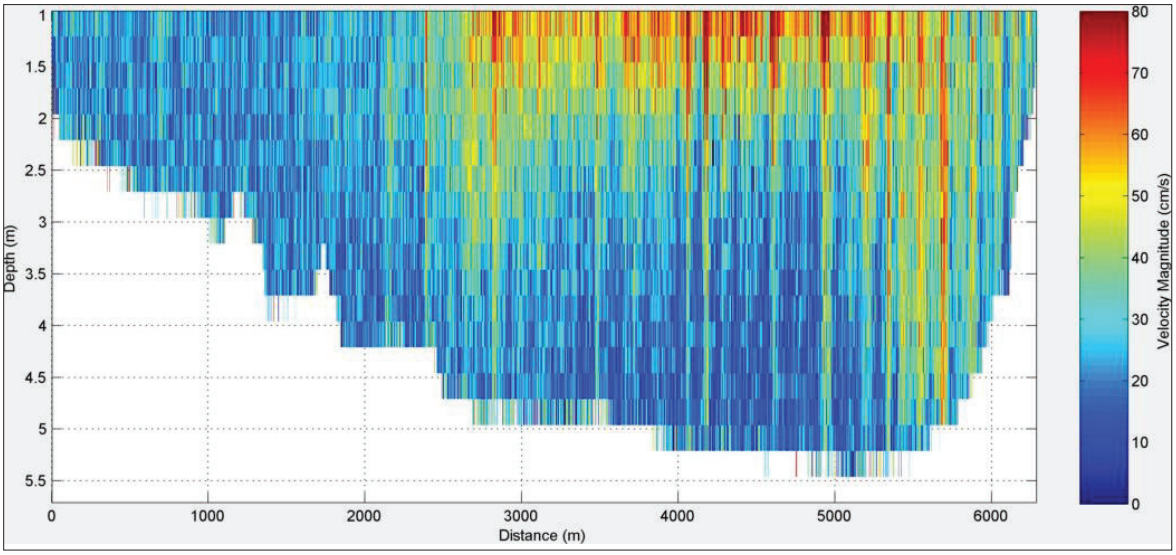
ERDC/Coastal and Hydraulics Laboratory

ERDC/CHL LR-20-2

Dauphin Island Data Collection

Michael T. Ramirez, William C. Butler, and Thad C. Pratt

April 2020



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Final Letter Report

Prepared for U.S. Army Corps of Engineers
Mobile District
109 St. Joseph Street
Mobile, AL 36603

Abstract

In order to assist US Army Corps of Engineers, Mobile District (CESAM), the Engineer Research and Development Center, Coastal and Hydraulics Laboratory (ERDC-CHL) conducted field data collection and analysis to document the wave climatology, water levels, and circulation occurring in the vicinity of Dauphin Island, Alabama and the entrance channel to Mobile Bay, Alabama over a 4 month period. In addition to the circulation data, bathymetry and side scan data for the model initialization were also be collected. This information will be utilized in a study to evaluate the feasibility level alternatives capable of increasing resiliency and sustainability of Dauphin Island, AL. The results of the field data collection and analysis efforts are outlined in this letter report and include full spectra directional wave data, wave height, wave period, wave direction, sea surface elevation, current velocities, roving tidal current measurement current velocities, and bathymetric surveys.

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Preface

The U.S. Army Corps of Engineers (USACE), U.S. Army Engineer Research and Development Center (ERDC), Coastal and Hydraulics Laboratory (CHL), funded by the U.S. Army Corps of Engineers, Mobile District, performed this study.

This report was prepared by Messrs. Michael T. Ramirez, William C. Butler, and Thad C. Pratt, ERDC-CHL (CEERD-HNF), Field Data Collection and Analysis Branch (HNF), Vicksburg, MS. The work described in the report was performed under the general administrative supervision of Mr. William C. Butler, Chief of Field Data Collection and Analysis Branch (CEERD-HNF), and Dr. Jackie S. Pettway, Chief of Navigation Division (CEERD-HN). Dr. Ty V. Wamsley and Mr. Jeff Eckstein were Director and Deputy Director of CHL (CEERD-HZ), respectively, during the study and preparation of the report. Colonel Teresa A. Schlosser was ERDC Commander. Dr. David W. Pittman was ERDC Director.

Sensor Deployment Parameters

Aquadopp	
Latitude	30.242248°
Longitude	-88.212435°
Velocity Profile Interval	300 seconds
Velocity Profile Averaging Interval	60 seconds
Velocity Profile Cell Size	25 cm
Wave Measurement Interval	3600 sec
Wave Measurement Sample Rate	2 Hz
Instrument Frequency	2000 kHz
Instrument Firmware	3.39

AWAC	
Latitude	30.200543°
Longitude	-88.092881°
Velocity Profile Interval	300 seconds
Velocity Profile Averaging Interval	60 seconds
Velocity Profile Cell Size	50 cm
Wave Measurement Interval	3600 sec
Wave Measurement Sample Rate	2 Hz
Instrument Frequency	1000 kHz
Instrument Firmware	3.30 AST

Introduction

The U.S. Army Corps of Engineers (USACE), South Atlantic Division (SAD), Mobile District (SAM) is tasked with leading a multi-agency effort to restore sediment to the Dauphin Island Barrier system (Figure 1).

