

# 10309

Diagram No. IS-61

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

Type of Survey ... Hydrographic  
Field No. .... AHP-10-8-89  
Registry No. .... H-10309

### LOCALITY

State ..... Michigan—Ontario  
General Locality ... St. Mary's River  
Sublocality ... Big Trout Island  
to Rains Point

199189

CHIEF OF PARTY  
LT V.D. Ross

### LIBRARY & ARCHIVES

DATE ..... August 8, 1991

# 10309

REF: L-993(91)

wcl

CHTS

14882 76-40  
14860  
14880  
14881



HYDROGRAPHIC TITLE SHEET

H-10309

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.

AHP-10-8-89

State Michigan--Ontario

General locality Saint Marys River

Locality Big Trout Island to Rains Point

Scale 1:10,000

Date of survey July 12 - <sup>27 SEPT</sup> July 28, 1989

Instructions dated April 7, 1989

Project No. OPR-~~X~~278

Vessel Launches 0518, 0519, and 0520

Chief of party LT V. Dale Ross

Surveyed by <sup>B.</sup> D.Elliott, <sup>D.</sup> G.Hendrix, <sup>m.</sup> T.Eybarski, <sup>E.</sup> C.Parker, <sup>J.</sup> M.Briscoe, <sup>L.</sup> J.Budlong

Soundings taken by echo sounder, hand lead, pole Raytheon DE719 w/ODOM digitrace

Graphic record scaled by D.Elliott, T.Rybarski, C.Parker, M.Briscoe, J.Budlong

Graphic record checked by J.Verlaque, D.Elliott, C.Parker

Protracted by HDAPS

Automated plot by AMC ~~X~~ METEL 1201 PLOTTER

Verification by \_\_\_\_\_

Soundings in ~~fathoms~~ feet at ~~MLW~~ MLW ~~MLW~~ MLW Low Water Datum (IGLD 1955: 576.8 feet)

REMARKS: All times are in Coordinated Universal Time.

This survey was designated as "sheet M".

Least depths were measured with sounding poles and leadlines.

NOTED IN THE DESCRIPTIVE REPORT WERE MADE IN 250

DURING OFFICE PROCESSING.

561-30-97 AWOIS and SURF 8/21/91 RWS  
X.W.W. 8/15/91



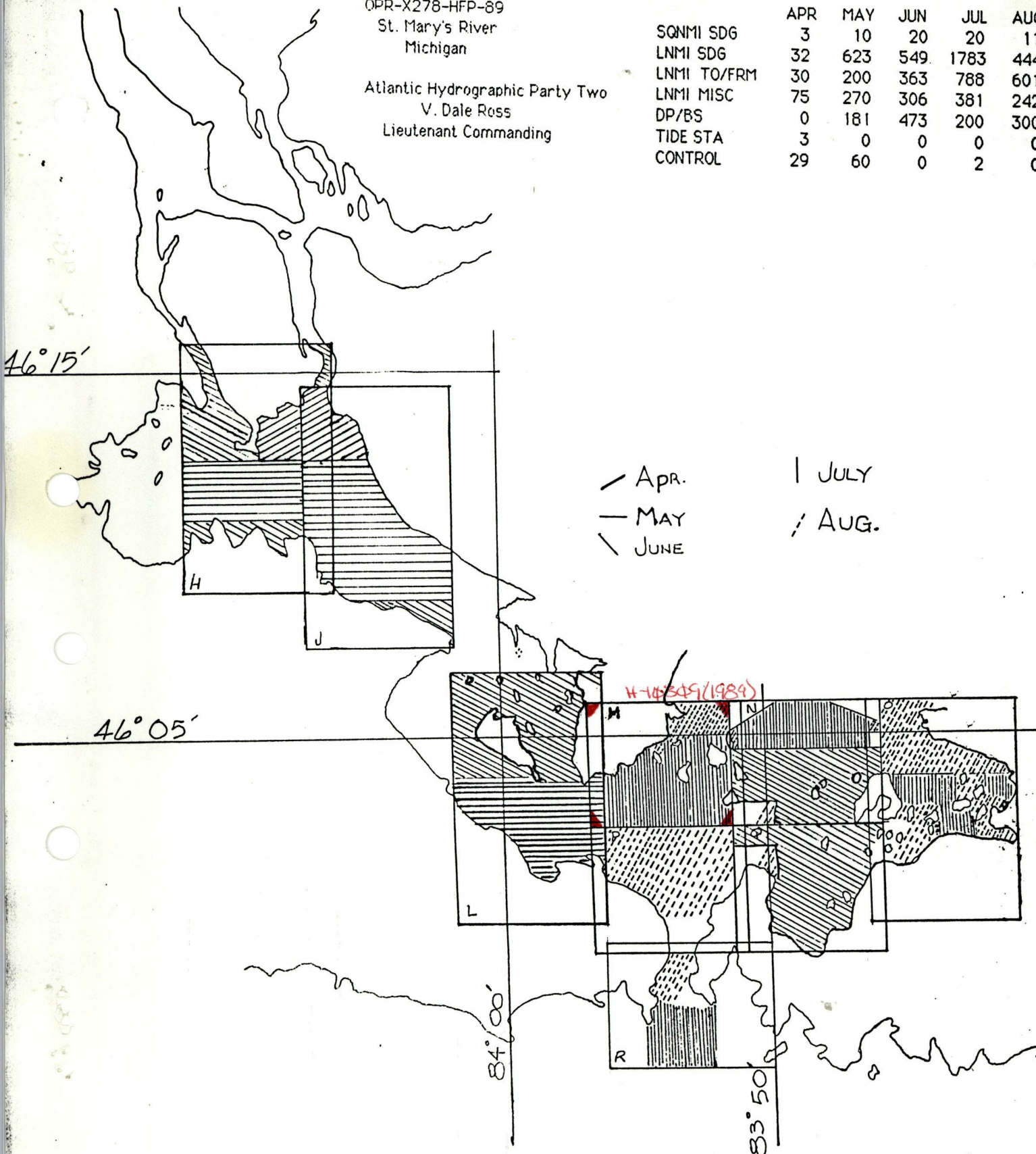
**Progress Sketch**

OPR-X278-HFP-89  
 St. Mary's River  
 Michigan

Atlantic Hydrographic Party Two  
 V. Dale Ross  
 Lieutenant Commanding

**LEGEND**

	APR	MAY	JUN	JUL	AUG
SONMI SDG	3	10	20	20	11
LNMI SDG	32	623	549	1783	444
LNMI TO/FRM	30	200	363	788	601
LNMI MISC	75	270	306	381	242
DP/BS	0	181	473	200	300
TIDE STA CONTROL	3	0	0	0	0
	29	60	0	2	0



— Apr.  
 — MAY  
 \ JUNE

| JULY  
 / AUG.

H-148345/1989

H

J

L

M

N

R

46° 15'

46° 05'

84° 00'

83° 50'



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SEPARATES FOLLOWING TEXT

- \* A. HYDROGRAPHIC SHEET PROJECTION AND ELECTRONIC CONTROL PARAMETERS
  - \* B. FIELD WATER LEVEL NOTE
  - C. GEOGRAPHIC NAMES LIST
  - \* D. ABSTRACT OF CORRECTIONS TO ECHO SOUNDINGS
  - \* E. ABSTRACT OF ELECTRONIC CORRECTORS
  - F. LIST OF STATIONS
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  - \* H. BOTTOM SAMPLES
  - I. LANDMARKS FOR CHARTS
  - J. APPROVAL SHEET
- \* DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.



DESCRIPTIVE REPORT TO ACCOMPANY  
HYDROGRAPHIC SURVEY H-10309  
(Field No. AHP-10-8-89)

Scale 1:10,000

1989

Atlantic Hydrographic Party Two  
Dale Ross, Chief of Party

A. PROJECT

General

This survey was conducted in accordance with Hydrographic Project Instructions OPR-X278-HFP, St. Mary's River, Michigan, dated April 7, 1989.

The purpose of project OPR-X278-HFP is to: Provide contemporary hydrography for the maintenance of existing charts and the construction of new large-scale charts; and to fulfill requests by the Lake Carriers Association, Great Lakes Pilots, Canadian Hydrographic Service, U.S. Coast Guard, U.S. Steel Great Lakes Fleet, commercial fishermen, and local marinas.

Per Section 1.8 of the project instructions, main scheme lines were to be run up to two feet of water under the keel or the 3-foot depth curve.

B. AREA SURVEYED

The area surveyed for H-10309 is bounded by longitude 083°56'03" W on the west, 46°02'57" N on the south, 083°50'57" W on the west, the southern shoreline of St. Joseph Island on the north, and the following points:

The northern tip of Cass Island to the northern tangent of Macomb Island;

the northern tip of Macomb Island to the northern tip of Butterfield Island;

the southwest tip of Butterfield Island to the north tip of Maple Island;

the southern tip of Maple Island to the northern tip of Big Trout Island.

~~July 28~~ <sup>SEPT 27</sup> This survey was conducted from July 13 (day 194) to ~~July 28~~ <sup>27</sup> (day 209), 1989. The survey area covers a one to two mile wide section of the St. Mary's River including a deep-draft channel maintained by the U.S. Army Corps of Engineers. The



200-meter channel in the survey area extends from Duncan Island to Pirate Island and serves as both the up-bound and down-bound channels connecting St. Mary's River to Worsley Bay.

### C. SOUNDING VESSELS

Vessels 0518 (EDP No. 0518), 0519 (EDP No. 0519), and 0520 (EDP No. 0520) are 21-foot MonArks which were used as sounding vessels during this survey. Field support was accomplished with a 17-foot MonArk and a 16-foot Zodiac. Sounding lines were run at 100 meter spacing, per Section 4.3 of the hydrographic manual.

### D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

#### 1. SOUNDING EQUIPMENT

The following Raytheon DE-719 fathometers were used for this survey:

<u>EDP #</u>	<u>S/N</u>	<u>Days</u>
0518	10744	195,198-199,201-202,205-207
0519	6211	194-195,198
0520	7881	205-206,209

Depths in feet were recorded using Raytheon DE-719 fathometers with a calibrated speed of sound through water of 4800 ft/sec. The depth of the water in the survey area ranged from 0 feet to ~~85~~ <sup>84</sup> feet.

Survey records were scanned by AHP 2 employees in accordance with the hydrographic manual. During the scanning of DE-719 analog records, significant peaks and deeps which occurred between selected soundings, missed depths, incorrectly digitized soundings, and effects of sea and swell action on the echograms were corrected. Positions which had erratic lines of position indicated by high residuals on the "raw" listing were "smoothed" in post processing. Positions were "smoothed" by dead reckoning between two accurate positions. If more than four consecutive positions had high residuals with an erratic track plot, the data were rejected and later rerun. In areas where only two lines of position were received, the "raw" listing would indicate the angle of intersection between these lines enclosed by a bracket. If more than four consecutive positions were outside of the 30 to 150 degree intersection margin, the data were rejected and later rerun. If less than five positions were outside the 30 and 150 degree margin, the positions were smoothed. Occasionally, the residual values were greater than 5 meters, yet the trackline



plot showed that the position of the survey vessel was accurate. In those instances, the data were considered adequate and were plotted with the other data on the final field sheet.

