitude 079°05'18.128"W. - Do not concur Do not chart - space doesn't permit

Chart a Wreck (25 feet) at latitude 33°12'43.816"N, longitude 079°05'11.458"W. Concur

Chart an Obstr (24 feet) at latitude 33°12'41.753"N, longitude 079°05'18.900"W. Concur

Delete Buoy (Yellow Nun Private, symbol 212) charted at latitude 33°12'12.9"N, longitude 079°05'12.0"W and chart a Buoy (Yellow Nun Private, symbol 212) at latitude 33°12'39.40"N, longitude 079°05'11.60"W. Do not concur - Retain as charted until informed to do otherwise by Coast Guard.

Refer to accompanying preliminary smooth sheet for shoal depth and contour modifications.

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use: Delete 24: Obstn in Lat 33-12-41, Lon 79-05-18 - Chart 11535 (11th Ed./APR/92
Chart 25 wk in Lat 33-12-45.539N, Lon 79-05-20.611 W
Chart 25 wk in Lat 33-12-43.816 N, Lon 79-05-11.458 W

* Data appended to this report

Item Investigation Report

Item Reference: A-5 **Type of Feature:** AWOIS 10191
Fish Haven - charted location

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°12'12.00"N **Datum:** NAD83
079°04'13.00"W
Center as listed in AWOIS 10191

Reported Least Depth: Authorized min. of 25 feet **Datum:** MLLW

Source & Description: NOAA: AWOIS 10191 is a fish haven charted at latitude 33°12'12.0"N, longitude 079°04'13.0"W. The required AWOIS search radius is 2000 meters.

Investigation

Date(s)/Day Number(s): 126-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Collect 200% side scan sonar, within the portion of the 2000 meter search radius (centered at latitude 33°12'12.0"N, longitude 079°04'13.0"W) that falls outside H10946 survey limits. Multibeam data shall be collected concurrently.

Survey Method: A set line spacing of 65 meters and SSS range of 75 meters were used to provide adequate coverage of the survey area, while matching the methods used in the adjoining main scheme areas. All H10946 SSS and multibeam requirements, as well as item investigation work order requirements were followed during survey operations.

Line, Time, Profile, Beam: N/A

Surveyed Position: N/A

Least Depth: N/A

Position Determined By: N/A

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: AWOIS 10191 is portrayed on all area charts as described in the AWOIS text. H10946 main scheme and Item A-5 data show no evidence of dumping, wrecks, or other fish haven related activities other than those covered by items A-4 and A-14 within the search radius of this item.

Investigation Results: Survey operations indicate possible inconsistency in the charted or reported placement of AWOIS 10191. Refer to Item A-4 for details of a debris field located 2000 meters to the WNW.

The survey requirement of this item should be considered resolved.

Charting Recommendation: Delete Obstn (fish haven) charted at latitude 33°12'12.0"N, longitude 079°04'13.0"W. Concur w/ conditions. See E&A Report Section N.1. for charting recommendations.

Charts Affected: 11520, 11531 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use:

Retain as charted until the proper permits are issued to re-chart + move the Fish Haven (Obstn)

Item Investigation Report

Item Reference: A-6 **Type of Feature:** AWOIS 10190, Obstruction 20 foot reported

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°11'42.8"N 079°05'13.5"W **Datum:** NAD83
Center as listed in AWOIS 10191

Reported Least Depth: 20 foot reported **Datum:** MLLW

Source & Description: NOAA: AWOIS 10190 is an Obstruction, 20 foot reported, from LNM 47/71. The AWOIS note suggests a sunken buoy. Preliminary SSS from H10946 shows that there are several SSS contacts clustered within a 400 meter radius of the charted position.

Investigation

Date(s)/Day Number(s): 129-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Acquire additional multibeam coverage, so that when combined with existing multibeam coverage, full bottom multibeam coverage is obtained within the region defined by the following coordinates:
33°11'50.2"N, 079°05'29.8"W
33°11'34.3"N, 079°05'29.8"W
33°11'50.2"N, 079°05'00.5"W
33°11'34.3"N, 079°05'00.5"W

Survey Method: Multibeam data were collected following H10946 data quality requirements, with trackline spacing sufficient to provide overlapping data within the area. Vessel speed was kept under 5 knots during collection. All available data were reviewed while determining the shoal sounding.

Line, Time, Profile, Beam: 2000-133, L877, T1611, P863, B17

Surveyed Position: 33°11'44.813"N, 079°05'12.724"W

Least Depth: 26.6 feet

Position Determined By: Multibeam and DGPS.

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: The charted 20 foot obstruction was not found. The shoal point surveyed within the A-6 area is 26 feet located approximately 70 meters from the reported 20 foot obstruction (see A-15). The surveyed position of the block for safe water buoy "WB" is within 25 meters of its charted position. Surrounding waters are charted between 34-37 feet and match the survey data well except as indicated below.

Investigation Results: Survey data adequately covers the entire search area. No obstruction with a shoal depth of 20 feet was identified. Several significant contacts were logged within the A-6 area. FC-075 (correlated to FC-107 and FC-111) is discussed in Item A-16. FC-069 (correlated to FC-074) is the target closest to the reported 20 foot obstruction and represents the shoal sounding in the A-6 area. This object is discussed further in A-15. FC-007 (correlated to FC-009) has a height of approximately 1 meter (3.3 feet). The correlated multibeam sounding is 31 feet, surrounded by soundings of 36 feet, therefore this is considered an obstruction. The target is probably an old buoy, sinker, and chain based on SSS imagery. FC-013 (correlated to OC-018) has a height of 1 meter (3.3 feet) measured on SSS. The correlated multibeam sounding is 32 feet, surrounded by soundings of 33-36 feet.

Charting Recommendation: Delete charted Obstn (20 foot reported) at latitude 33°11'42.8"N, longitude 079°05'13.5"W. Concur

Chart an Obstr (31 feet) at latitude 33°11'45.769"N, longitude 079°05'27.349"W

See Items A-15, A-16 for further recommendations.

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use:

Delete obstn (20ft rep) in Lat 33-11-42.8N, Lon 79-05-13.5W
Chart 31 Obstn in Lat 33-11-45.769N, Lon 79-05-27.349W

See also page 50-53 of the Report

Item Investigation Report

Item Reference: A-7 **Type of Feature:** 18 foot charted sounding

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°11'38.12"N **Datum:** NAD83
079°07'10.18"W
Approximate Charted Location

Reported Least Depth: 18 foot **Datum:** MLLW

Source & Description: NOAA: 18 foot sounding charted at the above listed coordinates. Preliminary survey depth information from H10946 did not find an 18 foot depth in the area.

Investigation

Date(s)/Day Number(s): 130-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Acquire additional multibeam coverage, so that when combined with existing multibeam coverage, full bottom multibeam coverage is obtained within a 250 meter radius centered at the above listed coordinates.

Survey Method: Multibeam data were collected following H10946 data quality requirements, with trackline spacing sufficient to provide for overlapping data within the coordinates provided. All available data were reviewed while attempting to locate the subject sounding.

Line, Time, Profile, Beam: N/A

Surveyed Position: N/A

Least Depth: N/A

Position Determined By: N/A

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: The charted 18 foot sounding was not located. Adjacent soundings to the north, east, and south generally agree with those charted. Soundings to the west and northwest are deeper by 2-5 feet.

Investigation Results: Survey operations provided extensive coverage of the subject shoal and should provide sufficient information to justify removal this sounding.

The shoal points in this area are all 26 feet. They consist of encroaching shoals north of the channel on both the east and west side of the site and the anchor block for Red Buoy 4.

No contacts were recorded within the subject area other than the anchor block noted above.

The survey requirements of this item should be considered resolved and this sounding removed from the chart.

Charting Recommendation: Delete an 18 foot sounding at latitude 33°11'43.658"N, longitude 079°07'08.176"W and reference accompanying preliminary smooth sheet for depth and contour modifications. Concur

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use:

Delete 18' shoal SND charted in Lat 33-11-38.12 N
Lon 79-07-10.18 W
on Chart 11532

on Lat 33-11-43.658 N
Lon 79-07-08.176 W
on Chart 11531

Item Investigation Report

Item Reference: A-8 **Type of Feature:** Charted Shoal

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°11'00"N **Datum:** NAD83
079°03'25"W
Approximate Charted Location

Reported Least Depth: 28 feet **Datum:** MLLW

Source & Description: NOAA: The Georgetown Harbor Pilots Association has requested that this shoal be investigated. This item extends outside the original limits of H10946, but is to be incorporated into the H10946 data and report.

Investigation

Date(s)/Day Number(s): 126, 127, 128 &132-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Run 20 meter spaced multibeam only lines within the defined polygon. Full bottom coverage is not required. One cross line is required.
33°11'05.72"N, 079°03'57.18"W
33°11'17.51"N, 079°02'59.49"W
33°11'00.42"N, 079°02'53.19"W
33°10'37.83"N, 079°03'57.42"W

Survey Method: Multibeam data were collected following H10946 data quality requirements, with 20 meter trackline spacing as specified. All available data were reviewed while determining the shoal sounding.

Line, Time, Profile, Beam: 2000-033, L200, T2055, P34034, B39

Surveyed Position: 33°10'51.631"N, 079°03'38.170"W

Least Depth: 28.2 feet

Position Determined By: Multibeam and DGPS

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: The surveyed shoal as defined by the 30 foot contour is approximately 330 meters south of the charted shoal and covers a smaller area. The surveyed and charted least depths match (28 feet).