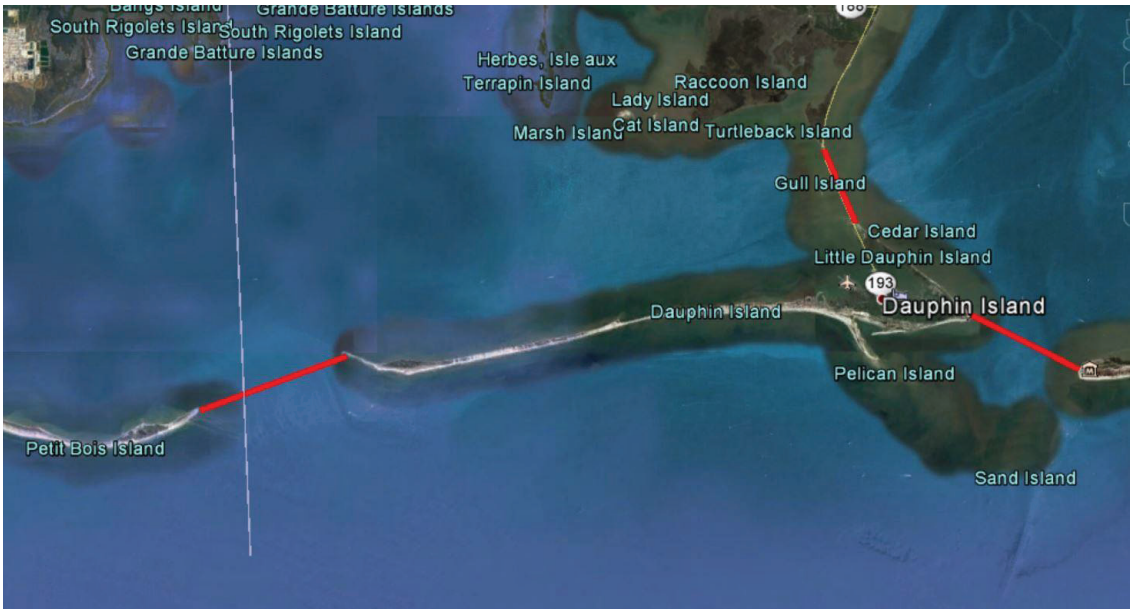

Figure 1. Dauphin Island, AL.

Dauphin Island is a large barrier island providing protection to the Gulf Coast of Alabama. In additional to its wind- and wave-protection of Alabama's coastal resources, it also provides terrestrial and estuarine habitats for important coastal flora and fauna. In addition to land loss due to ongoing barrier island processes, this island is a high risk due to rising sea level and the associated increased magnitude and frequency of coastal storms resulting from climate change.

Purpose

Sponsored by the National Fish and Wildlife Foundation (NFWF) and the State of Alabama, this study was performed by the USACE in conjunction with United States Geological Survey (USGS) to evaluate and quantify the wave and current environment in the vicinity of the precious coastal protection resources of Dauphin Island.

The purpose of the field data collection and analysis efforts is to document the wave climatology, water levels, and circulation occurring in the vicinity of Dauphin Island, Alabama, and the entrance channel to Mobile Bay, Alabama, over a four month period. In addition to the circulation data, bathymetry and side scan data for the model initialization were also collected. The tasks are described as follows:

1. Waves and Currents. Direction wave, currents, and water level data collected by a self-contained system in trawler resistant mounts deployed at two locations north and south of Dauphin Island. In-situ current meters with acoustic profiling with Acoustic Wave and Current profilers (AWAC) capability.
2. Roving Current (Circulation) Measurements. Acoustic Doppler Current Profiler (ADCP) transects collected during daylight hours to get horizontal/vertical profiles for examining water column velocity trends along a single cross-sectional line.
3. Bathymetry Survey. Surveys in depths of 3 to 10 feet range outside of the navigation channel were targeted. Multi-beam data along specified transects were collected.

Sensor Deployment

June 2015

The initial field deployment was on 20 June 2015. One Aquadopp current profiler and one acoustic wave and current profiler (AWAC) were deployed near Dauphin Island, AL. These instruments were configured to record directional wave and current data for 90 days. The Aquadopp configuration was to average 60 seconds of data every 300 seconds for velocity data. Cell size for the velocity profile data was 25 cm. Aquadopp wave measurements were made every one hour for 17 minutes.