## 2. CORRECTIONS TO ECHO SOUNDINGS

Corrections for the speed of sound through water were computed from data obtained with an Odom Hydrographic Systems, Inc. DIGIBAR, electronic speed of sound probe. The serial numbers (s/n) of the instruments used to obtain the speed of sound data are 154 and 155. Program "Velocity" was used for the speed of sound correction computations.

All speed of sound correctors were applied during semi-smooth and final plotting by the HDAPS system.

<u>Table Applied</u>	<u>Cast</u>	<u>Day</u>	<u>Depth</u>	<u>Location</u>	<u>Days</u>
1	1	193	18 meters	46°04'02" N 083°53'20" W	194-199
2	2	200	22 meters	46°03'59" N 083°53'41" W	200-207
3	3	208	22 meters	46°03'48" N 083°53'57" W	208-212

A data quality assurance test (DQA) was performed prior to each use of the DIGIBAR. Speed of sound tables are included in the Separates Following Text.\*

All soundings on the final field sheet are corrected for the speed of sound through water.

Lead line comparisons were conducted to determine instrument error and verify static draft. Correctors for instrument error were not consistent, ranging from 0.0 to 0.3 feet. Since lead line comparisons were not performed daily and the correctors computed were not uniform, instrument correctors were not applied to the final field sheet soundings, but are included for reference. Leadline comparison logs are included in the Separates Following Text.\*

A 1.2 foot static draft correction, taken from historical data, was applied to all sounding data acquired with the Raytheon DE-719 echo sounders. The static draft correction was applied by the following method. By Hydrographic Data Acquisition and Processing System (HDAPS) convention, "height" was the up/down displacement of the sensor from the static waterline, positive down. The location of the high frequency DE-719 transducer was  
\* DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.



used as the starting point (0,0) for the on-board coordinate system. Thus, a height of 1.2 feet, or 0.36 meters, was entered into the offset table in the HDAPS system to account for the draft of the survey vessel. The offset tables are included with the Separates Following Text.\*

Settlement and squat measurements for vessels 0518 and 0520 were performed on day 122 and for vessel 0519 on day 187 in the De Tour Coal Docks in Michigan by setting up a Zeiss level (s/n 59891) ashore. Each survey vessel approached the Zeiss level at normal survey speeds with a rodman holding the level rod over the transducer while the observer read the level rod to the recorder. A curve was drawn showing speed versus settlement and squat measurements so that settlement and squat correctors could be generated. Settlement and squat correctors for each vessel were applied to all survey data.

Water levels were reduced in the field to low water datum. These unverified water level correctors were applied to all soundings on the final field sheets. APPROVED TIDES WERE APPLIED DURING OFFICE PROCESSING.

Per Section 5.7 of the project instructions, low water datum below the locks at Sault Sainte Marie, Michigan, is the sloping surface of the river when the gauge below the locks reads 577.5 feet and the elevation of Lake Huron is 576.8 feet. As a result, low water datum for the DeTour Coal Dock water level station is the interpolated value of the two elevations or 576.8 feet. Water level heights were obtained daily from the DeTour Coal Dock water level station (907-5098).

Approved water levels were requested from the Sea and Lake Levels Branch in a letter dated July 31, 1989. A copy of the letter is included in the Separates Following Text.\*

#### E. HYDROGRAPHIC SHEETS (FIELD)

The survey scale is 1:10,000. All sheets were produced by AHP-2 employees with the HDAPS system on the Bruning ZETA 824 plotter. A list of sheets submitted for H-10309 follows:

<u>Sheet</u>	<u>Scale</u>	<u>Quantity</u>
Boat Sheet	1:10,000	1
Sounding Plot	1:10,000	1
Final Field Sheet	1:10,000	1
Overlay	1:10,000	1

Main scheme hydrography, aids to navigation, and horizontal control stations used during the survey are plotted on the final field sheet. Channel lines, detached positions, and bottom samples are plotted on the overlay. All soundings on the final field sheet are corrected for draft, water levels, settlement and

\* DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.



squat, and speed of sound through water.

All survey sheets were submitted with the descriptive report to the Atlantic Hydrographic Section, Atlantic Marine Center, Norfolk, Virginia.

F. CONTROL STATIONS *SEE ALSO SECTION 2.9. OF THE EVALUATION REPORT.*

The horizontal control datum for this project is the North American Datum of 1927.

The Coastal Surveys Unit from the Atlantic Marine Center used third order, class I traverse and intersection methods to establish horizontal control for this project. The horizontal control report was written within the Coastal Surveys Unit and was forwarded to the Atlantic Hydrographic Section at the Atlantic Marine Center.

Geographic positions for all control stations used on this survey are highlighted and included with the station list in the Separates Following Text.

G. HYDROGRAPHIC POSITION CONTROL

Survey Methods

The AHP-2 is ~~being~~ outfitted with the HDAPS and with an automated range-azimuth positioning system, Polarfix, for data collection and processing. The HDAPS system in use by AHP-2 is a semi-automated data acquisition system which is able to collect sounding data using up to four lines of position or by automated range/azimuth methods for more precise positioning. The hardware on the survey launches for storing the data consists of either a Navitronic's Complex computer or a Texas Microsystems Inc. (TMI) computer. Sensor data is received by the vessel's computer through an 'intelligent' interface called a Hyflex which is also made by Navitronic.

The Polarfix consists of a sensing head and a controlling unit on shore which tracks a set of prisms on a survey vessel. The position of the boat is computed by initializing the sensing head on a target with a third order, class I position. This target is defined as the "passive" initial from which all automated range/azimuth positions are computed for the particular setup. A check initial is then defined by slewing the sensing head to a prism which is mounted on a tripod, preferably over a third order, class I position. The sensing head will receive a range and an angle from the prism target relative to the "passive" initial. This check initial is referred to as an "active" target. The operator on the survey vessel may now label



the "active" target as a "pickup point" so that the sensing head may be sent to the "active" target throughout the day to ensure the stability of the sensing head. After initializing the sensing head on the "passive" and "active" targets, the sensing head is slewed to the prisms on the vessel, by which the sensing head can track the survey vessel. An angle is measured from the "passive" initial to the survey vessel and a distance is recorded from the survey vessel to the location of the sensing head.

A draft letter dated May 11, 1989, was sent to AHP 2 from LCDR Nicholas E. Perugini of the Hydrographic Surveys Branch, Rockville, MD, regarding acceptable tolerances for Polarfix check initial angles. The check initial angle is the angle between the passive and active targets. The maximum acceptable tolerances are defined as :

<u>Average of: Maximum planned survey range plus distance of sensing head to active target</u>	<u>Tolerance</u>
Less than 1000 meters	± 6.8'
1000-1999 meters	± 3.4'
2000-2999 meters	± 2.3'
greater than or equal to 3000 meters	± 2.0'

Hydrographic position control was also accomplished using the Mini-Ranger Falcon 484 system which provided accuracy to meet 1:10,000 scale survey requirements. Range/range positioning, using, at most, four stations simultaneously, was used during this project. A survey network was set up to allow four reference stations to be accessed simultaneously by HDAPS. The following Falcon Mini-Ranger equipment was used:

<u>VESNO</u>	<u>Equipment</u>	<u>S/N</u>
0518	RPU	D0017
	CDU	E0008
	R/T	E2965
0519	RPU	E0142
	CDU	F0188
	R/T	F3404
0520	RPU	E0146
	CDU	F0188
	R/T	F3389

#### Critical System Checks

Critical system checks were performed on days 193, 194, and 199 for each Mini-Ranger code by the fixed point calibration method. Station SWEETS POINT LIGHT (station 106), station ARCHIBALD ISLAND LIGHT (station 149), station TROUT (station



115), and PIPE ISLAND TWINS LIGHT (station 153) were the points from which all codes listed above were checked. All critical check values were less than 5 meters which is within the required limits of the field procedures manual. Results of the calibrations are included in the Separates Following Text.\*

#### Non-Critical System Checks

Non-critical system checks were performed by visually observing the error circle radius (ecr) and residual (res) values on the Comflex screen in the survey vessels. The "DUMP ALPHA" and "DUMP GRAPHICS" functions are not installed on these vessels. As a result, if the survey technician did notice continually erroneous error circle radii or residual values, they would stop the vessel and correct the problem by either replacing the batteries at the shore station or by not using that Mini-Ranger code for control. If the residuals were greater than 5 meters (.5mm at the scale of the survey) for an extended period of time, (3-5 minutes), the data was rejected and later rerun. The error circle radius was never greater than 15 meters (1.5 mm at the scale of the survey.)

#### Mini-Ranger Falcon Calibrations

Baseline calibrations were performed to the standards of Section 3.1.2.1 of the field procedures manual. Opening baseline calibrations were conducted on April 28, July 05, and June 09, 1989 at the De Tour Coal Dock near De Tour Village, Michigan. The baseline values were incorporated into the Comflex "C-O" tables on the survey launches so that the correctors would be applied directly to all "on-line" data. All records of these calibrations are included in the Separates Following Text.\*

A closing baseline calibration was not performed since the survey was conducted in less than a six month period.

#### H. SHORELINE *SEE ALSO SECTION 2.D. OF THE EVALUATION REPORT.*

The aerial photography for TP-00361 was flown in May 1984. Shoreline drawn on the final field sheet originates with a 1:10,000 scale photographic enlargement of topographic map 00361 (TP-00361) and Class III final reviewed shoreline manuscript TP-00361 of 1984.

Detached positions were taken on new piers or other new items located within the survey area along the shoreline. On those items which were displayed on the shoreline manuscript, but which no longer exist, detached positions were taken to verify that the survey vessel was in the vicinity of the item in question. All detached positions were acquired with the "on-line" system by consecutively selecting the "F4" function key,  
\* DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.



pressing "RETURN" twice, followed by "END" within a four second period. Items located on the shoreline manuscript which still exist, were visually verified and labeled with reference numbers on July 13 (day 194). Reference numbers are labeled on both the final field sheet and boat sheet. The symbol for each item verified along the shoreline was drawn in black ink on the final field sheet. Descriptions and photographs of reference numbers were entered in a journal labeled "REF NO. DES" and is included in the accordion file with the survey data for vessel 0518.

Shoreline was verified by its junction with hydrographic data and by visual inspection. Shoreline verification was performed on July 14 (day 195) and July 17 (day 198) identifying new piers and rocks, confirming the positions of existing piers from the shoreline manuscript and locating those areas where piers no longer exist. On features which no longer exist, if the bottom was visible and there were no indications of salvage operations or ruins of any sort, the hydrographer identified the feature as no longer existing. These changes were noted on the boat sheet. Existing piers were labeled with reference numbers 9000-9009. Echogram annotations of inner shoreline buffers describe shoreline features; annotations relating to the outer buffers are limited as the purpose of the outer buffer is to create a safe zone for bringing the vessel about to continue main scheme hydrography.