Investigation Results: Survey operations provide extensive coverage of the subject shoal and will allow accurate charting of its extent. No contacts were recorded within the survey area.

Sediment sample grab 26 was taken on this shoal as "med br S brk Sh". A copy of NOAA Oceanographic Log Sheet 75-44 referencing this sample is included in Separate II.

This item does not pose a new danger to navigation and the survey requirements should be considered resolved.

Charting Recommendation: Reference accompanying preliminary smooth sheet for depth and contour modifications. Concur

Charts Affected: 11520, 11531 & 11535

Office Use:

Revise chart with present survey soundings

Item Investigation Report

Item Reference: A-9 **Type of Feature:** Charted Shoal

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°10'19"N **Datum:** NAD83
079°03'11"W
Approximate Charted Location

Reported Least Depth: 28 feet **Datum:** MLLW

Source & Description: NOAA: The Georgetown Harbor Pilots Association has requested that this shoal be investigated. This item extends outside the original limits of H10946, but is to be incorporated into the H10946 data and report.

Investigation

Date(s)/Day Number(s): 132 &134-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Run 20 meter spaced multibeam only lines within the defined polygon. Full bottom coverage is not required. One cross line is required.
33°10'13.47"N, 079°03'52.05"W
33°10'51.19"N, 079°02'39.64"W
33°10'33.12"N, 079°02'28.67"W
33°10'01.29"N, 079°03'08.61"W
33°09'54.22"N, 079°03'52.05"W

Survey Method: Multibeam data were collected following H10946 data quality requirements, with 20 meter trackline spacing as specified. All available data were reviewed while determining the shoal sounding.

Line, Time, Profile, Beam: 2000-132, L726, T1901, P2839, B10

Surveyed Position: 33°10'05.418"N, 079°03'31.216"W

Least Depth: 28.8 feet

Position Determined By: Multibeam and DGPS

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: The surveyed shoal as defined by the 30 foot contour is approximately 300 meters south of and smaller than the charted shoal. The surveyed

least depth of 29 feet across the entire length of the ridge is generally 1 foot deeper than charted. The new 30 foot contour will plot mostly inside the existing 30 foot contour.

Investigation Results: Survey operations provided extensive coverage of the subject shoal and will allow accurate charting of its extent. No contacts were recorded within the survey area.

Sediment sample grab 25 was taken on this shoal as "med br S brk Sh". A copy of NOAA Oceanographic Log Sheet 75-44 referencing this sample is included in Separate II.

This item does not pose a danger to navigation and the survey requirements should be considered resolved.

Charting Recommendation: Reference accompanying preliminary smooth sheet for depth and contour modifications. Concur

Charts Affected: 11520, 11531 & 11535

Office Use:

Revise chart with present survey soundings.

Item Investigation Report

Item Reference: A-10 **Type of Feature:** Charted Shoal

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°09'48"N **Datum:** NAD83
079°03'11"W
Approximate Charted Location

Reported Least Depth: 28 feet **Datum:** MLLW

Source & Description: NOAA: The Georgetown Harbor Pilots Association has requested that this shoal be investigated. This item is entirely outside the original limits of H10946, but is to be incorporated into the H10946 data and report.

Investigation

Date(s)/Day Number(s): 138-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Run 20 meter spaced multibeam only lines within the defined polygon. Full bottom coverage is not required. One cross line is required.
33°09'49.02"N, 079°02'40.58"W
33°10'01.94"N, 079°01'55.60"W
33°09'46.27"N, 079°01'48.51"W
33°09'32.04"N, 079°02'33.54"W

Survey Method: Multibeam data were collected following H10946 data quality requirements, with 20 meter trackline spacing as specified. Lines were extended southwest from the southwestern edge of the site to provide adequate coverage of the subject shoal.

Line, Time, Profile, Beam: 2000-138, L760, T1531, P2584, B27

Surveyed Position: 33°09'44.772"N, 079°02'12.887"W

Least Depth: 28.4 feet

Position Determined By: Multibeam and DGPS

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: The surveyed shoal as defined by the 30 foot contour is approximately 100 meters south of and smaller than the charted shoal. The new 30 foot contour will plot entirely inside the existing 30 foot contour, but will be represented as a

sharper ridge along the southern edge. The surveyed least depth of 28 feet is the same as the charted least depth, but located southeast of the charted position.

Investigation Results: Survey operations provided extensive coverage of the subject shoal and will allow accurate charting of its extent. No contacts were recorded within the survey area.

Sediment sample grab 24 was taken on this shoal as "med br S brk Sh". A copy of NOAA Oceanographic Log Sheet 75-44 referencing this sample is included in Separate II.

This item does not pose a new danger to navigation and the survey requirements should be considered resolved.

Charting Recommendation: Refer to accompanying preliminary smooth sheet for depth and contour modifications. Concur

Charts Affected: 11520, 11531 & 11535

Office Use:

Revise charted soundings to reflect present survey findings.

Item Investigation Report

Item Reference: A-11 **Type of Feature:** Charted Shoal

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°09'49.7"N **Datum:** NAD83
079°00'05.4"W
Approximate Charted Location

Reported Least Depth: 30 feet **Datum:** MLLW

Source & Description: NOAA: The Georgetown Harbor Pilots Association has requested that this shoal be investigated. This item extends outside the original limits of H10946, but is to be incorporated into the H10946 data and report.

Investigation

Date(s)/Day Number(s): 138-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Run 20 meter spaced multibeam only lines within the defined polygon. 100% bottom coverage is not required. One cross line is required.

Survey Method: Multibeam data were collected following H10946 data quality requirements, with 20 meter trackline spacing as specified. Lines were extended southwest from the southwestern edge of the site to provide adequate coverage of the subject shoal.

Line, Time, Profile, Beam: 2000-138, L805, T1918, P1847, B28

Surveyed Position: 33°09'43.808"N, 079°00'14.332"W

Least Depth: 30.4 feet

Position Determined By: Multibeam and DGPS

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: The surveyed shoal as defined by the 30 foot contour is 300 meters southwest of the charted shoal. The surveyed shoal is elongated rather than circular as charted. The new 30 foot contour will plot entirely outside the charted 30 foot contour and to the southwest. The surveyed least depth is 30 feet and is located southwest of the charted 30 foot sounding.

Investigation Results: Survey operations provided extensive coverage of the subject shoal and will allow accurate charting of its extent. No contacts were recorded within the survey area.

Sediment sample grab 23 was taken on this shoal as "med br S brk Sh". A copy of NOAA Oceanographic Log Sheet 75-44 referencing this sample is included in Separate II. This item does not pose any new or unknown danger to navigation and the survey requirements should be considered resolved.

Charting Recommendation: Reference accompanying preliminary smooth sheet for depth and contour modifications. Concur

Charts Affected: 11520, 11531 & 11535

Office Use:

Revise charted depths with present survey soundings

Item Investigation Report

Item Reference: A-12 **Type of Feature:** FC-113 and FC-115 Significant contact

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°11'17.09"N 079°04'47.54"W From H10946 SSS Data **Datum:** NAD83

Reported Least Depth: N/A **Datum:** MLLW

Source & Description: Ocean Surveys: SSS contact number FC-113, height of 1.9 meters (6.2 feet) and contact number FC-115, height of 0.6 meters (2 feet). The contact was not identified in the multibeam data.

Investigation

Date(s)/Day Number(s): 133-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Collect multibeam data along two orthogonal tracklines crossing the contact near nadir. When acquiring multibeam over the contact, vessel speed shall not exceed 5 knots.

Survey Method: Multibeam data were collected along orthogonal tracklines following H10946 data quality requirements. Vessel speed was kept under 5 knots during collection.

Line, Time, Profile, Beam: 2000-133, L842, T1702, P762, B17

Surveyed Position: 33°11'16.859"N, 079°04'47.562"W

Least Depth: 29.4 feet

Position Determined By: Multibeam and DGPS.

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: This item is a single, uncharted object.

Investigation Results: Survey operations confirmed the existence of an object in the location noted above. The object is about 3.4 meters wide and 6.6 meters long with a height of about 1.8 meters (6 feet).

The survey requirements of this item should be considered resolved.

Charting Recommendation: Chart an Obstr (29 feet) at latitude 33°11'16.859"N, longitude 079°04'47.562"W. Concur

Charts Affected: 11520, 11531 & 11535

Office Use:

Chart (29) Obstn in Lat 33-11-16.859N
Lon 79-04-47.562W

Item Investigation Report

Item Reference: A-13 **Type of Feature:** FC-008
Significant contact

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°12'14.80"N **Datum:** NAD83
079°05'29.84"W
From H10946 SSS Data

Reported Least Depth: N/A **Datum:** MLLW

Source & Description: Ocean Surveys: SSS contact number FC-008, height of 1.5 meters (4.92 feet). There is no correlating SSS contact. The contact was not identified in the multibeam data.

Investigation

Date(s)/Day Number(s): 133-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Collect multibeam data along two orthogonal lines crossing the contact near nadir. When acquiring multibeam over the contact, vessel speed shall not exceed 5 knots.

Survey Method: Multibeam data were collected along orthogonal tracklines following H10946 data quality requirements. Vessel speed was kept under 5 knots during collection. Additional data were collected in an expanded coverage area.
Line, Time, Profile, Beam: N/A

Surveyed Position: N/A

Least Depth: N/A

Position Determined By: N/A

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: All charted depths compare with present survey data within about 1 foot. No shoals are charted in the vicinity.