August 2015

A second trip to the field area was made in August 2015 to retrieve the instruments. The Aquadopp was retrieved and redeployed in the same location following battery replacement and data download. The AWAC was not located despite repeated attempts using its acoustic pinger device. This instrument was replaced with a second AWAC with the same specifications in the same location. Both instruments used the same configuration parameters for the first and second deployments.

Sensor Deployment Parameters

The sensor deployment parameters for the Aquadopp are provided in Table 1. The sensor deployment parameters for the AWAC are provided in Table 2. Locations for the Aquadopp and AWAC are given in Figure 2.

Table 1: Aquadop Sensor Deployment Parameters.

Aquadopp	
Latitude	30.242248°
Longitude	-88.212435°
Velocity Profile Interval	300 seconds
Velocity Profile Averaging Interval	60 seconds
Velocity Profile Cell Size	25 cm
Wave Measurement Interval	3600 sec
Wave Measurement Sample Rate	2 Hz
Instrument Frequency	2000 kHz
Instrument Firmware	3.39

Table 2: AWAC Sensor Deployment Parameters.

AWAC	
Latitude	30.200543°
Longitude	-88.092881°
Velocity Profile Interval	300 seconds
Velocity Profile Averaging Interval	60 seconds
Velocity Profile Cell Size	50 cm
Wave Measurement Interval	3600 sec
Wave Measurement Sample Rate	2 Hz
Instrument Frequency	1000 kHz
Instrument Firmware	3.30 AST

Figure 2: Map of Aquadopp and AWAC locations.

Post-Processing

All sensor data were processed using Nortek Storm Software to calculate wave height, frequency, and direction statistics. Height statistics include Significant Wave Height (Hm0), calculated as the highest 1/3 of the wave population for each measurement interval, as well as the 10^{th} percentile wave height (H10), and maximum wave height for each measurement interval (Hmax). Wave frequency statistics were calculated from the population of wave periods: the peak period (Tz) and the mean period (Tm02). Wave direction convention is to show the direction from which the waves came. Peak Direction (DirTp) is the direction of the largest waves from each population. Directional Spread (SprTp) is the uncertainty in wave direction. Mean Direction (MeanDir) is the mean of the wave population.

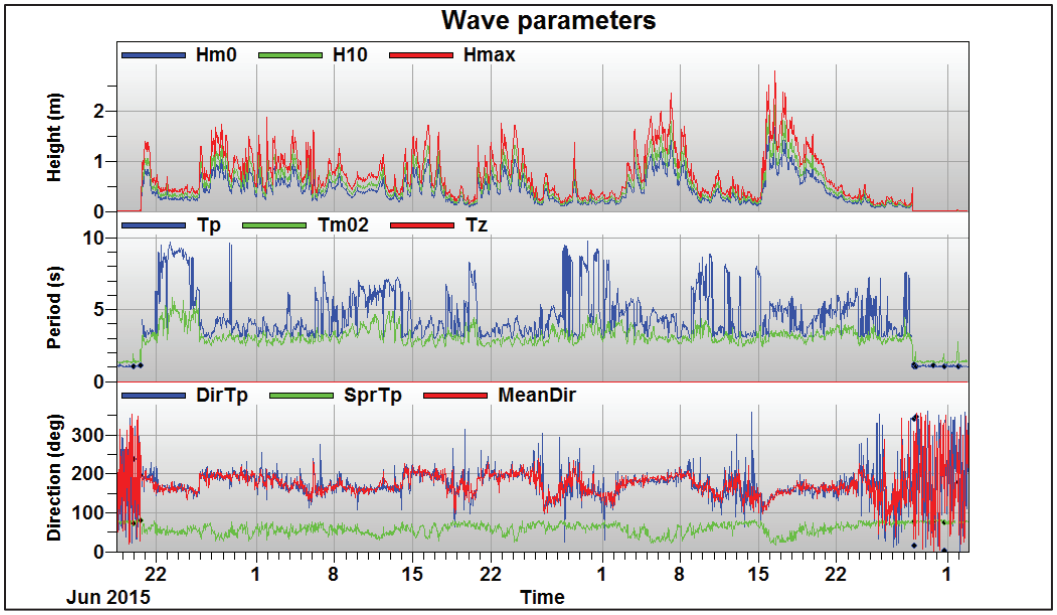

Figure 3. Wave statistics time series from the June-August 2015 Aquadopp deployment.