Shoreline details were also verified during hydrographic operations using the photographic print of the "Notes to Hydrographer" TP-00360. The following observations were noted by the hydrographer:

The water level in St. Mary's River was one to two feet lower than the previous year when hydrography was run. As a result, the survey vessels were unable to run hydrography near the rocky shoreline. The lower than normal water level in St. Mary's River allowed the MonArks to survey only to the 2 to 3-foot curve. In most cases, the MonArks were run-in until only one foot of water was beneath the keel. Several grassy areas, rocky areas, and shallow areas alongshore were visually verified and noted on the final field sheet along St. Joseph Island, Ontario. Those features on the shoreline manuscript already existing, were assigned reference numbers when visually verified.

Changes in shoreline are shown in red ink on the final field sheet. Verified shoreline is shown in black ink on the final field sheet. The majority of the shoreline in the survey area consists of rocks and boulders.

There were no control stations located seaward of the high water line within the sheet limits. *DO NOT CONCUR*  
*CONTROL STATIONS #106, #109, AND #175 ARE LOCATED ON BOULDERS; #104 IS LOCATED ON A CONCRETE CADSON NAVIGATION LIGHT; AND #114 IS LOCATED ON A SLAB OF ROCK.*



I. **CROSSLINES** SEE ALSO SECTION 3.9. OF THE EVALUATION REPORT.

A total of 11.6 linear nautical miles of crosslines were run on H-10309 which equals 8% of the main scheme hydrography. Crossline soundings agree to within 1-foot of the main scheme soundings.

Main scheme hydrography was run with three sounding vessels. Crosslines were run with two sounding vessels and depths between the two sounding vessels agreed within one-foot.

J. **JUNCTIONS** SEE ALSO SECTION 5. OF THE EVALUATION REPORT.

This sheet junctions with shoreline and FS-8081 (Canadian 1981 survey)\* to the north, H-10302 (1989) to the west, H-10311 (1989) to the east, and H-10313 (1989) to the south.

\* SEE ALSO SECTIONS 5. AND 6. OF THE EVALUATION REPORT.

Junction soundings between the present survey and the 1989 surveys agree well. Depths varied by no more than two feet along the eastern, western, and southern present survey limits. The depth curves between the prior surveys and the present survey junctioned smoothly. Junction soundings between the present survey and Canadian survey FS-8081 were within two feet along the northern limits of the present survey. SEE ALSO SECTIONS 5 AND 6. OF THE EVALUATION REPORT. DO NOT CONCUR

K. **COMPARISON WITH PRIOR SURVEYS** SEE ALSO SECTION 6. OF THE EVALUATION REPORT.

The present survey was compared with the following prior surveys:

LS-111	(1854)	1:15,840
LS-854	(1895)	1:10,000
LS-1702A	(1936)	1:10,000
LS-1771	(1941)	1:10,000
CHS FS-8081	(1981)	1:30,000

The prior surveys listed above cover the entire area of the present survey. Prior survey LS-111 (1854) has no grid and is at a non standard scale. There are only a few soundings (three) currently charted from this prior survey and the new survey confirms these depths. Present survey depths were generally 0 to 1 foot shoaler than the prior survey depths. DO NOT CONCUR  
SEE SECTION 6.9. OF THE EVALUATION REPORT.

Prior survey LS-854 (1895) covers the entire present survey area. There are only a few soundings (13) which are currently charted and the new survey confirms those depths\*. Present survey depths are generally 0 to 1 foot deeper than the prior survey inside the 18 foot depth curve. Outside the 18 foot depth curve, present survey depths are 1 to 5 feet shoaler throughout the survey area than the prior survey. DO NOT CONCUR SEE SECTION 6. b. OF THE EVALUATION REPORT.



Prior surveys LS-1702A (1936) and LS-1771 (1941) are the most recent prior surveys and cover the entire survey area. Prior survey LS-1702A is supplemented with data from surveys conducted in 1854, 1895, and 1910. This is stated on the prior surveys. The prior surveys compare very well with the present survey. Present survey depths are generally 1 to 4 feet shoaler than prior survey depths throughout the survey area. *SEE ALSO SECTIONS 6.C. AND 6.d. OF THE EVALUATION REPORT.*  
The following should be noted:

1) Along the southeastern side of St. Joseph Island, between longitude  $83^{\circ}53'40''$  W and longitude  $83^{\circ}56'00''$  W, there is considerable disagreement between the prior survey shoreline and the shoreline shown on the final field sheet. The present survey shoreline manuscript shows marsh limits extending seaward of the shoreline shown on prior survey LS-1702A (1936). The hydrographer was prohibited from getting too close to shore because of rocks, grass, and shallow water. The area should be charted as shown by the present survey. *CONCUR*

2) Pirate Island is shown on prior survey LS-1702A (1936) as a single island. The chart presently shows considerable shoreline recession on the northern shore. The area should be charted as shown by the present survey. *CONCUR*

3) Along the northern shore of Janden Island, considerable shoreline recession has occurred. The area should be charted as shown by the present survey. *CONCUR*

4) The charted location of Little Cass Island is in disagreement with the present survey location. The island is much smaller as shown by the present survey. The northern end is actually a foul area containing rocks awash and marsh. *CONCUR*

5) The charted two-foot least depth on Andrews Reef originates with prior survey LS-1702A (1936). ~~This depth was confirmed during the present survey and the area should be charted as shown by the present survey.~~ *SEE SECTION 6.c.i) OF THE EVALUATION REPORT.*

Shoreline differences discussed in this section of the descriptive report may be attributed to natural changes and the difference in vertical water level datums. *CONCUR*



L. COMPARISON WITH THE CHART *SEE ALSO SECTION 7. OF THE EVALUATION REPORT.*

Comparisons were made with the following largest scale chart covering the present survey area:

<u>Chart No.</u>	<u>Edition</u>	<u>Edition Date</u>
14882	28th	August 2, 1986

The charted hydrography originates with the previously discussed prior surveys noted in Section K of this report. *CONCUR*

1) Three charted rocks awash originate with prior survey LS-833 (1896) in the vicinity of latitude  $46^{\circ}04'07''$  N, longitude  $083^{\circ}54'37''$  W. These rocks fall inside the foul limit line defined by the present survey. The area should be charted as shown by the present survey. *CONCUR*

2) A charted rock awash in the vicinity of latitude  $46^{\circ}04'12''$  N, longitude  $083^{\circ}54'36.5''$  W originates with prior survey LS-833 (1896). ~~This rock was found by the hydrographer and no change in charting status is recommended.~~ *SEE ALSO SECTION 7. (2) OF THE EVALUATION REPORT.*

~~The bottom composition of the survey area is primarily mud with sand and areas of rock and grass near the shoreline.~~

There are no conflicts between the charted channel controlling depths and present survey depths.

There are no newly found, unreported dangers to navigation in the present survey area. *DO NOT CONCUR SEE SECTION 7. D. OF THE EVALUATION REPORT.*

Two submarine cables were located in the survey area. One at the southern tip of Andrews Island extending to Big Trout Island's eastern shore, reference number 9007, and one from Maple Island's western shore along the edge of Maple Island to the southern tip of Maple Island and then extending south to Big Trout Island, reference number 9006. There was no cable crossing sign at the end of Big Trout Island. Positions were acquired for cable crossing signs by standing at the middle of each sign and observing angles with a sextant on known control stations. These positions, positions 3154-3156, are recorded on the project tables mini-diskette under the "Contact Utility" program in HDAPS .

There are no submarine pipelines nor overhead cables in the present survey area. *CONCUR*

Except as noted above, the present survey is adequate to supersede the charted hydrography. *CONCUR*



## M. ADEQUACY OF SURVEY

This survey is a complete basic hydrographic survey and is adequate to supersede all prior surveys within the common area. *CONCUR*

## N. AIDS TO NAVIGATION

Non-Floating Aids to Navigation *SEE ALSO SECTION 7.C. OF THE EVALUATION REPORT.*

One fixed aid to navigation was located in the survey area and is adequate to serve the intended purpose. The LIGHT LIST, Volume VII, GREAT LAKES, 1989 Edition lists ARCHIBALD ISLAND LIGHT at latitude 46°04.9" N, longitude 083°52.5" W whereas the third order, class I position located in 1989 shows the light at latitude 46°04'30.328" N, longitude 083°53'11.449" W. The position may be referenced on the Non-Floating Aids to Navigation, NOAA Form, 76-40, included with the Separates Following Text. *CONCUR*

Floating Aids to Navigation

<u>Floating Aid</u>	<u>Survey Position</u>	<u>Light List Position</u>
Green Can KE 13	46°03'48.3" N 083°53'48.3" W	None Listed
Lighted Buoy KE 14 Fl R	46°03'45.1" N 083°54'11.4" W	46°03.8 N 83°54.2 W

Both floating aids were positioned with Mini-Ranger Falcon 484 using three lines of position.

## O. STATISTICS

<u>Description</u>	<u>VESNO 0518</u>	<u>VESNO 0519</u>	<u>VESNO 0520</u>	<u>Total</u>
Total Positions	980	426	154	1560
Detached Positions	11	0	0	11
Duplicate Positions	0	0	0	0
Total Miles of Hydrography	85	50	11	146
Sq. Nautical Miles of Hydro	3	1.5	.4	4.9
Bottom Samples	0	29	0	29
Digibar Casts	2	1	0	3
Tide Stations Levelled	-	-	-	-
Days of Production	8	3	3	14



## P. MISCELLANEOUS

Bottom samples were taken and submitted to the Smithsonian Institution as directed in Section 6.7 of the project instructions. Twenty-nine bottom samples were transmitted on July 28, 1989. A position was acquired for each bottom sample in Modified Universal Transverse Mercator (MTM) coordinates and converted to geographic positions (GP's) using the utilities of the HDAPS. Bottom sample positions were plotted on the overlay with the channel lines, and other detached positions. The bottom samples were listed on the Oceanographic Log Sheet - M, NOAA Form 75-44, and may be found in the Separates Following Text. *\*DATA REMOVED FROM ORIGINAL DESCRIPTIVE REPORT AND FILED WITH FIELD RECORDS.*

No anomalous currents were observed in the survey area.

Seven soundings were manually plotted on the final field sheet and need to be digitized, position numbers 926 - 927 on the east shore of Andrews Island. This was an inner shoreline buffer where limited positioning control was available.

Position number 926 begins at the inside corner of an "L-shaped" pier and runs north to position number 927 on the shoal at the northern tip of Andrews Island. These positions are noted with "NSP" on the echogram of day number 206.

Q. RECOMMENDATIONS *SEE ALSO SECTIONS 6. AND 7. OF THE EVALUATION REPORT.*

Recommendations may be found in sections H, K, L, and N of this report.

## R. AUTOMATED DATA PROCESSING

The HDAPS system currently in use, consists of the following system components: A Hewlett Packard (HP) 9000 Model 300 computer, an HP 9153C Disk Drive with a Winchester hard disk with a storage capacity of 20 Mbytes, an HP 98785A Color Monitor, a Bruning ZETA 824 plotter, an HP 82906A Rugged Writer, and an M4 Data Model 9800 9-track tape drive.