Investigation Results: No contacts were seen during investigation of this item. The original extents of the search were expanded to provide full bottom multibeam coverage in an area 100 meters square, centered on the reported position. All data

associated with this contact location were reexamined. Only the single original contact, FC-008 was identified with no correlating targets.

There were two soundings (quality 3) from one line that appear 4 feet shoaler than surrounding points. (Line 2000-133 852_1878.) Several other lines were run in virtually the same location, however none confirmed the presence of a contact. The original two soundings were rejected from the final data set.

The survey requirements of this item should be considered resolved. Concur

---

Charting Recommendation: N/A

Charts Affected: N/A

Office Use:

No changes to charting recommended

Item Investigation Report

Item Reference: A-14 **Type of Feature:** FC-033
Significant contact

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°12'10.64"N
079°05'18.73"W
From H10946 SSS Data
Datum: NAD83

Reported Least Depth: N/A **Datum:** MLLW

Source & Description: Ocean Surveys: SSS contact number FC-033, height of 2.6 meters (8.5 feet). This correlates with contact OC-026. The contact was not identified in the main scheme multibeam data.

Investigation

Date(s)/Day Number(s): 133-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Collect multibeam data along two orthogonal lines crossing the contact near nadir. When acquiring multibeam over the contact, vessel speed shall not exceed 5 knots.

Survey Method: Multibeam data were collected along orthogonal track lines following H10946 data quality requirements. Vessel speed was kept under 5 knots during collection.

Line, Time, Profile, Beam: 2000-133, L868, T1517, P851, B40

Surveyed Position: 33°12'10.806"N, 079°05'18.802"W

Least Depth: 31.3 feet (31.26)

Position Determined By: Multibeam and DGPS.

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: This is a single, uncharted obstruction. All surrounding charted depths compare with present survey data within about 1 foot. No shoals are charted in the vicinity.

Investigation Results: Multibeam data confirmed the presence of an object, 2.75 meters long, 2.1 meters wide and 1.8 meters (6.0 feet) high. There was a smaller object 0.3 meters (1.0 feet) high approximately 25 meters north of the main target.

The survey requirements of this item should be considered resolved.

Charting Recommendation: Chart an Obstr (31 feet) at latitude 33°12'10.807"N, longitude 079°05'18.803"W. concur

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale affected.

Office Use:

Chart (31) obstn in Lat 33-12-10.806 N
Lon 79-05-18.802 W

Item Investigation Report

Item Reference: A-15 **Type of Feature:** FC-069
Significant Contact

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°11'44.67"N
079°05'12.63"W
From H10946 SSS Data
Datum: NAD83

Reported Least Depth: N/A **Datum:** MLLW

Source & Description: Ocean Surveys, SSS contact number FC-069, height of 2.1 meters (6.9 feet) which correlates to FC-074. It is located between main scheme multibeam lines. This item lies within the full bottom multibeam coverage area of A-6, however the item is considered significant enough that additional multibeam data is desired.

Investigation

Date(s)/Day Number(s): 133-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Collect multibeam data along two orthogonal lines crossing the contact near nadir. When acquiring multibeam over the contact, vessel speed shall not exceed 5 knots.

Survey Method: Multibeam data were collected along orthogonal tracklines following H10946 data quality requirements. Vessel speed was kept under 5 knots during collection. All available data were reviewed while determining the shoal sounding.

Line, Time, Profile, Beam: 2000-133, L877, T1611, P863, B34

Surveyed Position: 33°11'44.813"N, 079°05'12.724"W

Least Depth: 26.6 feet

Position Determined By: Multibeam and DGPS.

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: This is a single, uncharted obstruction. A charted Obstn (20 foot reported) is approximately 70 meters to the south-southeast of this

obstruction. Surrounding waters are charted between 34-37 feet and match survey data well.

Investigation Results: A single large object was identified. The obstruction is more than 6 meters long and about 3.0 meters wide. It is approximately 2.0 meters (6.6 feet) high.

This obstruction also represents the shoal sounding within the A-6 area.

This should be considered a danger to navigation.

Charting Recommendation: Chart an Obstr (26 feet) at latitude 33°11'44.813"N, longitude 079°05'12.724"W. Concur

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use:

Chart (26) Obstn in Lat 33-11-44.813 N
Lon 79-05-12.724 W

Item Investigation Report

Item Reference: A-16 **Type of Feature:** FC-107 & FC-075 Significant Contact

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°11'47.90"N 079°05'07.99"W From H10946 SSS Data **Datum:** NAD83

Reported Least Depth: N/A **Datum:** MLLW

Source & Description: Ocean Surveys, SSS contact number FC-107, height of 2.7 meters (8.9 feet). This item correlates with SSS contact FC-075, which has no relief. This item lies within the full bottom coverage multibeam area of A-6, however the item is considered significant enough that additional multibeam data are desired.

Investigation

Date(s)/Day Number(s): 133-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Collect multibeam data along two orthogonal lines crossing the contact near nadir. When acquiring multibeam over the contact, vessel speed shall not exceed 5 knots.

Survey Method: Multibeam data were collected along orthogonal tracklines following H10946 data quality requirements. Vessel speed was kept under 5 knots during collection. All available data were reviewed while determining the shoal sounding.

Line, Time, Profile, Beam: 2000-129, L362, T1425, P746, B6

Surveyed Position: 33°11'47.949"N, 079°05'07.985"W

Least Depth: 29.1 feet

Position Determined By: Multibeam and DGPS

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: This is a single, uncharted contact. A charted Obstn (20 foot reported) is approximately 215 meters to the southeast, however the charted Obstn

was not found (See Item Investigation Report A-6). Surrounding waters are charted between 34-37 feet and match survey data well.

Investigation Results: Survey operations revealed a single large object with a smaller object located about 3 meters to the SE. The main obstruction is 3.75 meters long and 3.0 meters wide. It is approximately 2.0 meters (6.6 feet) high. The associated smaller object is about 2 meters long, 1 meter wide and 0.7 meters (2.3 feet) high.

Charting Recommendation: Chart an Obstr (29 feet) at latitude 33°11'47.949"N, longitude 079°05'07.985"W. Concur

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale chart affected.

Office Use:

Chart 29 Obstn in Lat 33-11-47.949 N
Lng. 79-05-07.985 W

Item Investigation Report

Item Reference: A-17 **Type of Feature:** FC-003 – Possible Shoal

State and Locality: Winyah Bay Entrance, S.C.

Reported Position: 33°13'03.14"N **Datum:** NAD83
079°07'02.15"W
Center of area from H10946 SSS and MB Data

Reported Least Depth: 25 feet as reported in 3/24/00 **Datum:** MLLW
Danger to Navigation Report

Source & Description: Ocean Surveys, SSS contact number FC-003, height of 0.4 meters (1.3 feet), (correlates to OC-005) with a multibeam correlation showing what may be a 1.0 meter (3.3 feet) ridge or obstruction.

Investigation

Date(s)/Day Number(s): 130-2000 **Survey Vessel Name:** West Cove

Survey Requirements: Acquire additional multibeam coverage, so that when combined with existing multibeam coverage, 100% multibeam coverage is obtained within the polygon region defined by the following coordinates:
33°13'06.46"N, 079°07'07.89"W
33°13'06.46"N, 079°06'56.26"W
33°12'59.82"N, 079°06'56.26"W
33°12'59.82"N, 079°07'07.89"W

Survey Method: Multibeam data were collected following H10946 data quality requirements, with trackline spacing sufficient to provide for overlapping data within the coordinates provided. All available data were reviewed while determining the shoal sounding.

Line, Time, Profile, Beam: 2000-130, L954, T1405, P598, B19 for shoal mound
2000-42, L545, T1454, P12515, B30 for secondary mound

Surveyed Position: 33°13'02.152"N, 079°07'00.917"W, shoal mound
33°13'02.891"N, 079°07'01.799"W, secondary mound

Least Depth: 25.3 feet, shoal mound
25.3 feet, secondary mound

Position Determined By: Multibeam and DGPS

Comparison with Prior Survey: No prior surveys were provided

Comparison with Chart: This obstruction/shoal is not presently depicted on any area charts. Chart 11532, the largest scale chart, presently depicts 28 feet plotted directly over the contact.

Investigation Results: Survey operations revealed two individual mounds extending 3-4 feet above the surrounding bottom. The combined extent is approximately 75 meters long by 40 meters wide. The obstruction is orientated with the secondary mound 30 meters to the NW of the shoal mound with each mound being approximately 25 meters in diameter.

A sediment sample Grab-27 was taken at this location. After two failed attempts a small amount of "fne br S brk Sh" was recovered. *See Separate II for a copy of NOAA Form 75-44, Oceanographic Log Sheet referencing this sample.

As noted above this item was included in the 3/24/00 Dangers to Navigation report included in Appendix A of this DR.

The Survey portion of the Item should be considered resolved.
* Data Filed with field records

Charting Recommendation: Chart an Obstr (25 feet) at latitude 33°13'02.152"N, longitude 079°07'00.917"W. Concur

Charts Affected: 11520, 11531, 11532 & 11535
11532 1:40,000 Edition 19 9/25/99 is the largest scale affected.