ADCP Survey

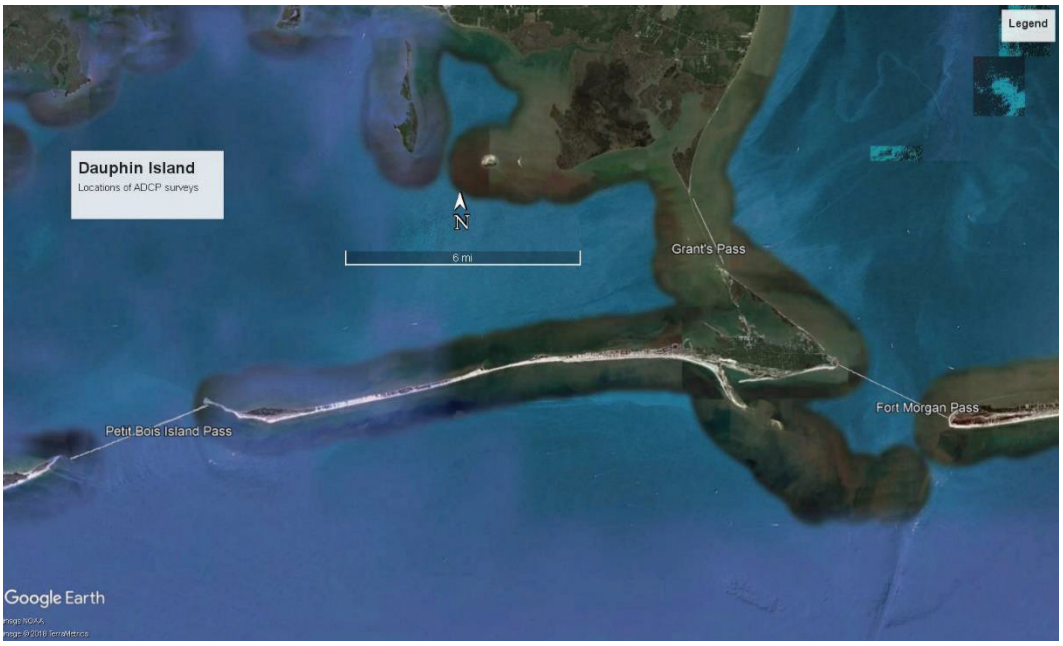

Figure 4: Map of passes surveyed by ADCP in August and December 2015.

ADCP surveys were conducted in the three passes surrounding Dauphin Island at this time. The accompanying data files are organized by the name of the vessel that performed each survey, with R/V *Clara Jean* surveying Petit Bois Island Pass, R/V *Curtis* surveying Grant's Pass, and R/V *T. Waller* surveying Fort Morgan Pass. These passes were surveyed repeatedly for 13 hours to capture the ebb half of the tidal cycle. A cross section of velocity magnitude at Petit Bois Island Pass (both as depth-averaged velocity vectors, and cross-sectional colormaps) is included below. All three vessels were equipped with Teledyne RDI Workhorse Rio Grande 1200 kHz ADCP instruments and Trimble DGPS systems for navigation and positioning data.

ADCP Transect Coordinates

The transect coordinates for the ADCP locations, identified by Petit Bois Pass West, Petit Bois Pass East, Grant's Pass North, Grant's Pass South, Fort Morgan Pass West, and Fort Morgan Pass East, are given in Table 3.

Table 3: ADCP Transect Coordinates.

Petit Bois Pass West	Latitude: 30.211723° Longitude: -88.401419°
Petit Bois Pass East	Latitude: 30.231420° Longitude: -88.343694°
Grant's Pass North	Latitude: 30.308463° Longitude: -88.137010°
Grant's Pass South	Latitude: 30.284146° Longitude: -88.123139°
Fort Morgan Pass West	Latitude: 30.246115° Longitude: -88.074206°
Fort Morgan Pass East	Latitude: 30.227063° Longitude: -88.028851°

ADCP Measurements

The velocity magnitudes through Petit Bois Island Pass at 5 different times on 26 August 2015 are given in Figure 5, Figure 6, Figure 7, Figure 8, Figure 9, Figure 10, Figure 11, Figure 12, and Figure 13. Figures 5-8 show the velocity magnitudes through the area as velocity vectors with length of each vector signifying the magnitudes of the velocity. Figures 9-13 show velocity magnitudes over the width and depth of the transects.