Data were acquired and stored on an IBM compatible computer with a hard disk then transferred to 3<sup>1/2</sup>-inch double sided double density micro-floppy diskettes. A Navitronic Path Guidance Unit (PGU) functions both as a remote steering display for the coxswain and as a remote control keyboard for the acquisition system. The interface between the acquisition computer and the hydrographic sensors is the Navitronic's Hyflex 1000.

All off-line programs are written in HP BASIC while all on-line programs are written in Quick BASIC.



During data acquisition, high frequency digitized depths are recorded while simultaneously applying draft and settlement and squat corrections. Baseline calibration correctors for each line of position are also applied on-line. Actual water levels and speed of sound correctors are applied to the final field sheet from the respective corrector tables. Sounding plots and trackline plots are produced during processing.

Raw data were converted and written to the HP hard drive to generate a master listing which displays data collected for that day. After the data are edited, data abstracts are generated to ensure that all changes were performed prior to plotting the data.

Raw data stored on the 3<sup>1</sup>/<sub>2</sub>-inch micro floppy diskettes were labeled with a five digit code. The first three digits correspond to the day of the year. The last two digits are zeroes. When more than one diskette is used per vessel, the fourth digit is increased sequentially by one. Edited data, stored on magnetic tapes, are also labeled with a five-digit code. The first three digits correspond to the day number, with the fourth and fifth digits arbitrarily labeled with a one denoting an edited tape. Therefore, an edited tape would be labeled as 18211.

In addition to the HDAPS system which used program NAVISOFT 300, version 2.47, the following non-HDAPS computer programs were used:

		<u>Version</u>	<u>Date</u>
VELOCITY	Velocity Computations (IBM PC)	1.0 extended	9/8/89
MTEN3 w/ enhancements	Geodetic Computations (IBM PC)		6/88

#### S. REFERRAL TO REPORTS

<u>Title</u>	<u>Transmittal Information</u>
*Descriptive Report To Accompany Survey H-10302	Atlantic Hydrographic Section Atlantic Marine Center, 1989
*Descriptive Report To Accompany Survey H-10311	Atlantic Hydrographic Section Atlantic Marine Center, 1989
*Descriptive Report To Accompany Survey H-10313	Atlantic Hydrographic Section Atlantic Marine Center, 1989



Title  
Horizontal Control Report  
for OPR-X278-HFP  
HC-8711

Transmittal Information  
Photogrammetry Branch  
Atlantic Marine Center, 10/31/89

Written by: C.M. Middleton Jr.

\*Chart Sales Agent Report  
OPR-X278-HFP

Atlantic Hydrographic Section  
Atlantic Marine Center, 1989

\*User Evaluation Report  
OPR-X278-HFP

Program Planning & Requirement  
Atlantic Marine Center, 1989

\*Chart Inspection Report  
OPR-X278-HFP

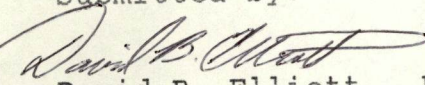
Mr. Rudolph D. Sanocki  
Atlantic Hydrographic Section  
Atlantic Marine Center, 1989

\*Coast Pilot Report

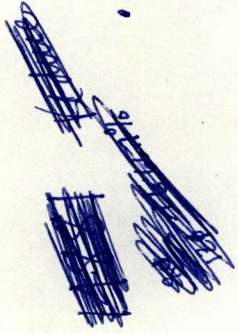
Coast Pilot Section  
Mapping and Charting Branch  
Rockville, MD, 1989

\*Reports were submitted at the end of project OPR-X278 in 1989.

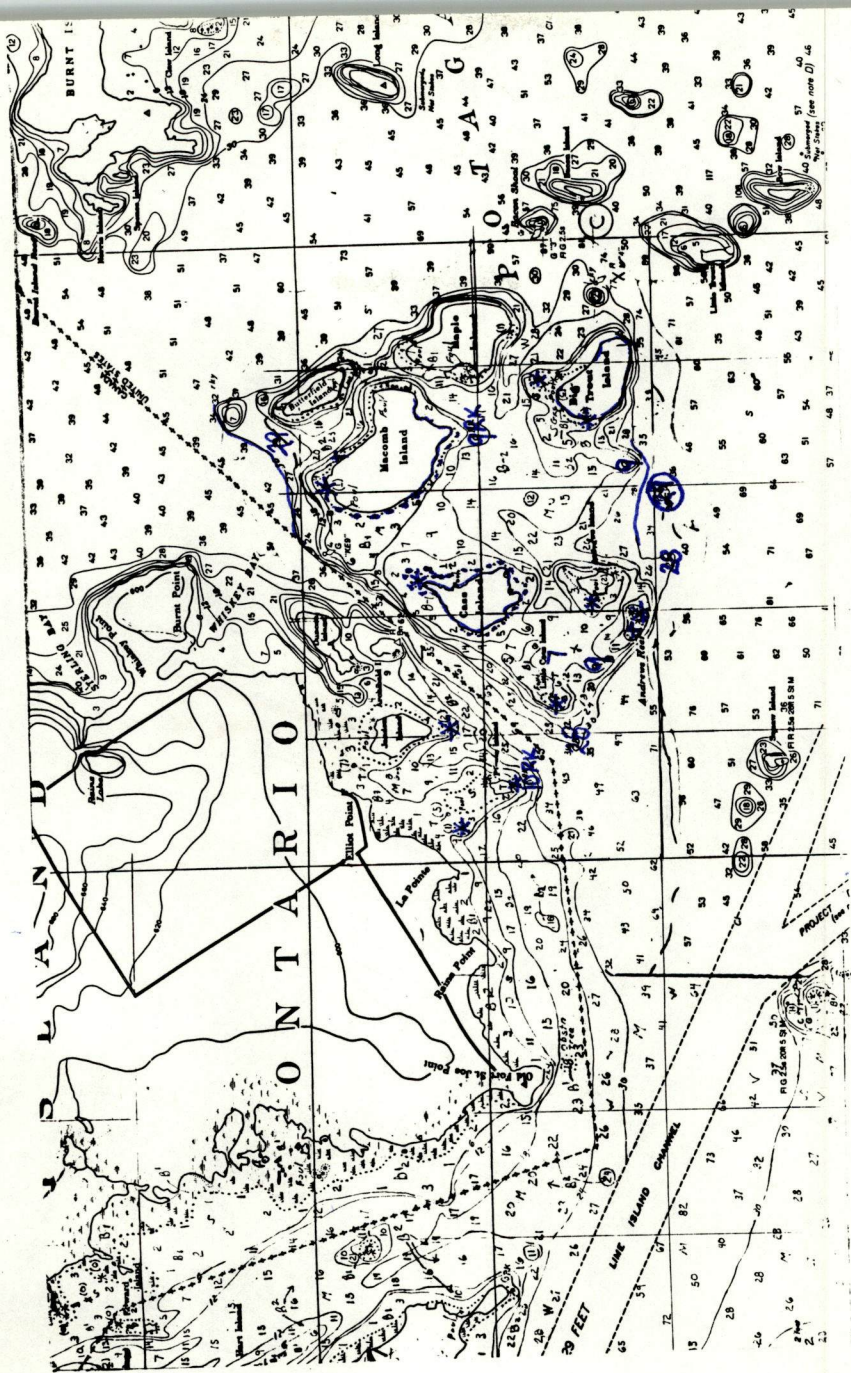
Submitted by:

  
David B. Elliott, Launch Hydrographer in Charge

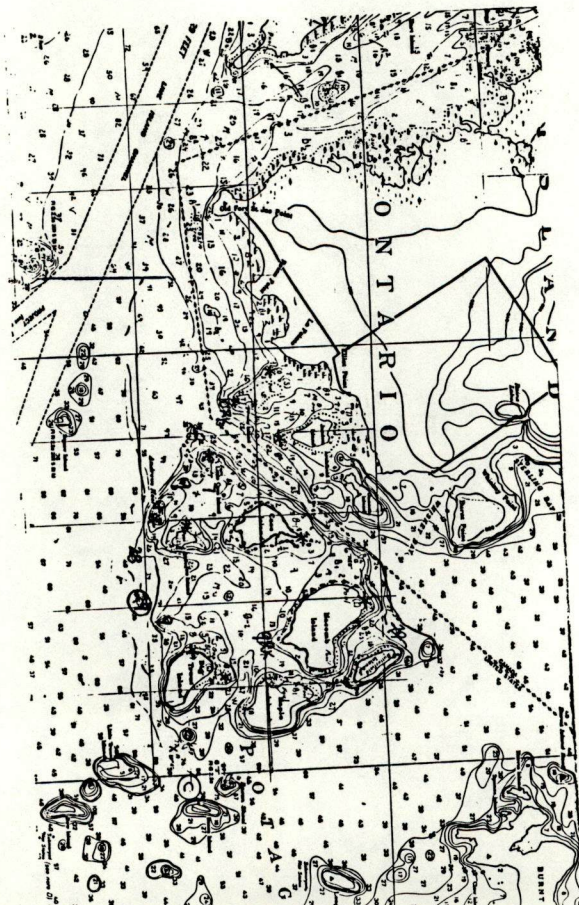




for 14880







14881  
124 88 #4.1% (blue)  
for 14880



ST MARYS RIVER 1989  
LIST OF GEOGRAPHIC POSITIONS

SPN	STATION NAME	GPN CODE	LATITUDE			LONGITUDE			G-NB
			K	DEG	MN	SEC	DEG	MN	
1	REF MON 9 IWC 1911	9	46	3	47.15300	83	56	56.09400	
2	PAF 32	9	46	1	49.77525	83	58	52.62893	
3	LINK	9	46	3	55.60382	83	58	29.45339	
4	DICK	9	46	2	19.33801	83	56	9.75459	
5	SQUAW ISLAND LIGHT	9	46	2	19.69979	83	54	15.00421	
6	SWEETS POINT LIGHT	9	46	2	19.32374	83	56	9.66544	
7	SWEET	9	46	1	46.67431	83	56	40.73220	
8	POB	5	46	3	57.52803	83	55	46.92495	
9	SKULL	5	46	3	51.47386	83	54	24.16075	
10	REF MON 223 USLS 1894	9	46	2	20.15800	83	54	15.05600	
11	UDP 061 COE								
12	UDP 005 COE								
13	ZEERIP	5	45	59	53.71356	83	52	14.37119	
14	CASS	5	46	4	21.44057	83	52	42.70649	
15	TROUT	5	46	3	33.78874	83	51	13.51870	
16	BUTEND	5	46	4	43.78997	83	51	1.18173	
17	N LONG	5	46	4	40.66012	83	48	35.10492	
18	LONG	5	46	4	23.72729	83	48	45.39005	
19	BACON USLS 1894	9	46	3	28.48800	83	49	35.11500	
20	LUX	5	46	3	12.74618	83	50	46.55025	
21	N GULL	5	46	2	18.13192	83	47	28.28661	
22	KAHN	5	46	1	41.19421	83	49	30.08460	
23	STURGEON	5	46	0	58.17066	83	49	30.20833	
24	NATES	5	46	0	4.96133	83	49	26.59223	
25	FAIR PT	5	46	0	10.20592	83	49	1.90424	
26	FAIRBANK	5	46	0	17.91779	83	48	16.10595	
27	ROPP	5	46	1	39.76642	83	45	20.44431	
28	PICNIC	5	46	0	25.17107	83	47	23.77680	
29	277 USLS 1894	9	46	0	46.63400	83	46	47.95700	
30	CROSS	5	46	2	3.38698	83	47	33.55898	
31	BOW	5	46	2	21.85256	83	49	39.41275	
32	BOUL	5	46	2	11.56729	83	45	24.42405	
33	WILLIAMS	5	45	59	15.16154	83	48	2.70725	
34	HARBOR	5	46	2	55.57951	83	45	37.89724	
35	DIX	5	46	1	34.94788	83	50	41.61470	
36	HAVEN	5	46	1	32.64112	83	44	58.78611	
37	FIRE	5	46	2	27.66839	83	44	17.23790	
38	BALD	5	46	2	47.30356	83	44	25.04261	
39	GRAPE	5	46	2	39.05100	83	43	13.66772	
40	KEMP	5	46	2	8.92268	83	41	37.93343	
41	NOID	5	46	2	19.86234	83	41	.98769	
42	ASH	5	46	2	56.78001	83	42	4.17448	
43	PIZZA	5	46	3	18.06733	83	41	45.36350	
44	PENNER	5	46	3	40.24606	83	42	6.75217	
45	PAW	5	46	3	46.00771	83	40	37.04830	
46	PECK	5	46	4	4.74723	83	42	1.88257	
47	RUNT	5	46	4	50.00968	83	43	16.02438	
48	LAZARZ	5	46	2	11.73134	83	43	29.15512	
49	ARCHIBALD ISLAND LIGHT	9	46	4	30.32878	83	53	11.44943	
50	227 USLS 1894								
51	225 USLS 1894								
52	261 USLS 1894	9	46	3	33.67800	83	51	14.06700	
53	PIPE ISLAND TWINS LIGHT	4	46	1	34.32821	83	53	29.23953	