Office Use:

Chart (25) Obstn in Lat 33-13-02.152 N
Lon 79-07-00.917 W

* Data Filed with field records

N. COMPARISON WITH THE CHART - See also Evaluation Report

N.1 General Comparisons. Most of the survey area lies within the boundary of Chart 11532, 19th Edition published 9/25/99, This chart supercedes the 18th edition listed in the project specifications and has been used for chart comparisons. The area south of latitude 33°14'N and east of longitude 079°05'W is covered by chart 11531, 20th edition (8/98). The area north of latitude 33°14'N and east of longitude 079°05'W is covered by chart 11535, 11th edition (4/92). The only applicable changes published in Local Notices to Mariners for these three charts were those related to the ~~3/24/00~~ Report of Dangers to Navigation (see LNM 21/00). These items are discussed in either this section or in the Item Investigations Reports (Section M). Concur

1:40,000. 1:80,000. 1:80,000. 4-14-2000

In general, the survey data matches the charted soundings to within 2 feet. Survey depths are slightly deeper (0-2 feet) more often than slightly shoaler (0-2 feet) when compared to the charted depths. Surveyed depths are consistent with the charted depths in the area north of the channel with only a few exceptions. This suggests a rather stable depositional environment. The 30 foot contour is similar to the contour on the chart, although the northwest edge of the area appears to be slightly deeper than previously charted. The trend of the 36 foot contour in this area is different than charted because the present survey provides denser data, allowing the 36foot contour to be defined in greater detail. Concur

The shoal just north of the entrance channel along the western edge of the survey area exhibits a significant change from the chart. The shoal has migrated to the southeast and depths as shallow as 8feet are observed east of the charted 18 foot contour. A 5 foot sounding is located at latitude 33°12'09.924"N, longitude 079°07'55.826"W. Note that this is newer information than that presented as Item 7 in the ~~3/24/00~~ Danger to Navigation Report, therefore a Revised Dangers To Navigation Report was submitted on ~~9/27/00~~. 10/13/2000. (See also the Evaluation Report) 4/14/2000

A ridge-like area has been identified in the northwest. A shoal point of 25 feet is located at latitude 33°14'13.666"N, longitude 079°06'28.085"W. The ridge is at least 100 meters long and 50 meters wide based on SSS imagery (see FC-002) and may extend much further. The charted depth is 24 feet so this is not considered a previously uncharted danger to navigation. Concur

South of the entrance channel, along the western part of the main survey and extending into the Item A-1 area, present survey depths are as much as 2-3 feet shoaler than charted in some parts and 1-3 feet deeper in other parts. This indicates a dynamic depositional area, as the shoal appears to be shifting. The shoalest sounding is ~~13~~ 14 feet, located at latitude 33°10'08.931"N, longitude 079°08'28.554"W, near a charted 17 foot sounding. This ~~13~~ 14 foot sounding is in an area of large sand waves. The sand wave area is centered at latitude 33°10'06.7"N, longitude 079°08'23.9"W and extends several hundred meters in all directions. The sand waves are 1.6-3.3 feet high and have a wavelength of 50-60 meters. Concur

Throughout the rest of the survey area, south of the channel, surveyed depths are generally within (+/-) 3 feet of the charted depths. The one exception is at latitude 33°09'29.8"N, longitude 079°06'21.8"W, where the present survey depths are 30-31 feet and the charted depth is 38 feet. Other charted soundings in the area are 29-32 feet. Based on the quality and density of the present survey, the charted sounding of 38 feet should be considered disproved. Concur

N.2 AWOIS Items and Additional Work Items. AWOIS item 10188 is a dump site for dredged materials located at latitude 33°11'N and longitude 079°06'W. The charted depths are from a 1997 survey. The present survey identified several changes in the water depths within the dump site. In the western half of the dump site survey depths are generally 2 feet deeper than charted (23-29 feet vs. 21-27 feet). In the eastern half of the dumpsite survey depths are 1-2 feet deeper inside the two charted 30 foot closed contours, however several new shoal depths have been identified. A 24 foot sounding, located at latitude 33°10'53.299"N, longitude 079°06'01.752"W is included as Item 1 in the 3/24/00 Dangers to Navigation Report. A ~~23~~ 22 foot sounding, located at latitude 33°10'59.125"N, longitude 079°05' 36.055"W was reported as Item 2 in the ~~3/24/00~~ 4/14/00 Dangers to Navigation Report. The final processed depths and/or locations of these items are slightly different than originally reported so the final data are included in the Revised Dangers to Navigation Report. An additional shoal sounding of 23 feet is located at latitude 33°10'53.499"N, longitude 079°05'44.092"W. This was submitted as a new danger to navigation in the revised report. It is important to note that full bottom multibeam coverage was not collected within this active dumpsite. This area should be monitored and resurveyed as needed to ensure that future dumping does not produce significantly decreased water depths or new dangers to navigation. dated 10/13/2000 Concur

The following table lists the remaining AWOIS items and other additional work items. Each of these is discussed in detail in Section M. Please refer to individual Item Investigation Reports (Items A-1 through A-17) in Section M for specific survey requirements, results and charting recommendations.

Additional Item Number	Item Description
A-1	AWOIS 10189, S/V Rosainante
A-2	Entrance Channel Centerline
A-3	Jetty in ruins, south of entrance channel
A-4	Debris field (possible fish haven)
A-5	AWOIS 10191, Fish Haven
A-6	AWOIS 10190, Obstruction (20 ft. reported)
A-7	Charted 18 ft. sounding
A-8	Charted shoal east of project area
A-9	Charted shoal east of project area
A-10	Charted shoal east of project area
A-11	Charted shoal east of project area
A-12	SSS contact identified on main survey line(s)

Additional Item Number	Item Description
A-13	SSS contact identified on main survey line(s)
A-14	SSS contact identified on main survey line(s)
A-15	SSS contact identified on main survey line(s), within A-6
A-16	SSS contact identified on main survey line(s), within A-6
A-17	SSS contact identified on main survey line(s)

N.3 Controlling Depths in Channel: Please refer to Section M, Additional Item A-2 for a detailed discussion of the Entrance Channel survey results and chart comparisons. - See also the Evaluation Report.

N.4 Comparison of Sediment Classification: Sediment samples taken in the main survey area, were mostly fine to medium, brown sand with varying amounts of broken shell. Charted sediment types, north of the channel, generally agree with one major exception. Mud is charted at latitude 33°12'46.7"N, longitude 079°07'13.4"W. The closest sediment samples collected during this survey were medium sand 600 meters northwest and fine sand 1,200 meters east northeast of the charted mud.

Four differences between present sediment sampling and charted descriptions were noted south of the channel. The following table describes these differences.

CHARTED BOTTOM TYPE	LOCATION	SURVEYED BOTTOM TYPE	DISTANCE FROM CHARTED
S	33°10'47.0"N 079°08'08.6"W	med br S brk Sh	600 m E
H	33°10'23.9"N 079°04'31.8"W	med br S brk Sh	1200 m NE and NW 1600 m SE and SW
Sy	33°09'53.2"N 079°06'52.0"W	crs br S brk Sh med br S brk Sh	700 m SE 1400 m WSW
h S	33°08'48.5"N 079°06'37.8"W	med br S brk Sh	400 m SE

O. ADEQUACY OF SURVEY - See also Evaluation Report

Survey H10946 is complete and adequate to supersede prior surveys for the purpose of updating the charted sounding data. No parts of the survey are considered incomplete or substandard.

Data for all tracks shown on the multibeam coverage plot are included in the accepted survey data. 200% side scan coverage was completed over the main survey area and over additional item areas where required.

P. AIDS TO NAVIGATION (See also Evaluation Report)

P.1 Correspondence: The only correspondence with the Coast Guard relative to Aids to Navigation was in reference to Range "A" of Winyah Bay entrance channel and is discussed in Appendix B of this report. (Data appended to this Report)

P.2 Comparison to the light list and current charts: The following table summarizes the differences noted for each aid found within the survey limits.

Aid	Light List – Volume III 1999	Chart 11532 19th Edition
WB (1)	125 / 1865 - Listed position is 30m SE of actual block. All characteristics match	Block located 25m NE of charted position
Red 4	1885 - No coordinates listed – All characteristics match	Block located 10m NE of charted position
Green 5	1890 - No coordinates listed – All characteristics match	Match
Red 6	1895 - No coordinates listed - All characteristics match	Block located 10m NNE of charted position
Green 7	1900 - No coordinates listed - All characteristics match	Block located 20m NNE of charted position
Red 8	1905 - No coordinates listed - All characteristics match	Block located 20m SE of charted position
2EB	140 - Listed position is 120m NE of actual block	Block located 18m SW of charted position
Private Yellow (2) Georgetown near shore reef buoy	115 - Listed position is 168m N of charted position and 662m S of buoy located in Item A-4.	No buoy found at charted location. Similar uncharted buoy found 830m N in Item A-4

Note 1: The WB buoy is commonly referred to as the "sea buoy", however according to Chart 1 Section Q (130.5) it has the characteristics of a "safe water mark". The present survey has identified several shoal points associated with debris on the bottom just north of this buoy (see Section M Item A-6). Depths as shoal as 26feet were recorded in this area. Therefore the safe water designation may not be appropriate in this location.

Note 2: The Private buoy charted north of WB was not found. A similar buoy was located north of the charted position in the middle of an active area of dumping of artificial reef material. See Item A-4 and A-5 reports for details.

P.3 Listing of Aids: A listing of all aids within the survey limits is included below. All reported buoy positions were developed from correlated multibeam and side scan information and represent the location of the respective anchor blocks. A DGPS navigation system operating in accordance with the project specifications was used in all cases.

All buoys matched published information adequately except the coordinates of 2EB and the Private Yellow buoy. This information is detailed in P.2.