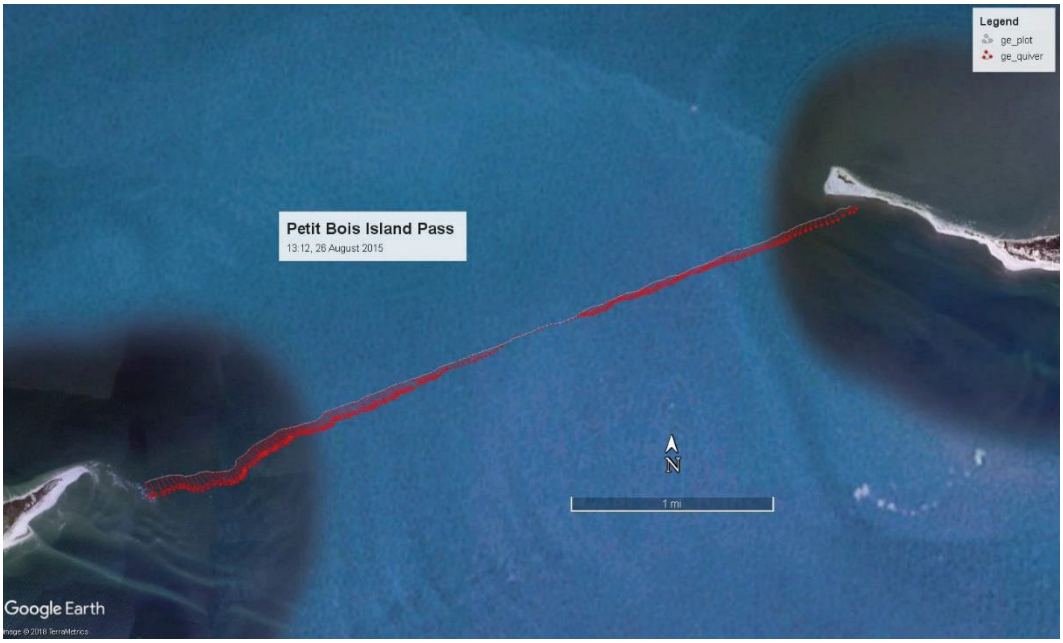

Figure 5. Velocity magnitude through Petit Bois Island Pass at 13:12 UTC, 26 August 2015.

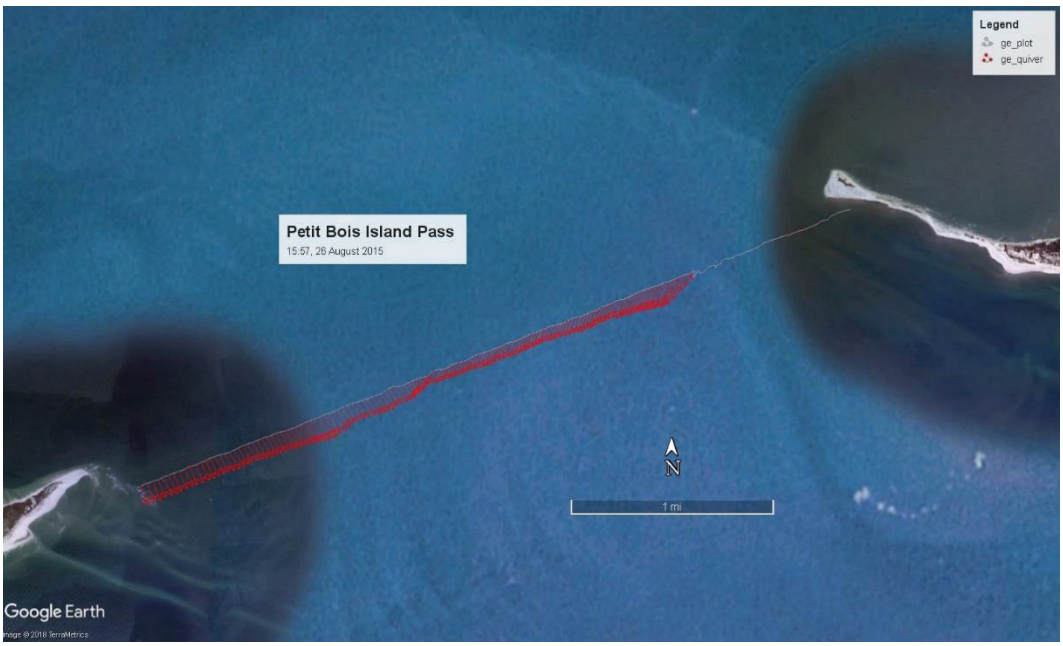

Figure 6. Velocity magnitude through Petit Bois Island Pass at 15:57 UTC, 26 August 2015.