ST MARYS RIVER 1989  
LIST OF GEOGRAPHIC POSITIONS

SPN	STATION NAME	GPN CODE	LATITUDE			LONGITUDE			G-N
			K	DEG	MN	SEC	DEG	MN	
54	DETOUR VILLAGE WATER TANK	4	45	59	29.34567	83	54	13.86635	
55	PIPE ISLAND LIGHT	4	46	0	58.40368	83	53	58.39359	
56	CHERRY	5	46	5	27.26553	83	45	19.49923	
57	STAND	5	46	4	8.84450	83	46	14.41418	
58	MARE	5	46	3	49.34706	83	47	32.37922	
59	PK BURNT	5	46	5	40.11208	83	48	47.40005	
60	285 USLS 1894	9	46	3	48.76000	83	47	32.52900	
61	231 USLS 1894	9	46	0	32.83900	83	51	58.59300	
62	DETOUR REEF LIGHT	9	45	56	56.79100	83	54	11.20700	
63	PIPE	5	46	1	34.34691	83	53	29.18695	
64	CARR	5	45	59	23.21788	83	53	50.56745	
65	FRY	5	45	59	6.19188	83	53	40.45230	
66	DOG	5	45	58	22.72838	83	53	.43435	
67	PT DETOUR	5	45	57	28.39053	83	54	37.87958	
68	DETOUR SOUTH MICROWAVE MAST	4	45	58	35.47839	83	54	53.66493	
69	DETOUR NORTH MICROWAVE MAST	4	45	59	26.74188	83	54	9.89256	
70	WATSON REEF LIGHT	4	46	0	23.41003	83	53	58.49437	
71	DETOUR ENTRANCE LIGHT 2	5	45	59	44.22379	83	53	56.76002	
72	DRUMMOND DOLOMITE STACK	4	45	59	7.34796	83	52	42.08775	
73	FRYING PAN ISLAND LIGHT	5	45	59	9.39374	83	53	41.26479	
74	ANDREW	5	46	3	21.63139	83	52	38.17979	
75	MACOMB	5	46	4	47.46030	83	51	43.57370	







RESPONSIBLE PERSONNEL

TYPE OF ACTION	NAME	ORIGINATOR
OBJECTS INSPECTED FROM SEAWARD		<input type="checkbox"/> PHOTO FIELD PARTY <input type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)
POSITIONS DETERMINED AND/OR VERIFIED		FIELD ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		OFFICE ACTIVITY REPRESENTATIVE
		<input type="checkbox"/> REVIEWER <input type="checkbox"/> QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'  
(Consult Photogrammetric Instructions No. 64,

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object.  
EXAMPLE: 75E(C)6042  
8-12-75

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

- F - Field
- L - Located
- V - Verified
- 1 - Triangulation
- 2 - Traverse
- 3 - Intersection
- 4 - Resection
- 5 - Field identified
- 6 - Theodolite
- 7 - Planetable
- 8 - Sextant

A. Field positions\* require entry of method of location and date of field work.

EXAMPLE: F-2-6-L  
8-12-75

\*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.

FIELD (Cont'd)

B. Photogrammetric field positions\*\* require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object.  
EXAMPLE: P-8-V  
8-12-75  
74L(C)2982

II. TRIANGULATION STATION RECOVERED

When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery.

EXAMPLE: Triang. Rec.  
8-12-75

III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH

Enter 'V-Vis.' and date.

EXAMPLE: V-Vis.  
8-12-75

\*\*PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.



DIVE INVESTIGATION REPORT  
PROJECT NUMBER ~~X-278~~ X-278  
SURVEY 110-8-89  
FIELD NUMBER H 10309

PA  
9/5/90

DN 207

DIVE NUMBER 1

DIVE DATE

7/27/89

I. AREA OF INVESTIGATION

A. State/Country MI / USA

Sub-Locality St. Mary's River

B. Position: Latitude 46° 03' 44.533"

Longitude 83° 54' 22.936"

(Dive site or center of search area)

C. Method of Positioning Falcon M/R, MLOP

II. PURPOSE OF INVESTIGATION

A. AWOIS item number: N/A

B. Source of item being investigated (if other than AWOIS listing): straight sounding on pos. # 5219+5 to 5220

C. Contacts (e.g. USCG, C of E, Harbor Masters, Owners, etc.):  
N/A

D. Names, Addresses and Phone Numbers etc. of contacts:  
N/A

III. SURVEY PROCEDURES

A. Determination of dive site (e.g. wire drag, side scan, development): Echo Sounder, straight sounding, pos. # 5219+5 to 5220

B. Search Procedure (e.g. following a groundwire, circle search, sweep along known feature, etc.)

10m line circle search

C. Known reference to features nearby:

SOUTH OF KIRATE ISL., WEST OF LITTLE CASS

D. Area and depths covered:

10m CIRCLE SEARCH, 0-15ft







DIVE INVESTIGATION REPORT  
PROJECT NUMBER X-278  
SURVEY HFP 10-8-89  
FIELD NUMBER H-10309

RH  
9/18/90

DIVE NUMBER 2

DIVE DATE 7/27/89

I. AREA OF INVESTIGATION

- A. State/Country MT/USA Sub-Locality St Mary's River  
E=28703.7 N=24332.8
- B. Position: Latitude 46° 03' 08.09" Longitude 83° 53' 07.715"  
(Dive site or center of search area)
- C. Method of Positioning Falcon Mini-Ranger, MLOP

II. PURPOSE OF INVESTIGATION

- A. AWOIS item number: N/A
- B. Source of item being investigated (if other than AWOIS listing): STRAY SOUNDING FROM MAINSCHEME HYDROGRAPHY DN 198, PN 5320+1
- C. Contacts (e.g. USCG, C of E, Harbor Masters, Owners, etc.):

- D. Names, Addresses and Phone Numbers etc. of contacts:

III. SURVEY PROCEDURES

- A. Determination of dive site (e.g. wire drag, side scan, development): Echo Sounder, PN 5320+1, RL 4700
- B. Search Procedure (e.g. following a groundwire, circle search, sweep along known feature, etc.)  
10m line circle search
- C. Known reference to features nearby:
- D. Area and depths covered: SW of Andrew Is, WEST OF ANDREWS REEF  
10m CIRCLE SEARCH,



IV. DIVE DATA

- A. Divers: C. Parker + J. Verhague
- B. Time of Dive (in UTC) - Real 13:54 to 14:16  
Elapsed 21 min
- C. General Bottom Depths (units and method of determination):  
5-10 FT, PATHOMETER, DEPTH GAUGE (CALIBRATED), SOUNDING POLE
- D. Current and conditions: MINIMUM
- E. Visibility (number of feet - horizontally and vertically):  
Horiz. → 7 FT      Vert. → 7 FT
- F. Bottom type (mud, sand, rocks, etc.): rock, mud

IV. RESULTS

- A. Detached Positions Number(s): PN 946  
Time of D.P.'s (UTC): Describe if other time zone: 142015  
Least Depth and Fix Numbers (raw depth): PN 946, L.D. = 5.0 FT  
Method of determining depth (The raw sounding should be recorded. The reduced least depth should be plotted on the field sheet.) SOUNDING POLE, DEPTH GAUGE
- B. Description of findings:  
rock shoal extending eastward to Andrews reef  
large boulders, BOTTOM SCATTERED ROCKS AND MUD.
- C. Dimensions of item or feature (attach sketch if appropriate):
- D. Unusual Conditions:  
None

VI. CHARTING RECOMMENDATIONS

Position Lat. 46° 03' 08.09" Long. 83° 53' 07.715"  
Reduced Depth \_\_\_\_\_  
Type of Feature (Reference Chart No. 1) SUBM. Rocks



DIVE INVESTIGATION REPORT  
PROJECT NUMBER X-278  
SURVEY HFP 10-8-89  
FIELD NUMBER 1410309

*PLT 9/15/90*

DIVE NUMBER 3

DIVE DATE 7/27/89

**I. AREA OF INVESTIGATION**

- A. State/Country MI/USA Sub-Locality St. Mary's River  
*E=30734.8 N=25958.9*
- B. Position: Latitude 46° 04' 00.787 Longitude 83° 51' 33.164  
(Dive site or center of search area)
- C. Method of Positioning Falco Mini-Ranger

**II. PURPOSE OF INVESTIGATION**

- A. AWOIS item number: N/A
- B. Source of item being investigated (if other than AWOIS listing): straight sounding on pos 738+5
- C. Contacts (e.g. USCG, C of E, Harbor Masters, Owners, etc.):

*N/A*

- D. Names, Addresses and Phone Number: etc. of contacts:

*N/A*

**III. SURVEY PROCEDURES**

- A. Determination of dive site (e.g. wire drag, side scan, development): Echo Sounding, PN 738+5, ref. line 6450 (FATHOM)
- B. Search Procedure (e.g. following a groundwire, circle search, sweep along known feature, etc.)  
10 m line circle search
- C. Known reference to features nearby:  
SSW of Macomb Island
- D. Area and depths covered:  
10 m circle, 15 FT