Aid	Latitude (NAD83)	Longitude (NAD83)	Characteristics
WB	33°11'36.409"N	079°05'10.826"W	RW "WB" Mo A WHIS
Red 4	33°11'37.636"N	079°07'13.871"W	R 4 Fl R 4s Bell
Green 5	33°11'30.914"N	079°08'02.089"W	G 5 Fl G 2.5s
Red 6	33°11'36.685"N	079°08'02.372"W	R 6 Fl R 2.5s
Green 7	33°11'31.038"N	079°09'07.814"W	G 7 Q G
Red 8	33°11'37.449"N	079°09'06.410"W	R 8 Q R Bell
2EB	33°09'32.117"N	079°07'50.143"W	R N 2EB
Private Yellow	33°12'39.485"N	079°05'12.030"W	Y N Priv

Q. STATISTICS

Lineal nautical miles of sounding lines	1,113
Lineal nautical miles of side scan sonar	857
Square nautical miles of sounding lines	23.87
Square nautical miles of side scan sonar	22.82
Days of data acquisition	43
Total number of soundings	588,609,825
Number of selected soundings on preliminary smooth sheet	15,636 - 1:15,000 30,086 - 1:10,000
Number of detached positions	0
Number of bottom samples	27
Number of velocity casts	206 casts, 134 applied to final data
Number of tide stations installed	0

R. MISCELLANEOUS (See also the Evaluation Report)

R.1 Leap Year. Several systems experienced leap year difficulties. The SSS, 448 depth sounder, SVP profilers, and Hypack Max software recorded 2/29/00 as 3/1/00. All affected systems were reset to read 3/1/00 again on 3/1/00, however some of the raw files from the above systems associated with these days may be archived with the wrong day. The Hypack Max systems continued to record automatic file extensions with the wrong day for the remainder of the project. The leap year situation does not affect the final data set or the Isis/CARIS files in any way.

R.2 Sediment Samples: Sediment samples were collected at 22 stations within the Sheet A limits. An additional 5 samples were taken, four from the shoal points of Item Investigation areas A-8 thru A-11. The fifth was taken within the area associated with

Item A-17. Copies of NOAA Form 75-44 and transmittal sheets sent to the Smithsonian are included in Separate II.*

R.3 Histogram Evaluation: The histogram of the final 10 meter bin data set (650,000 points) shows that the number of soundings from the outer beams is generally greater than those from inner beams. Also there are significantly more points from beam 1 and beam 60 than any other beams. Several factors may be contributing to this result. First, the tracklines were run generally parallel to the contours. This means that most of the time one side of the outer beams was up slope, on the shoal side of the trackline. Since the lines were run in opposite directions about half the time, this would increase the weighting of the outer beams in shoal bias data. Second, since the shoal bias binning is done line by line, not by area, soundings from the outer beams are more often located in otherwise unoccupied 10 meter bins. Third, any undetected variation in the speed of sound in the water mass would be most pronounced in the outer beams. This problem could result in the soundings at the outer beams being either slightly shallower or deeper than actual depths, however only the shoal bias would be displayed in the 10 meter bin set.

Although the higher number of soundings from the outer beams is significant, the soundings are all well within the acceptable range. A graph of the average depths of each beam in the 10 meter bin set shows that depths from beams 1 and 60 are no shoaler than soundings from other beams. The very small range of the average depth per beam also indicates that the data set is well within specifications.

R.4 SVP cast positions: Four raw cast files were found to contain typographical errors in the position field. The tabulation of cast locations presented in Section G reflects the actual locations of all casts. The locations were retrieved from the Hypack Max target files taken during cast operations. The following table is a list of the affected files.

Year – Day	Time	File Name
2000-032	18:16	00032181.SVP
2000-034	18:53	00034185.SVP
2000-057	12:54	00057125.SVP
2000-124	12:41	00124124.SVP

S. RECOMMENDATIONS

S.1 According to the US Coast Guard, the present positions of the Range A lights are temporary. In a letter dated 5/15/2000 references are made to the rebuilding of this range in the summer of 2000. This letter is included in Appendix J.* (Data appended to this Report)

S.2 No information pertaining to dredging within the survey limits was obtained. A dredge was seen operating in Winyah Bay a few miles south of the Route 17 bridge during the period between 2000-120 and 2000-138.

*Data filed with the field records

S.3 Continued monitoring of the shoal encroachment on the north side of the channel is recommended as stated in Section M. Concur

S.4 Resurvey of the Item A-4 area after the site is closed to dumping to map the final shoal depth is recommended as stated in Section M. Concur

S.5 Resurvey of the dump site, AWOIS 10188, periodically and/or after the site is closed to dumping is recommended as stated in Section M. Concur

T. REFERRAL TO REPORTS

T.1 Various field and office generated side scan sonar contact images, in hard copy and digital format, have been forwarded to NOAA offices throughout this project. During processing, all contacts were logged in CARIS SIPS to correct for layback and positional errors generated by unfiltered heading values. A complete set of updated digital image files is included in the final data delivery to ensure all images are readily available with final corrected positions. The naming convention for the TIFF images is *x*C-*nnn*.tif, where *x* is either F for field or O for office – the contact designator, and *nnn* is the three digit contact number.

T.2 Danger to Navigation report filed on ~~March 24, 2000~~ April 14, 2000, which is included in Appendix A of this report. A revised Danger to Navigation Report filed on ~~September 27, 2000~~ October 13, 2000 is also included in Appendix A. (appended to this Report)

T.3 Patch test raw data and Vessel Configuration File from 027-2000, forwarded to E. Sipos on 1/29/00.

T.4 A letter describing the characteristics of the artificial reef buoy found north of "WB" buoy was given to E. Sipos on 3/7/00.

B.1 No landmarks exist within the limits of the survey area.

*B.2 During the investigation of additional work item A-2, multibeam investigation of the channel centerline, it was discovered that the charted position of Range A was no longer correct. Range A is the first range of the channel leading into Winyah Bay. This range was destroyed during a storm. The present position of Range A also did not agree with a local notice to mariners posting dated 07/00, which references local notice to mariners 52/99. Aids to Navigation Division, USCG Georgetown stated that the range had been rebuilt further back on land and that a survey of the new location had been performed. A copy of the letter from the Survey Branch is included in Appendix J, Supplemental Correspondence. It should be noted that the letter states that they intend to rebuild this range in the summer of 2000.

Channel coordinates were also obtained from the US Army Corps of Engineers and compared to the USCG range line for final determination of track line location. A copy of the correspondence with the Corps is also included in Appendix J, Supplemental Correspondence.

* See also Evaluation Report Section P.

J.1 The following is a summary of information relevant to survey operations obtained from the Georgetown Pilots Association by Eric Sipos of NOAA and George Reynolds of Ocean Surveys during a meeting held 3/8/00.

a. AWOIS 10189 Rosainante. Pilots report that most of the wreck had washed on shore and was salvaged years ago. However, debris from this wreck and many others that have occurred in this area may still exist.
b. Pilots recommend that the current chart depiction of the South Jetty be revised to better warn mariners of its location.
c. Pilots report a possible incorrect 18' sounding on the chart adjacent to buoy "R4".

J.2 Attached is a letter from the USCG Survey Division in reference to Range A that is mentioned in Appendix B.

J.3 Attached is an email from US ACOE in reference to Winyah Bay Channel coordinates that are mentioned in Appendix B.

Bartlett, Raymond PO1

From: Hunter, Allen PO2
Sent: Monday, May 15, 2000 10:59 AM
To: Bartlett, Raymond PO1
Subject: FW: Winyah Bay

-----Original Message-----
From: Wagner, Scott LT
Sent: Monday, May 15, 2000 11:08 AM
To: Hunter, Allen PO2
Subject: FW: Winyah Bay

-----Original Message-----
From: Carlson, Clinton LTJG
Sent: Wednesday, December 29, 1999 10:58 AM
To: Wagner, Scott LT
Cc: Durbin, Brent LTJG; Grimes, Albert
Subject: Winyah Bay

Scott:

Just to give you the heads up it looks like all the work up in Georgetown SC has been completed (at least until summer). I don't know if you need this or not but here are the particulars for the "temp range positions"

Front 33 11 33.99728 N 79 10 59.852097 W NAD83
499500.72494 N 2555667.95622 E South Carolina 3900

Rear 33 11 33.983007 N 79 11 08.490138 W NAD83
499486.38991 N 2554934.13307 E South Carolina 3900

Far to Near range azimuth 268 56 07.6,
range front to rear 268 52 51.2 @ 733.9631.
Range 90 degree offsets from far end are Front-- 0.0676 feet Right and rear--0.6292 feet Left.

I have no idea what sort of a schedule D7 has on line for the final construction but if you would like us to be involved please give us as much heads up as possible (we are gearing up for our own survey season). Along those lines, you had mentioned earlier that you might have some ranges that needed surveys on the Gulf Coast. If you are still interested let us know and we'll see what we can do. Typically we are able to position a light to 3rd order class one (+/- 5cm or one part in 10,000) if you require we can go to 2cnd order class one (+/- 2cm or one part in 50,000) Bear in mind that to survey 2cnd order we'll have to have a First Order mark nearby to serve as the base station. Since Florida has typically has good control this shouldn't be a problem.

Drop me a line if you think you'll need our services. Any way, it was a pleasure working for you and we look forward to rebuilding Winyah Bay this summer.