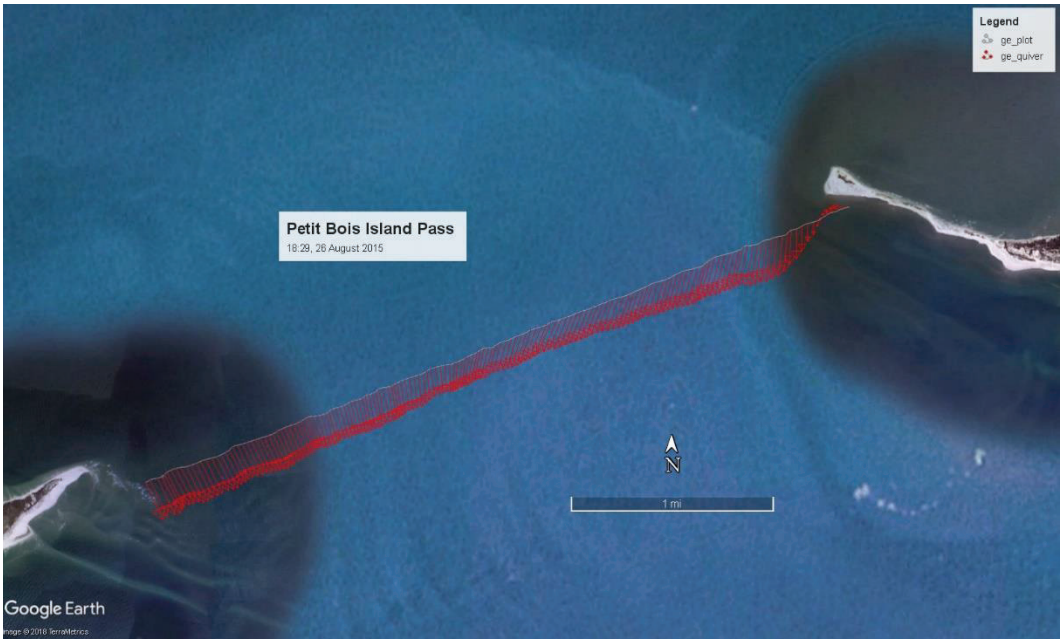

Figure 7. Velocity magnitude through Petit Bois Island Pass at 18:29 UTC, 26 August 2015.

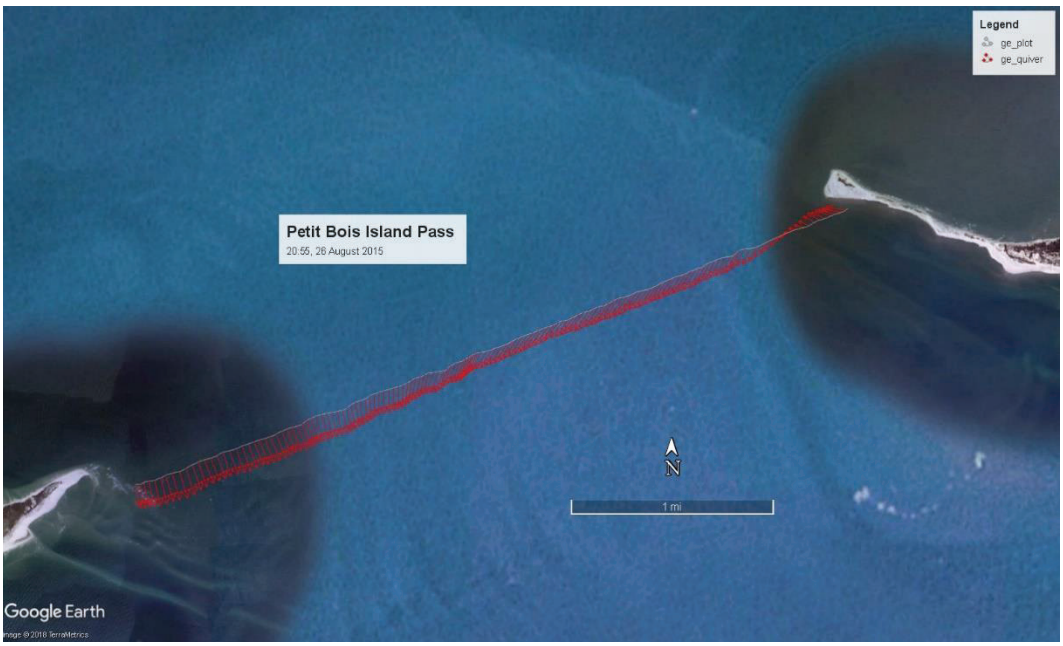

Figure 8. Velocity magnitude through Petit Bois Island Pass at 20:55 UTC, 26 August 2015.