IV. DIVE DATA

- A. Divers: C. Parker & J. Velazquez
- B. Time of Dive (in UTC) - Real 14:50 to 15:05  
Elapsed 15 min
- C. General Bottom Depths (units and method of determination):  
15'
- D. Current and conditions: minimum current
- E. Visibility (number of feet - horizontally and vertically):  
V - 10.0' H - 6' to 8'
- F. Bottom type (mud, sand, rocks, etc.): mud, scattered rocks

IV. RESULTS

- A. Detached Positions Number(s): P.N. 947  
Time of D.P.'s (UTC): Describe if other time zone: 150709  
Least Depth and Fix Numbers (raw depth): 11.0' PN 947  
Method of determining depth (The raw sounding should be recorded. The reduced least depth should be plotted on the field sheet.) LEADLINE, DEPTH GAUGE
- B. Description of findings:  
lg. boulder 4' in height, 18.6' CIRCUMFERENCE AT THE BASE, BOTTOM SCATTERED ROCKS AND MUD.
- C. Dimensions of item or feature (attach sketch if appropriate):  
4' in height, 18.6' CIRCUMFERENCE AT THE BASE
- D. Unusual Conditions:  
NONE

VI. CHARTING RECOMMENDATIONS

Position Lat. 46° 04' 00.707 Long. 83° 51' 33.164"  
Reduced Depth \_\_\_\_\_  
Type of Feature (Reference Chart No.1) SUBM. ROCK



DIVE INVESTIGATION REPORT

PROJECT NUMBER X 278

SURVEY WFP 10-8-89

FIELD NUMBER 410309

ATAC DIVE DATA  
9/8/90

DIVE NUMBER 4

DIVE DATE 7/27/89

I. AREA OF INVESTIGATION

A. State/Country MI/USA Sub-Locality St. Mary's River

B. Position: Latitude 46° 04' 11.75" Longitude 83° 53' 56.48"  
(Dive site or center of search area)

C. Method of Positioning Falcon Mini-Ranger MLOP

II. PURPOSE OF INVESTIGATION

A. AWOIS item number: N/A

B. Source of item being investigated (if other than AWOIS listing): Echo Sounding, Straight Sounding pos # 297+5 + pos # 298

C. Contacts (e.g. USCG, C of E, Harbor Masters, Owners, etc.):

N/A

D. Names, Addresses and Phone Numbers etc. of contacts:

N/A

III. SURVEY PROCEDURES

A. Determination of dive site (e.g. wire drag, side scan, development): Echo Sounding, PN 297+5 to # 298

B. Search Procedure (e.g. following a groundwire, circle search, sweep along known feature, etc.)  
20 m line circle search

C. Known reference to features nearby:  
S of Sanden Is.

D. Area and depths covered:  
20m circle, 3' - 10FT



IV. DIVE DATA

- A. Divers: C Parker + D. Elliott
- B. Time of Dive (in UTC) - Real 1650 to 17:10  
Elapsed 20 min.
- C. General Bottom Depths (units and method of determination):  
3' to depth gauge
- D. Current and conditions: minimum current
- E. Visibility (number of feet - horizontally and vertically):  
H = 10', V = 10'
- F. Bottom type (mud, sand, rocks, etc.): rock; mud; sand

IV. RESULTS

- A. Detached Positions Number(s): # 948  
Time of D.P.'s (UTC): Describe if other time zone: 171143  
Least Depth and Fix Numbers (raw depth): L.D. = 4.3 FT, P.N. 948  
Method of determining depth (The raw sounding should be recorded. The reduced least depth should be plotted on the field sheet.) Sounding Pole
- B. Description of findings:  
area foul with rocks on bottom, large boulder, 4 FT DIAMETER, LEAST DEPTH 4.3 FT.
- C. Dimensions of item or feature (attach sketch if appropriate):  
4' diam, 2' height
- D. Unusual Conditions:  
NONE

VI. CHARTING RECOMMENDATIONS

Position Lat. 46° 04' 11.751" Long. 83° 53' 56.481  
Reduced Depth \_\_\_\_\_  
Type of Feature (Reference Chart No.1) SUBM. ROCKS





**UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration**

NATIONAL OCEAN SERVICE  
COAST AND GEODETIC SURVEY  
Atlantic Hydrographic Section  
439 West York Street  
Norfolk, VA. 23510-1114

May 15, 1991

Commander (oan)  
Ninth Coast Guard District  
1240 East 9th Street  
Cleveland, Ohio 44199-2060

Dear Sir

The following item was previously reported as a danger to navigation on July 3, 1990 (see attachment):

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number....H-10309  
State.....Michigan  
General Locality.....St. Marys River  
Locality.....Big Trout Island to Rains Point  
Project Number.....OPR-X278  
Surveyed by.....Atlantic Hydrographic Party 2

Object Addressed:

An uncharted dangerous rock which covers and uncovers, (Object #4 on danger to navigation report dated, 3 July 1990), located in Latitude 46°03'07.28"N, Longitude 83°52'16.71"W was reported bearing 3 feet at Low Water Datum. The location shown on the attached chartlet from the original danger to navigation report is correct. The geographic position of the rock has been corrected to Latitude 46°03'08.43"N, Longitude 83°53'02.46 and bares 2 feet at Low Water Datum.

Affected nautical charts (object 1):

CHART NUMBER	EDITION NUMBER	DATE	HORIZ DATUM	GEOGRAPHIC POSITION	
				LATITUDE	LONGITUDE
14880	28	4/28/90	NAD 83	46°03'08.43"N	83°53'02.46"W
14881	26	3/31/90	NAD 83	46°03'08.43"N	83°53'02.46"W
14882	29	2/10/90	NAD 83	46°03'08.43"N	83°53'02.46"W





Questions concerning this report should be directed to the Atlantic Hydrographic Section, Atlantic Marine Center by calling 804 441-6746 or FTS 827-6746.

Sincerely,

*for R. W. Sawicki*

CDR, Christopher B. Lawrence, NOAA  
Chief, Atlantic Hydrographic  
Section

Attachments





**UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration**

NATIONAL OCEAN SERVICE  
OFFICE OF CHARTING AND GEODETIC SERVICES  
Atlantic Hydrographic Section  
439 West York Street  
Norfolk, VA. 23510-1114

July 3, 1990

Commander, Ninth Coast Guard District  
Aids to Navigation Office  
Cleveland, Ohio 44199-2060

Dear Sir,

The following items were discovered during hydrographic survey operations and were considered dangers to navigation during office processing of the survey data:

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry Number...H-10309  
State.....Michigan  
General Locality.....St. Marys River  
Locality.....Big Trout Island to Rains Point  
Project Number.....OPR-X278  
Survey by.....Atlantic Hydrographic Party 2

**Objects Discovered:**

1) An uncharted shoal was found in the vicinity of Latitude 46° 03' 37.93"N, Longitude 083° 55' 29.86"W. The least depth on this feature was determined to be 16 feet at Low Water Datum; however, the presently charted information at this location shows depths of 21 to 24 feet.

2) An uncharted dangerous underwater rock was found in the vicinity of Latitude 46° 03' 44.52"N, Longitude 083° 54' 22.84"W. The least depth on this feature was determined to be 10 feet at Low Water Datum. Presently charted depths at this location are 24 to 30 feet.

3) An uncharted dangerous rock which is covered by 2 feet at chart datum was found in the vicinity of Latitude 46° 04' 11.74"N, Longitude 083° 53' 56.49"W. The presently charted depths on this feature are 16 to 18 feet.

4) An uncharted dangerous rock which covers and uncovers was found in the vicinity of Latitude 46° 03' 07.28"N, Longitude 083° 52' 16.71"W (Andrews Reef). It was determined that this feature bares three-feet at Low Water Datum. Presently charted information at this location shows a shoal with a two-foot depth.

**Affected Nautical Charts (Object 1):**

CHART NUMBER	EDITION NUMBER	DATE	HORIZ DATUM	GEOGRAPHIC POSITION	
				LATITUDE	LONGITUDE
14880	28	4/28/90	NAD 83	46° 03' 37.93"N	083° 55' 29.86"W
14881	26	3/31/90	NAD 83	46° 03' 37.93"N	083° 55' 29.86"W





14882 29 2/10/90 NAD 83 46° 03' 37.93"N 083° 55' 29.86"W  
Affected Nautical Charts (Object 2):

CHART NUMBER	EDITION NUMBER	DATE	HORIZ DATUM	GEOGRAPHIC POSITION	
				LATITUDE	LONGITUDE
14880	28	4/28/90	NAD 83	46° 03' 44.52"N	083° 54' 22.84"W
14881	26	3/31/90	NAD 83	46° 03' 44.52"N	083° 54' 22.84"W
14882	29	2/10/90	NAD 83	46° 03' 44.52"N	083° 54' 22.84"W

Affected Nautical Charts (Object 3):

CHART NUMBER	EDITION NUMBER	DATE	HORIZ DATUM	GEOGRAPHIC POSITION	
				LATITUDE	LONGITUDE
14880	28	4/28/90	NAD 83	46° 04' 11.74"N	083° 53' 56.49"W
14882	29	2/10/90	NAD 83	46° 04' 11.74"N	083° 53' 56.49"W

Affected Nautical Charts (Object 4):

CHART NUMBER	EDITION NUMBER	DATE	HORIZ DATUM	GEOGRAPHIC POSITION	
				LATITUDE	LONGITUDE
14880	28	4/28/90	NAD 83	46° 03' 07.28"N	083° 52' 16.71"W
14881	26	3/31/90	NAD 83	46° 03' 07.28"N	083° 52' 16.71"W
14882	29	2/10/90	NAD 83	46° 03' 07.28"N	083° 52' 16.71"W

Questions concerning this report should be directed to the Atlantic Hydrographic Section by calling 804 441 6746 or FTS 827 6746.