Very Respectfully

LTJG Clinton S. Carlson
Fifth Coast Guard District
Waterways Management Branch
757-398-6559

APPROVAL SHEET

FOR

H10946

Standard field surveying and processing procedures were followed in producing this survey in accordance with both the Statement of Work, Shallow Water Multibeam Sonar and Side Scan Sonar Survey Services, dated 1/22/99 and NOS Hydrographic Surveys, Specifications and Deliverables dated 4/23/99 provided for this project. Company, equipment, and software specific procedures were established and followed throughout the survey. These procedures are outlined in the field collection and office processing manuals. All data were continuously reviewed both onboard the vessel and at the processing center for quality and completeness.

The digital data, plots, and supporting documents have been reviewed by me, and are considered complete and adequate for charting purposes, and are approved. All records are forwarded for final review and processing to Atlantic Hydrographic Branch.

Approved and forwarded,

George Reynolds

George G. Reynolds
Ocean Surveys, Inc.
Chief of Party – H10946

NOAA FORM 76-155
(11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10946

Name on Survey	A ON CHART NO 11531, 11532	B ON PREVIOUS SURVEY NO	C ON U S QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P O GUIDE OR MAP	G RAND MCNALLY ATLAS	H U S LIGHT LIST	K	
EAST BANK	X		X							1
NORTH ATLANTIC										2
OCEAN	X		X							3
SOUTH CAROLINA (title)	X		X							4
WINYAH BAY										5
ENTRANCE	X		X							6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
										25

Approved: [signature]

Chief Geographer

MAR 12 2001

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 61-29
(12-71)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REFERENCE NO.
N/CS33-64-01

LETTER TRANSMITTING DATA

DATA AS LISTED BELOW WERE FORWARDED TO YOU BY (Check)

☐ ORDINARY MAIL ☐ AIR MAIL
☐ REGISTERED MAIL ☒ EXPRESS
☐ GBL (Give number)_____

TO:

CHIEF, DATA CONTROL GROUP, N/CS3x1
NOAA / NATIONAL OCEAN SERVICE
STATION 6815, SSMC3
1315 EAST-WEST HIGHWAY
SILVER SPRING, MARYLAND 20910-3282

DATE FORWARDED
11/21/2001

NUMBER OF PACKAGES
1

NOTE: A separate transmittal letter is to be used for each type of data, as tidal data, seismology, geomagnetism, etc. State the number of packages and include an executed copy of the transmittal letter in each package. In addition the original and one copy of the letter should be sent under separate cover. The copy will be returned as a receipt. This form should not be used for correspondence or transmitting accounting documents.

H10946

SOUTH CAROLINA, NORTH ATLANTIC OCEAN, WINYAH BAY ENTRANCE

ONE TUBE CONTAINING THE FOLLOWING:

2 SMOOTH SHEETS FOR SURVEY H10946 - SHEETS A AND B
1 ORIGINAL DESCRIPTIVE REPORT FOR SURVEY H10946
3 H-DRAWINGS ON MYLAR FOR SURVEY H10946 - 1 EACH FOR NOS CHARTS 11532, 11531, AND 11535
1 RECORD OF APPLICATION TO CHART FORM (NOAA FORM #75-96) FOR SURVEY H10946
2 DTM DRAWINGS FOR SURVEY H10946

FROM: (Signature) Deborah A Blond

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

NOAA \ NATIONAL OCEAN SERVICE
ATLANTIC HYDROGRAPHIC BRANCH N/CS33
439 WEST YORK STREET
NORFOLK, VA. 23510-1114

NOAA FORM 61-29 SUPERCEDES FORM C AND GS 413 WHICH MAY BE USED.

U.S. GOVERNMENT PRINTING OFFICE: 1988 - 554-006-61309

11/20/2001

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H10946

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	59125
NUMBER OF SOUNDINGS	59125

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	28.0	02/15/2001
VERIFICATION OF FIELD DATA	124.0	11/19/2001
QUALITY CONTROL CHECKS	25.0	
EVALUATION AND ANALYSIS	3.0	
FINAL INSPECTION	10.0	03/23/2001
COMPILATION	281.5	11/07/2001
TOTAL TIME	471.5	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 11/19/2001

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR H10946 (2000)

This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

Due to the scale and width of this survey, it could not be shown on one plotter sheet. The survey was therefore divided in half, lengthwise, and plotted as two smooth sheets, H10946A and H10946B.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

Hydrographic Processing System
NADCON, version 2.10
MicroStation 95, version 5.05
I/RAS B, version 5.01

The smooth sheets were plotted using a Hewlett Packard DesignJet 2500CP plotter.

H. CONTROL STATIONS

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD 83). Office processing of this survey is based on these values. The smooth sheet has been annotated with ticks showing the computed mean shift between the NAD 83 and the North American Datum of 1927 (NAD 27).

To place this survey on the NAD 27, move the projection lines 0.605 seconds (18.640 meters or 1.86 mm at the scale of the survey) north in latitude, and 0.849 seconds (21.996 meters or 2.20 mm at the scale of the survey) east in longitude.

K. JUNCTIONS

There are no junctional surveys to the north, south, east, or west. Present survey depths are in harmony with the charted hydrography to the north, south, east, and west. The size of the hydrographic field sheet necessitated its separation into two halves, Sheet "A" and Sheet "B". Sheet "A" joins sheet "B" to the east and sheet "B" joins sheet "A" to the west.

L. COMPARISON WITH PRIOR SURVEYS

A comparison with prior surveys was not done during office processing in accordance with section 4. of the memorandum titled "Changes to Hydrographic Survey Processing", dated May 24, 1995.

N. COMPARISON WITH CHARTS 11531 (20th Edition, AUG 29/98) 11532 (19th Edition, SEP 25/99) 11535 (11th Edition, APR 18/92)

Hydrography

The charted hydrography originates with the prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in sections M. and N. of the Descriptive Report. Attention is directed to the following:

1.) AWOIS Item 10191 an Obstruction Fish Haven (auth min 25ft) located in Latitude 33°12'45.61"N, Longitude 79°05'20.68"W, originates with an unknown source. The Fish Haven note and symbol are incorrectly charted, about 2000 meters southeast of the above position, in Latitude 33°12'13"N, Longitude 79°04'14"W. There are wrecks and obstructions located in the vicinity of Latitude 33°12'45.61"N, 79°05'20.68"W. This survey suggests that dumping for the fish haven has taken place in the correct area, around Latitude 33°12'45.61"N, Longitude 79°05'20.68"W, but that the fish haven symbol and note are incorrectly charted. It is recommended that the items found on this survey be charted as wrecks and obstructions, as space permits, until the Fish Haven's least depth and extent can be determined. It is further recommended that the Fish Haven note and symbol charted in Latitude 33°12'13"N, Longitude 79°04'14"W, be removed when the proper permits are issued.

2.) The following charted soundings were not addressed by the field unit. It is recommended these soundings be superseded by the present survey.

Depth ft/m	Latitude(N)	Longitude (W)	Present Survey Depth
29/8[8]	33°09'42"	79°06'39"	32
29/8[8]	33°09'27"	79°07'06"	31-32
29/8[8]	33°09'17"	79°06'39"	31-32
30/9[1]	33°09'04"	79°06'00"	32-34
30/9[1]	33°10'02"	79°06'00"	32-33

3.) The following soundings charted on NOS Chart 11531 (20th Edition, AUG 29/98) originate with an unknown source and were neither verified nor disproved by the present survey. It is recommended these soundings be retained as charted. It is further recommended that these soundings be added to NOS Chart 11532 (19th Edition, SEP 25/99).

Depth ft/m	Latitude(N)	Longitude (W)
$3/0^{9}$	33°11'22"	79°09'12"
$2/0^{6}$	33°11'22"	79°08'24"

4.) The following sounding charted on NOS Chart 11532 (19th Edition, SEP 25/99) originates with an unknown source and was neither verified nor disproved by the present survey. It is recommended this sounding be retained as charted. It is further recommended that this sounding be added to NOS Charts 11531 (20th Edition, AUG 29/98) and 11535 (11th Edition, APR 18/92).

Depth ft/m	Latitude(N)	Longitude (W)
$8/2^{4}$	33°12'17"	79°08'32"

Controlling Depths

Conflicts exist in the Entrance Channel Left Inside Quarter between the tabulated controlling depth of 28 feet and the present survey depths of 27 feet in the vicinity of Latitude 33°11'33"N, Longitude 79°08'01"W.

Except as noted above, the present survey is adequate to supersede the charted hydrography within the common area.

P. AIDS TO NAVIGATION

The hydrographer located eight (8) aids to navigation on the present survey. These aids were adequately discussed in the Descriptive Report and appear adequate to serve their intended purpose. The following should be noted:

1.) One charted privately maintained marker,(YN Priv), in Latitude 33°12'12.9"N, Longitude 79°05'12.0"W was located by the hydrographer in Latitude 33°12'39.40"N, Longitude 79°05'11.60"W, in an artificial reef dumping area. It is recommended that the marker be retained as charted until its

new position is confirmed by the 7th Coast Guard District, Office of Aids to Navigation.

2.) The hydrographer stated that Winyah Bay Range A Light is no longer correctly charted. It was determined that this range had been destroyed during a storm and a new position was been published in the Local Notice to Mariners dated July 2000 (LNM 7/00). The Coast Guard informed the hydrographer that the range was rebuilt and that a new location was determined. They further informed the hydrographer that they intend to rebuild this range during the summer of 2000. It is recommended that no changes to charting be made until a new position is established by the 7th Coast Guard District, Office of Aids to Navigation.

O. ADEQUACY OF SURVEY

This is an adequate hydrographic/side scan sonar/multibeam survey. No additional field work is recommended.