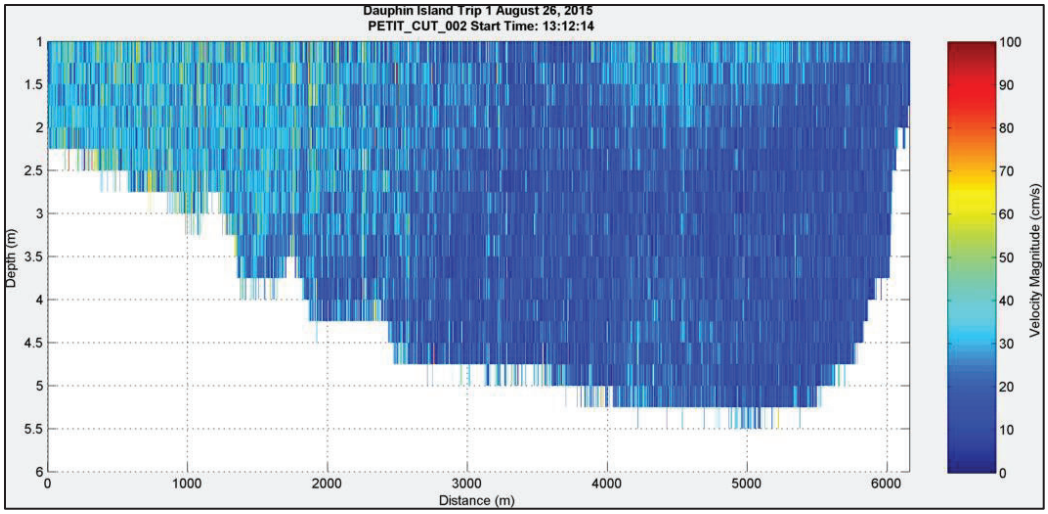

Figure 9. Velocity magnitude through Petit Bois Island Pass at 13:12 UTC, 26 August 2015.

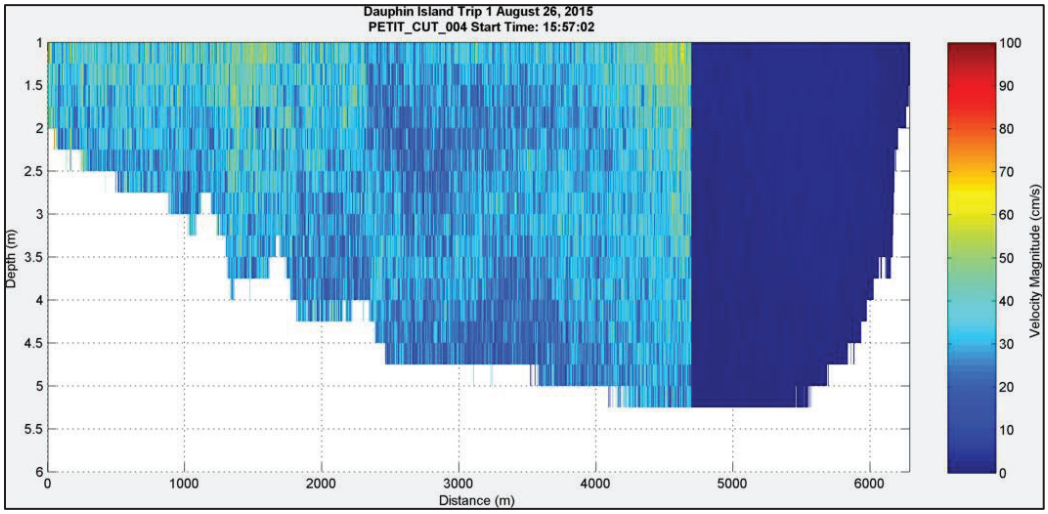

Figure 10. Velocity magnitude through Petit Bois Island Pass at 15:57 UTC, 26 August 2015. The blue area at the eastern end of the transect is an artefact of a temporary GPD data dropout.

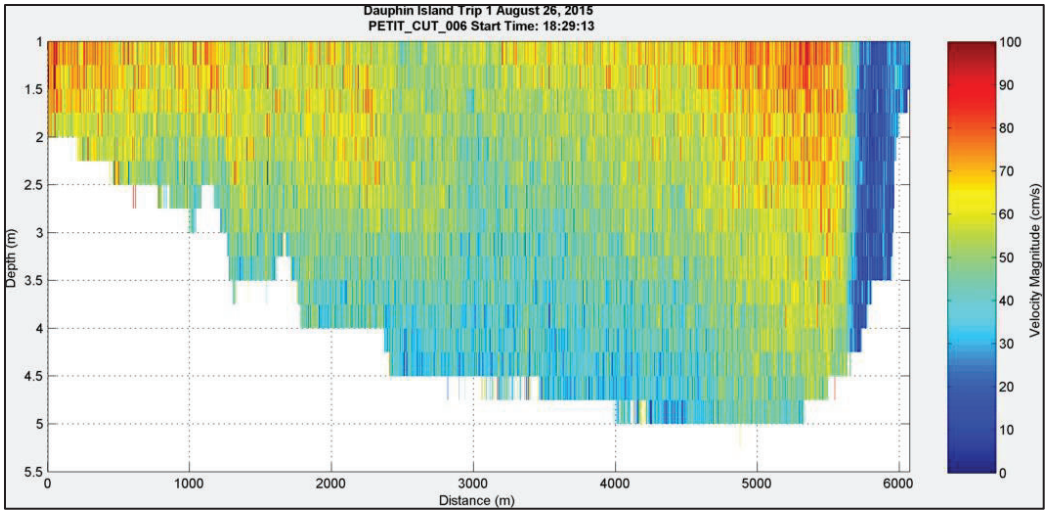

Figure 11. Velocity magnitude through Petit Bois Island Pass at 18:29 UTC, 26 August 2015.