Sincerely,

*for R. L. Sawicki*

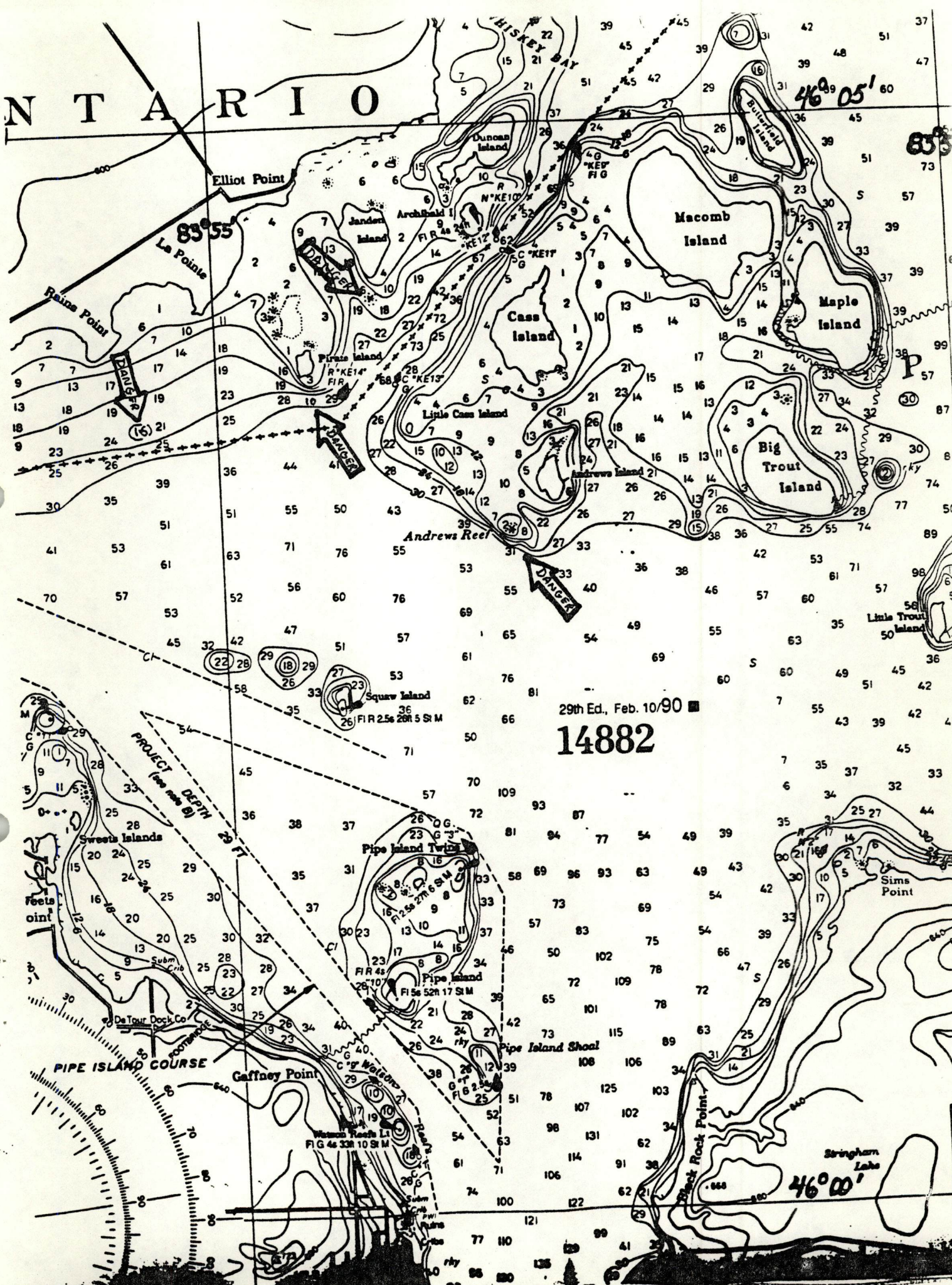
Christopher B. Lawrence  
Commander, NOAA

Chief, Atlantic Hydrographic Section

Attachment



N T A R I O





APPROVAL SHEET

BASIC HYDROGRAPHIC SURVEY

OPR-X278-HFP


AHP-10-8-89

H-10309

1989

This basic hydrographic survey was conducted in accordance with the project instructions for OPR-X278-HFP, the hydrographic manual, the hydrographic survey guidelines, and the field procedures manual. The survey data and reports were completed under daily supervision. All boat sheets and final field sheets were reviewed in their entirety and all supporting records were also checked.

This survey is a complete basic hydrographic survey for the area described in Section M of this report.



V. Dale Ross

LT NOAA

Chief, Atlantic Hydrographic Party Two



N/CG244-55-91

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 Section, N/CG243  
 NOAA/National Ocean Service  
 Room 151, WSC-1  
 Rockville, MD 20852

DATE FORWARDED

31 July 1991

NUMBER OF PACKAGES

1 box 1 tube

**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.

H-10309

Michigan--Ontario, St. Marys River,  
Big Trout Island to Rains Point

Pkg. 1 Tube:

- 1 Smooth Sheet
- 1 Smooth Position Overlay
- 2 Smooth Sounding Overlays
- 2 Smooth Field Sheets
- 1 Original Descriptive Report

Pkg. 2 Box

- 1 Accordion file containing Echograms, Data Printouts, Corrector Tape Printouts for VESNO 518 for JD's--195, 198-199, 201-202, 205-207  
 VESNO 520 for JD's--205-206, 209  
 VESNO 519 for JD's--194-195, 198
- 1 slot containing supplemental data from field
- 1 Binder containing Reference Data and Photos
- 1 Cahier containing Position printout, and Control File Listing,
- 1 Cahier containing Sounding printout, L-File
- 1 Envelope containing supplemental data from printouts
- 1 Binder containing data removed from original Descriptive Report

FROM: (Signature)

Norris A. Wike

RECEIVED THE ABOVE  
(Name, Division, Date)

Return receipted copy to:

Atlantic Hydrographic Section, N/CG24411  
 439 W. York Street  
 Norfolk, VA 23510-1114

D. S. Clark  
 8/9/91



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

WATER LEVEL NOTE FOR HYDROGRAPHIC SHEET

Processing Division: N/CG2441-Verification Section

Hourly heights are approved for: See Remarks  
Water Level Station

Period: July 13, 1989 to July 28, 1989

HYDROGRAPHIC SHEET: H-10309

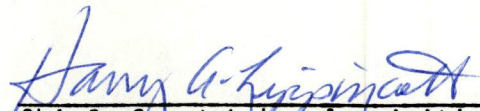
OPR-X278-AHP

Locality: St. Mary's River, MI

Plane of reference: Low Water Datum (IGLD --- : ---- Feet)

Remarks: Use the following Water Level Station and corresponding Low Water Datum for this survey.

DETOUR DOCK, MI (907-5098) 576.8'

  
Chief, Great Lakes Acquisition Unit



GEOGRAPHIC NAMES

H-10309

Name on Survey	14882									
	A	B	C	D	E	F	G	H	K	
	ON CHART NO.	ON PREVIOUS SURVEY NO.	ON U.S. QUADRANGLE MAPS	FROM LOCAL INFORMATION	ON LOCAL MAPS	P.O. GUIDE OR MAP	RAND McNALLY ATLAS	U.S. LIGHT LIST		
ANDREWS ISLAND	X									1
ANDREWS REEF	X									2
ARCHIBALD ISLAND	X									3
BIG TROUT ISLAND	X									4
BUTTERFIELD ISLAND	X									5
CASS ISLAND	X									6
DUNCAN ISLAND	X									7
ELLIOT POINT	X									8
JANDEN ISLAND	X									9
LITTLE CASS ISLAND	X									10
MACOMB ISLAND	X									11
MAPLE ISLAND	X									12
MICHIGAN (title)	X									13
ONTARIO	X									14
PIRATE ISLAND	X									15
POINTE, LA	X									16
POTAGANNISSING BAY	X									17
RAINS POINT	X									18
SAINT JOSEPH ISLAND	X									19
SAINT MARYS RIVER	X									20
										21
										22
										23
										24
										25

Approved:

*Charles E. Harrington*  
Chief Geographer - N/CG2x57

MAY 22 1991



07/30/91

HYDROGRAPHIC SURVEY STATISTICS  
REGISTRY NUMBER: H-10309

NUMBER OF CONTROL STATIONS	19
NUMBER OF POSITIONS	1496
NUMBER OF SOUNDINGS	6929

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	19	11/07/89
VERIFICATION OF FIELD DATA	228	09/20/90
ELECTRONIC DATA PROCESSING	20	
QUALITY CONTROL CHECKS	94	
EVALUATION AND ANALYSIS	46	07/22/91
FINAL INSPECTION	13	07/17/91
TOTAL TIME	420	
ATLANTIC HYDROGRAPHIC SECTION APPROVAL		07/30/91



**COAST AND GEODETIC SURVEY  
ATLANTIC HYDROGRAPHIC SECTION  
EVALUATION REPORT**

SURVEY NO.: H-10309

FIELD NO.: HFP-10-8-89

Michigan--Ontario, St. Marys River, Big Trout Island to Rains Point

SURVEYED: 12 July through 27 September 1989

SCALE: 1:10,000

PROJECT NO.: OPR-X278-HFP-89

SOUNDINGS: RAYTHEON DE-719B Fathometer

CONTROL: MOTOROLA Falcon 484 Mini-Ranger (Range/Range), KRUPP ATLAS Polarfix (Range/Azimuth),

Chief of Party.....V. D. Ross

Surveyed by.....D. B. Elliott  
.....J. L. Budlong  
.....G. D. Hendrix  
.....C. E. Parker  
.....M. J. Briscoe  
.....T. M. Rybarski  
.....J. S. Verlaque

Automated Plot by.....XYNETICS 1201 Plotter (AHS)

1. INTRODUCTION

a. No unusual problems were encountered during office processing.

b. Notes in the Descriptive Report were made in red during office processing.

2. CONTROL AND SHORELINE

a. Control is adequately discussed in sections F., G., and S. of the Descriptive Report.

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1927 (NAD 27). 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 survey datum and the North American Datum of 1983 (NAD 83). To place this survey on the NAD 83 datum move the projection lines 0.050 seconds (1.5 meters or .15 mm at the scale of the survey) south in latitude, and 0.050 seconds (1.1 meters or .11 mm at the scale of the survey) east in longitude.



b. Shoreline originates with 1:10,000 scale enlargement of 1:20,000 scale final reviewed Class III photogrammetric manuscripts TP-00361 of 1984-85. Shoreline revisions originating with the present survey are shown in red on the smooth sheet.

Photogrammetric manuscript surveys in this area were compiled at a scale of 1:20,000. The present survey was conducted at scale of 1:10,000. The enlargements of the shoreline manuscripts provided were not at 1:10,000 scale, as a result the transfer of the shoreline and alongshore features to the smooth sheet and the reconciliation of hydrography and shoreline proved to be a formidable task requiring additional time and effort by office personnel.

### 3. HYDROGRAPHY

a. Soundings at crossings are in excellent agreement and comply with the criteria found in sections 4.6.1 and 6.3.4.3. of the HYDROGRAPHIC MANUAL.

b. The standard six (6), twelve (12), eighteen (18), thirty (30), sixty (60), and charted twenty-four (24) foot depth curves were drawn in their entirety. The zero (0) curve was not delineated in its entirety because of vessel safety. The supplemental three (3) foot and dashed curves were drawn to show additional bottom relief.

c. The development of the bottom configuration and determination of least depths is considered adequate with the following exceptions:

1) A shoal with depths to 2 feet in the vicinity of Latitude  $46^{\circ}03'33.1''N$ , Longitude  $83^{\circ}51'34.0''W$  was not adequately developed by the present survey. Surroundings depth from present survey range from 4 to 6 feet. Additional lines of hydrography should have been run to adequately delineate the shoal.

2) A shoal with a depth to 0.5 feet in the vicinity of Latitude  $46^{\circ}04'11.80''N$ , Longitude  $83^{\circ}52'34.67''W$  was not adequately developed by the present survey. Surroundings depth from present survey range from 1 to 6 feet. Additional lines of hydrography should have been run to adequately delineate the shoal.

3) A shoal with a depth to 9 feet in Latitude  $46^{\circ}03'22.15''N$ , Longitude  $83^{\circ}53'26.57''W$  was not adequately developed by the present survey. Surroundings depth from present survey range from 11 to 16 feet. Additional lines of



hydrography should have been run to adequately delineate the shoal.