Dangers to Navigation

Two Danger to Navigation reports were submitted to Commander (oan), 7th Coast Guard District, Miami, Florida for inclusion in the Local Notice to Mariners, and to the Marine Chart Division, N/CS3x1, Silver Spring, Maryland. A copy of each report is appended to this Descriptive Report. The following should be noted:

1.) An uncharted wreck (barge) with a least depth of 29 feet (8^{8} m), in Latitude 33°12'45.28"N, Longitude 79°05'18.13"W, was noted during office processing with a depth of 27 feet. Space will not permit this item to be charted. It is therefore recommended that no changes to charting be made.

2.) An uncharted wreck (barge) with a least depth of 25 feet (7^{6} m), in Latitude 33°12'43.82"N, Longitude 79°05'11.46"W, was inadvertently omitted from the Danger to Navigation Report because of its proximity to previously reported wrecks. It is recommended that the feature be charted as shown on the present survey.

R. MISCELLANEOUS

Chart compilation was done by Atlantic Hydrographic Branch personnel, in Norfolk, Virginia. Compilation data will be forwarded to the Marine Chart Division in Silver Spring, Maryland. The following NOS Charts were used for compilation of the present survey:

11532	(19th Edition, SEP 25/99)	1:40,000
11531	(20th Edition, AUG 29/98)	1:80,000
11535	(11th Edition, APR 18/92)	1:80,000

Robert Snow

Robert Snow
Cartographic Technician
Verification of Field Data
Evaluation and Analysis

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H10946

Survey Title: State: South Carolina
Locality: North Atlantic Ocean
Sublocality: Entrance to Winyah Bay

Project Number: OPR-G360-KR-99

Survey Date:

Soundings are reduced to Mean Lower Low Water (MLLW) using predicted tides. Horizontal datum is NAD 83. Positions were determined using Differential Global Positioning System (DGPS). Items 1, 2, and 4 through 7 have previously been identified and submitted in a danger to navigation report dated April 14, 2000. These items are to be revised by depth and/or by Latitude and Longitude. Item 8 is a new danger to navigation not previously submitted.

Charts affected: 11531 20th Edition/ August 29, 1998, scale 1:80,000, NAD83
11532 19th Edition/ September 19, 1999, scale 1:40,000, NAD83
11535 18th Edition/ April 18, 1992, scale 1:80,000, NAD83

DANGERS TO NAVIGATION

FEATURE	DEPTH	LATITUDE (N)	LONGITUDE (W)
1. Depth	24 feet	33/10/53.30	079/06/01.25
2. Depth	23 feet	33/10/59.13	079/05/36.06
4. Obstn	24 feet	33/12/41.75	079/05/18.87
5. Wreck	25 feet	33/12/45.54	079/05/20.61
6. Depth	25 feet	33/13/02.15	079/07/00.92
7. Depth	5 feet	33/12/09.92	079/07/55.83
8. Depth	23 feet	33/10/53.50	079/05/44.09

Questions concerning this report should be directed to the Chief, Atlantic Hydrographic Branch at (757) 441-6746.

APPROVAL SHEET
H10946

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The digital data have been completed and all revisions and additions made to the smooth sheet during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Deborah A. Bland Date: 11/19/01

Deborah A. Bland
Cartographer,
Atlantic Hydrographic Branch

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

James S. Verlaque Date: 11/19/01

James S. Verlaque
Lieutenant Commander, NOAA
Chief, Atlantic Hydrographic Branch

****

Final Approval:

Approved: Samuel P. De Bow Date: 11/28/01

Samuel P. De Bow, Jr.
Captain, NOAA
Chief, Hydrographic Surveys Division

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE, Office of Coast Survey
Atlantic Hydrographic Branch
439 W. York Street
Norfolk, VA 23510-1114

April 14, 2000

Commander (oan)
Seventh Coast Guard District
Brickell Plaza Federal Building
909 SE 1st Avenue; Rm 406
Miami, FL 33131-3050

Dear Sir,

During hydrographic survey operations, at the entrance to Winyah Bay, South Carolina (Project OPR-F344-KR-99, Registry H10946) by Ocean Surveys, Inc. (OSI), seven items have been identified as hazards to navigation. I recommend these items be included in the next Local Notice to Mariners. The items were located using Differential GPS and is based on NAD83 datum. The soundings have been reduced to Mean Lower Low Water (MLLW). All depth data is preliminary pending final office verification.

	Feature	Latitude	Longitude
1.	24-ft Depth	33°10'53.83"N	79°06'03.34"W
2.	22-ft Depth	33°10'59.13"N	79°05'36.06"W
3.	31-ft Obstn	33°12'10.83"N	79°05'18.80"W
4.	29-ft Obstn	33°12'41.72"N	79°05'18.87"W
5.	28-ft Wk	33°12'45.61"N	79°05'20.68"W
6.	25-ft Depth	33°13'02.83"N	79°07'01.80"W
7.	6-ft Depth	33°12'08.51"N	79°07'55.77"W

Affected Nautical Charts:

Chart	Edition No.	Date
11531	20th	Aug 29/98
11532	19TH	Sep 25/99
11535	11th	Apr 18/92

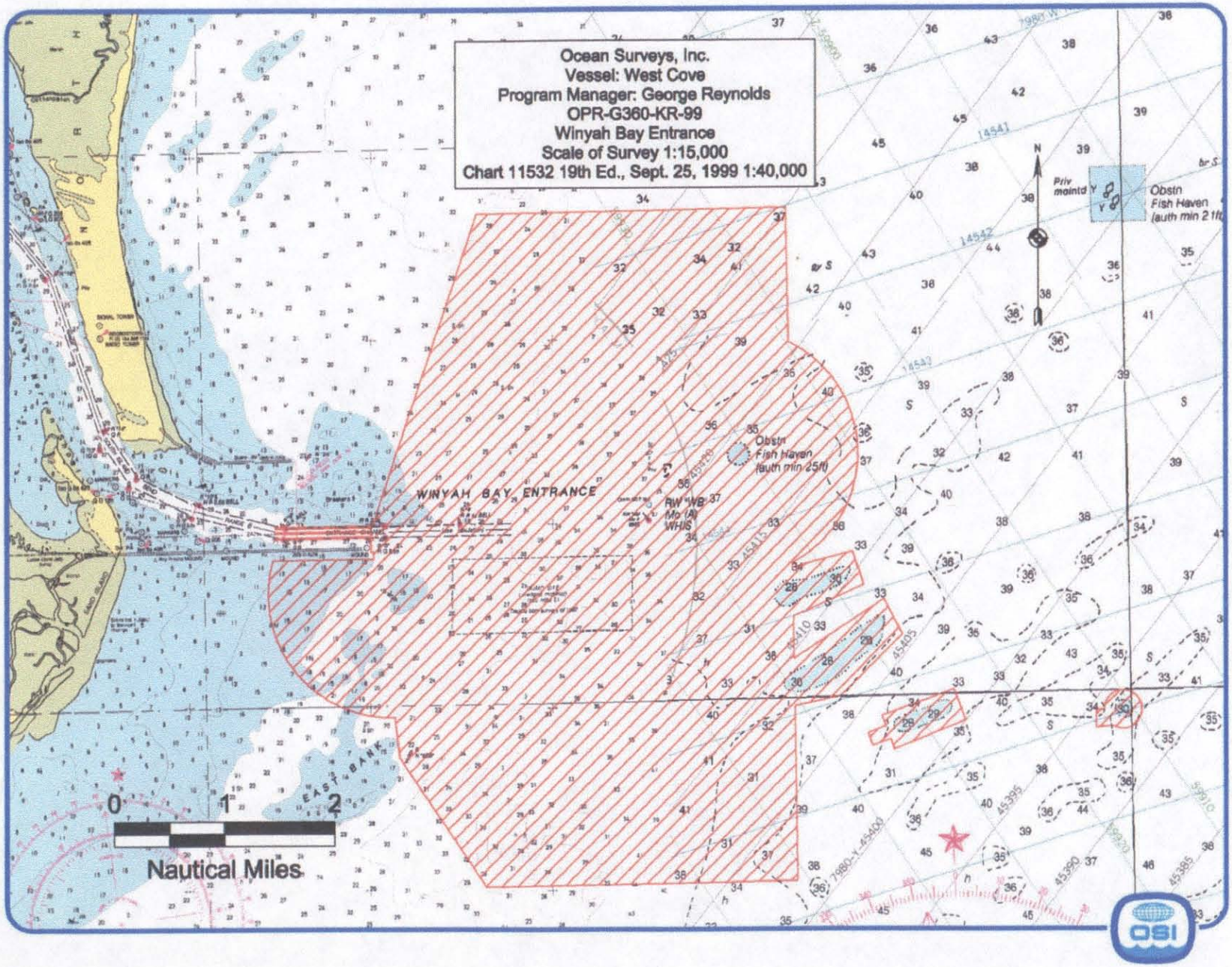
Questions concerning this report should be directed to the Atlantic Hydrographic Branch, by calling (757) 441-6746.

Sincerely,

Andrew L. Beaver, ~~LCDR~~, NOAA
Chief, Atlantic Hydrographic Branch

Attachment

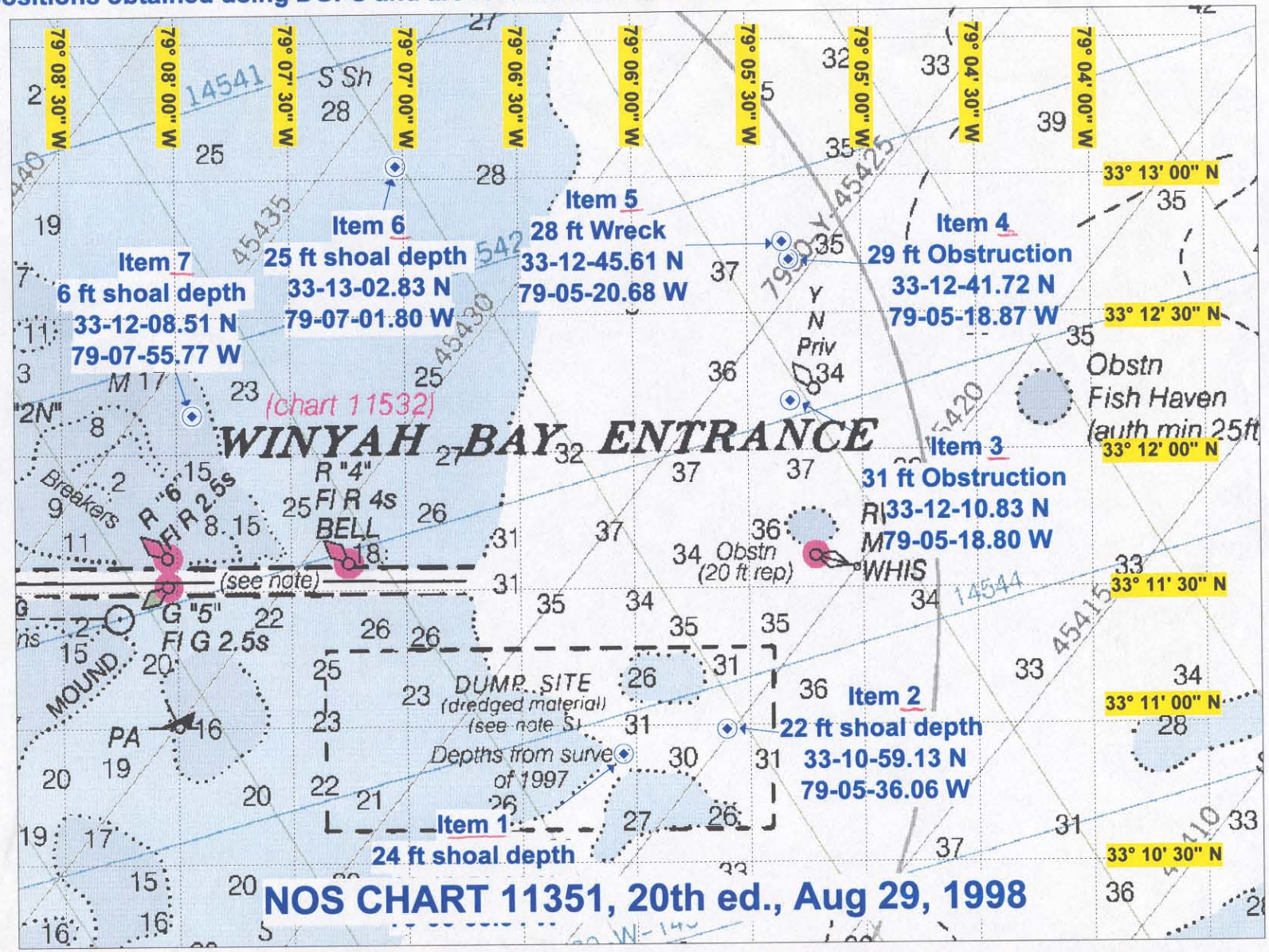
cc: NIMA-NIS
N/CS26
N/CS31


Ocean Surveys, Inc.
Vessel: West Cove
Program Manager: George Reynolds
OPR-G360-KR-99
Winyah Bay Entrance
Scale of Survey 1:15,000
Chart 11532 19th Ed., Sept. 25, 1999 1:40,000
WINYAH BAY ENTRANCE
Obstn
Fish Haven
(auth min 25ft)
Obstn
Fish Haven
(auth min 21ft)
Priv maintd
EAST BANK
0
1
2
Nautical Miles
OSI

DANGER TO NAVIGATION

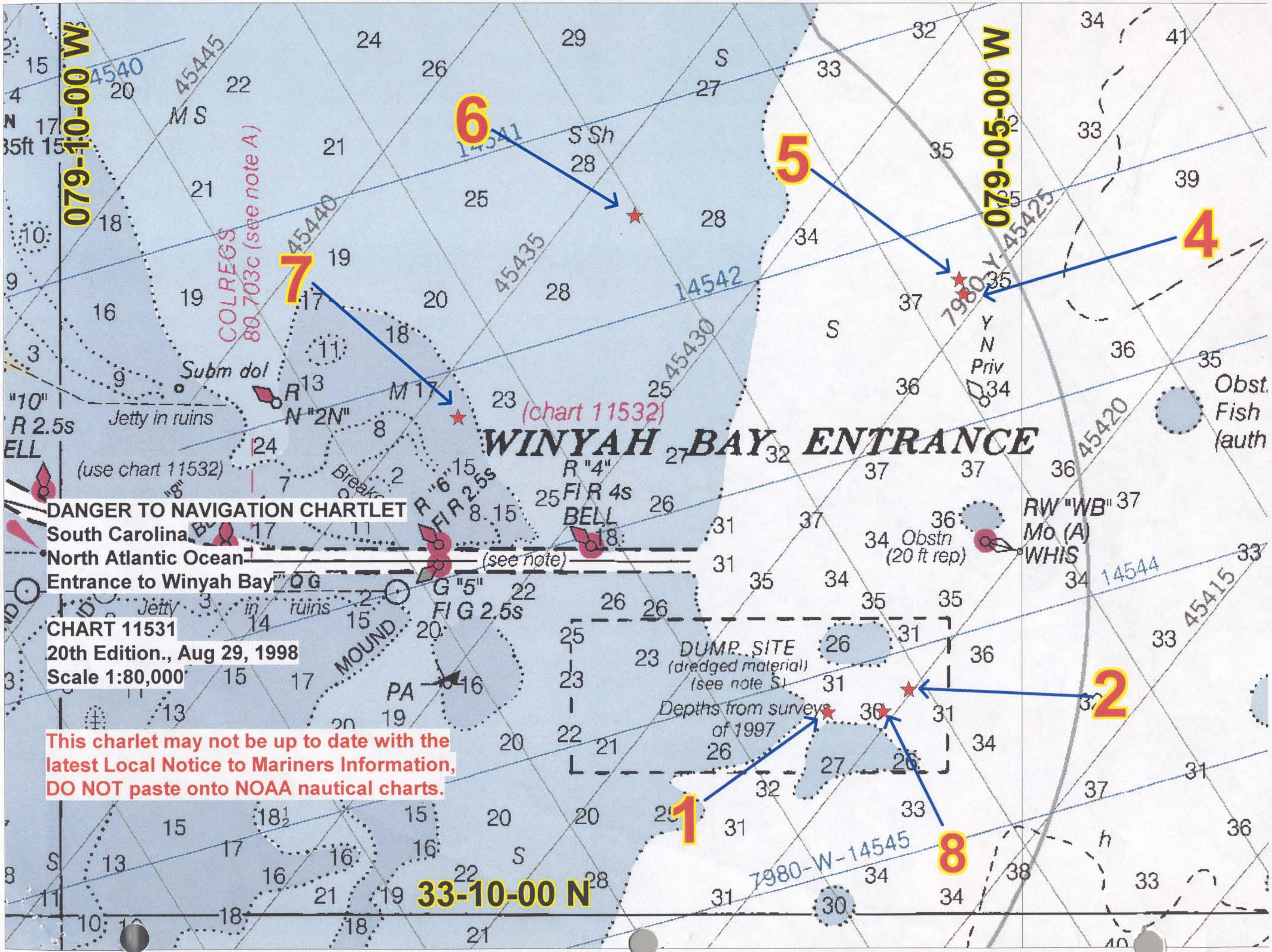
NOS Survey: H10946

All depths obtained using shallow water multibeam echosounder and referenced to MLLW using NOS verified tides. All positions obtained using DGPS and are referenced to NAD83.



NOS CHART 11351, 20th ed., Aug 29, 1998

PRELIMINARY INFORMATION .... NOT FOR USE IN NAVIGATION ...
SUBJECT TO FURTHER OFFICE REVIEW.


079-10-00 W
079-05-00 W
33-10-00 N
WINYAH BAY ENTRANCE
COLREGS
80.703c (see note A)
(chart 11532)
(use chart 11532)
Jetty in ruins
Subm dol
DUMP. SITE
(dredged material)
(see note S)
Depths from surveys of 1997
34 Obstn (20 ft rep)
RW "WB" Mo (A) WHIS
Obst. Fish (auth
R "4" Fl R 4s BELL
R "6" Fl R 2.5s
G "5" Fl G 2.5s
(see note)
7980-Y-45425
7980-W-14545
DANGER TO NAVIGATION CHARTLET
South Carolina
North Atlantic Ocean
Entrance to Winyah Bay
CHART 11531
20th Edition., Aug 29, 1998
Scale 1:80,000
This charlet may not be up to date with the latest Local Notice to Mariners Information, DO NOT paste onto NOAA nautical charts.
1
2
4
5
6
7
8

NOAA FORM 75-96
(10-83)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H10946 A and B

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.

1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
11532	10/31/01	Deborah A. Blan	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No.
11531	11/01/01	Deborah A. Blan	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No.
11535	11/05/01	Deborah A. Blan	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No.
11520	12/13/01	Heather Gillert	
			~~Full~~ Part ~~Before~~ After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.