4) A shoal with a depth to 1-foot, in Latitude 46°04'24.06"N, Longitude 83°54'35.66"W was not adequately developed by the present survey. Surroundings depth from present survey range from 2 to 6 feet. Additional lines of hydrography should have been run to adequately delineate the shoal.

The items discussed above do not significantly degrade the overall quality of the present survey.

#### 4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records and reports conform to the requirements of the HYDROGRAPHIC MANUAL. The following should be noted:

a) The field unit did not submit a dangers to navigation report as required by section 5.9. of the HYDROGRAPHIC MANUAL and HYDROGRAPHIC SURVEY GUIDELINE No. 46. See also section 7.c. of the Evaluation Report and Danger to Navigation Report letters submitted by Atlantic Hydrographic Section, dated 26 July 1990 and 15 May 1991.

b) The hydrographer ran lines parallel to the depth curves in many areas on the present survey. Running hydrography in this manner does not provide adequate information for the best delineation of the bottom topography, especially in channels.

#### 5. JUNCTIONS

H-10302 (1989) 1:10,000 to the west  
 H-10311 (1989) 1:10,000 to the east  
H-10313 (1989) 1:10,000 to the south

Adequate junctions were effected with junctional surveys H-10311 (1989) and H-10313 (1989).

A standard junction could not be effected between the present survey and junctional survey H-10302 (1989). The junctional survey is in substantial agreement with the present survey. Depths generally agree to within one (1) foot. Any adjustments to the depths curves in the junctional areas will have to be made at headquarters during chart compilation.

A junction could not be effected with Canadian Survey FS-8081 (1981) to the north because of disagreement with the



present survey data. Present survey depths are not in harmony with charted depths and depth curves in this area. See section 6. of this report for a comparison with survey FS-8081 (1981).

#### 6. COMPARISON WITH PRIOR SURVEYS

LS-111	(1854)	1:15,840
LS-854	(1895-6)	1:10,000
LS-1702A	(1936)	1:10,000
LS-1771	(1941)	1:10,000
FS-8081	(1981)	1:30,000 (Canadian)

The five (5) prior surveys listed above cover the present survey area in its entirety. The prior surveys used for comparison are a compilation of soundings obtained during the year of the survey and earlier survey data. Surveys LS-1702 (1936) and LS-1702A (1936) are surveys that contain data acquired in 1936 and data from surveys of 1895. During the prior survey comparison phase of office processing, it is difficult to discern the survey data from different years on the copies used by the evaluator.

a) Prior survey depths from LS-111 (1854) show a general trend of being four (4) to ten (10) feet deeper than the present survey soundings. Numerous shoreline changes between the present and prior surveys are apparent throughout the common area.

b) Prior survey depths from LS-854 (1895-6) show a general trend of being one (1) to six (6) feet deeper than the present survey soundings. Numerous shoreline changes between the present and prior surveys are apparent throughout the common area.

c) Prior survey depths from LS-1702A (1936) show a general trend of varying plus or minus ( $\pm$ ) 1 foot from present survey soundings. Numerous shoreline changes between the present and prior surveys are apparent throughout the common area. The following should be noted:

1) Andrews Reef, in the vicinity of Latitude  $46^{\circ}03'09''N$ , Longitude  $83^{\circ}53'05''W$ , originates with prior survey LS-1702A (1936). The area is shown as a six (6) foot curve and two (2) small islets on prior survey LS-1702A (1936) and chart 14882 (28th Ed., 2 August 1986). Two (2) rocks bearing 2 feet in Latitude  $46^{\circ}03'07.51''N$ , Longitude  $83^{\circ}53'04.60''W$  and Latitude  $46^{\circ}03'06.71''N$ , Longitude  $83^{\circ}53'01.80''W$  were located by the present survey within the charted reef area. The area is foul with rocks. It is recommended that the area be



revised and charted as shown on present survey.

2) A charted 15 ft depth, in Latitude 46°03'05"N, Longitude 83°51'48"W, originates with survey H-1702A (1936) as two (2) 15-ft soundings. Present survey depths range from 25-31 feet. No indication of the shoal depth is seen on the present survey and present survey line spacing was sufficiently reduced to consider this sounding disproved. Shoaling to 9 feet was found approximately 150 meters to the north. It is recommended that the area be charted as shown on the present survey.

d) Prior survey depths from LS-1771 (1941) show a general trend of being one (1) foot deeper than the present survey soundings. Numerous shoreline changes between the present and prior surveys are apparent throughout the common area.

The numerous shoreline changes between the present and prior surveys discussed above may be attributed to either natural changes, differences in the plane of reference, water levels at the time of the survey, or any combination of the reasons listed.

e) FS-8081 (1981) was to be used for a junctional survey. An adequate junction between the prior and present survey could not be made. A prior survey comparison was then made between the two surveys. A general sounding comparison could not be performed. It was determined during office processing that the prior survey had a possible control problem. It is recommended that FS-8081 (1981) be superseded by the present survey. This will result in some discontinuity between the present survey and the charted data. It is recommended that the Canadians resurvey this area at a larger scale at an appropriate time.

Except as noted above the present survey is adequate to supersede the above prior surveys within the common area.

## 7. COMPARISON WITH CHART 14882 (28th Ed., 2 August 1986)

### a. Hydrography

The charted hydrography originates with the previously discussed prior surveys and sources not readily available. The previously discussed prior surveys require no further consideration. The hydrographer makes an adequate chart comparison in section L. of the Descriptive Report. In addition to the recommendations in the Descriptive Report the following should be noted:



1) AWOIS item #5801, an island, in Latitude 46°04'08"N, Longitude 83°54'30"W, originates with Townsend's Revisory Survey of 1941. The island is not shown on chart 14882 (28th. Ed., 2 August 1986). The island falls within a foul area delineated by the present survey. The island is shown on Chart 14882 (29th. Ed., 10 February 1990) as a shoal area that uncovers at the sounding datum. It is recommended that the area be revised and charted as shown on the present survey.

2) A charted rock awash with a danger curve, in Latitude 46°04'12"N, Longitude 83°54'36"W, originates with prior survey LS-833 (1896). The field unit located an islet baring 5 feet at LWD, in Latitude 46°04'12.96"N, Longitude 83°54'36.62"W. It is recommended that the charted rock awash with a danger curve be deleted and the area charted as shown on present survey.

3) The following charted rocks with danger curves fall within the limits of foul areas delineated by the present survey.

<u>Items</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>
rocks	46°04'01"	83°54'21"
rocks	46°04'38"	83°53'53"
rock	46°04'50"	83°53'45"
rocks	46°03'51"	83°52'44"
rocks	46°04'02"	83°51'03"

It is recommended that the above listed areas be revised and charted as shown on present survey.

4) A charted rock with a danger curve, in Latitude 46°04'45"N, Longitude 83°54'12"W, was located by the present survey as an islet baring 7 feet at LWD, in Latitude 46°04'44.5"N, Longitude 83°54'12.0"W. It is recommended that the charted rock with a danger curve be deleted and the area charted as shown on the present survey.

5) A charted rock with a danger curve, in Latitude 46°03'41.0"N, Longitude 83°51'06.5"W, falls within the limits of a foul area delineated by the present survey. It is recommended that the charted rock with a danger curve be deleted and the area charted as shown on the present survey.

6) Two 9 ft depths are shown on the present survey in Latitude 46°03'09.74"N, Longitude 83°51'48.87"W and Latitude 46°03'12.27"N Longitude 83°51'44.30"W. Present survey surrounding depths are 10 to 18 feet. It is recommended that



the area be charted as shown on present survey.

7) The following uncharted rocks were located by the present survey in the following locations:

<u>LATITUDE (N)</u>	<u>LONGITUDE (W)</u>
46°03'22.77"	83°51'27.51"
46°03'23.68"	83°52'56.36"
46°03'06.71"	83°53'01.80"
46°03'09.25"	83°53'01.11"
46°03'35.41"	83°53'44.91"
46°04'04.67"	83°51'04.25"
46°03'37.67"	83°51'08.64"
46°03'37.44"	83°51'06.47"
46°03'33.57"	83°51'07.19"
46°04'08.32"	83°54'43.26"
46°03'44.52"	83°54'22.84"
46°03'08.08"	83°53'07.72"
46°04'00.70"	83°51'33.17"
46°04'11.74"	83°53'56.49"
46°04'52.97"	83°51'55.97"
46°03'14.82"	83°52'40.09"
46°04'21.44"	83°52'42.71"
46°03'51.47"	83°54'24.71"
46°04'47.46"	83°51'43.57"

It is recommended that the above rocks be charted as shown on the present survey.

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

b. Dangers to Navigation

There were no dangers to navigation submitted by the field unit. During office processing of the present survey four (4) features and/or soundings were determined to be dangers to navigation. Information for inclusion into the Local Notice to Mariners dated, 3 July 1990 was submitted to the Commander, Ninth Coast Guard District, Cleveland, Ohio. A copy of the danger to navigation report letter was forwarded to N/CG222, Chart Information Section, Rockville Maryland and to DMATC NAVINFONET. A correction to the information submitted 3 July 1990 was forwarded in a letter dated 15 May 1991. A copy of the two (2) dangers to navigation are appended in the Descriptive Report.



c. Aids to Navigation


The hydrographer located three (3) fixed and two (2) floating aids to navigation in the survey area. These aids appear adequate to serve their intended purpose.

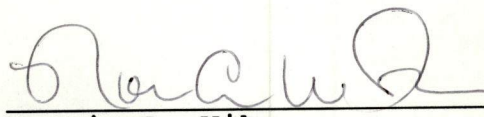
8. COMPLIANCE WITH INSTRUCTIONS

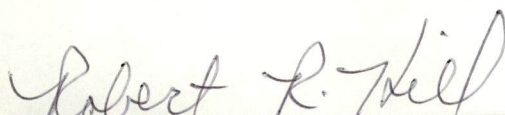
This survey complies with the Project Instructions except as noted in sections 3. and 4. of this report.

9. ADDITIONAL FIELD WORK

This is an adequate basic survey. No additional work is recommended at this time. See also sections 5. and 6. of this report regarding Canadian survey FS-8081 (1981).

  
\_\_\_\_\_  
Reginald L. Keene  
Cartographic Technician  
Verification of Field Data

  
\_\_\_\_\_  
Norris A. Wike  
Cartographer  
Evaluation and Analysis

  
\_\_\_\_\_  
Robert R. Hill  
Senior Cartographic Technician  
Verification Check



APPROVAL SHEET  
H-10309

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 disapproval 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 magnetic tape record for this survey. Final control, position, and sounding printouts of the survey have been made. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Robert G. Roberson

Date: 30 July 1991

Robert G. Roberson  
Chief, Evaluation and Analysis Team  
Atlantic Hydrographic Section

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.

Christopher B. Lawrence

Date: 7-30-91

Christopher B. Lawrence, CDR, NOAA  
Chief, Atlantic Hydrographic Section

\*\*\*\*\*

Final Approval:

Approved: J. Austin Yeager

Date: Aug 14, 1991

J Austin Yeager  
Rear Admiral, NOAA  
Director, Coast and Geodetic Survey