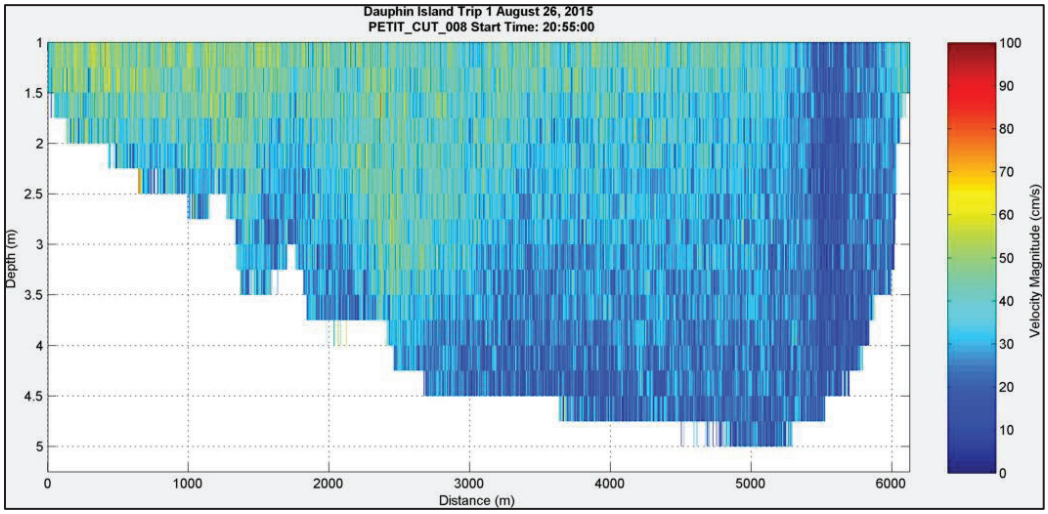

Figure 12. Velocity magnitude through Petit Bois Island Pass at 20:55 UTC, 26 August 2015.

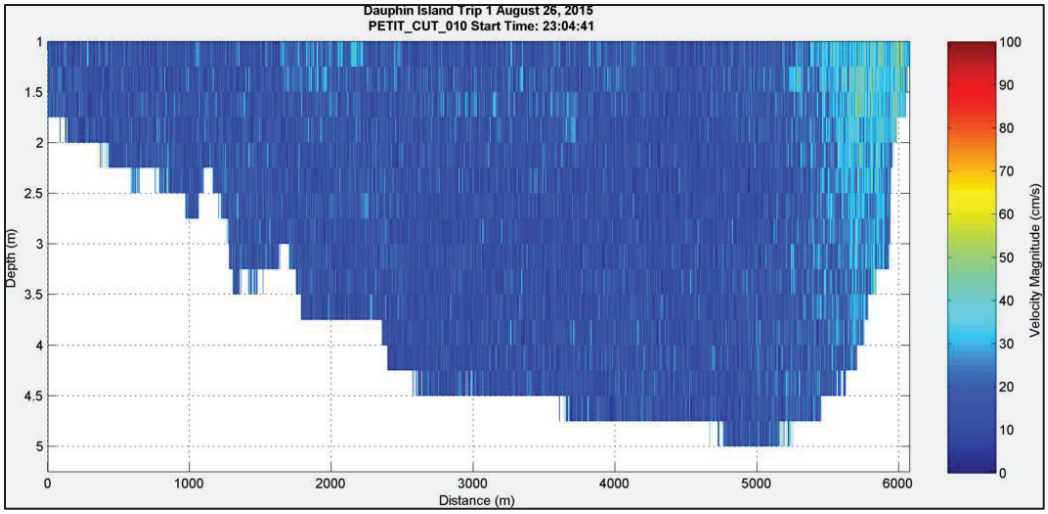

Figure 13. Velocity magnitude through Petit Bois Island Pass at 23:04 UTC, 26 August, 2015.

Multi-beam Survey

The purpose for this data collection effort was to perform a multi-beam bathymetric survey of a designated area around Dauphin Island. The sites of bathymetric surveys were at the Petit Bois Pass area, the sound side of Dauphin Island, and the Pelican Bay area utilizing multi-beam capability to identify the existing characteristics and conditions. Field operations began on August 26th, 2015, and ended on September 04, 2015. These operations utilized a 25' Safeboat vessel. All data was processed and compiled into a final digital format for delivery to be housed under the USGS Sandbox. The data collection methods used for this project were in conformance with EM 1110-2-1003. Figure 14 shows the multi-beam survey swaths.

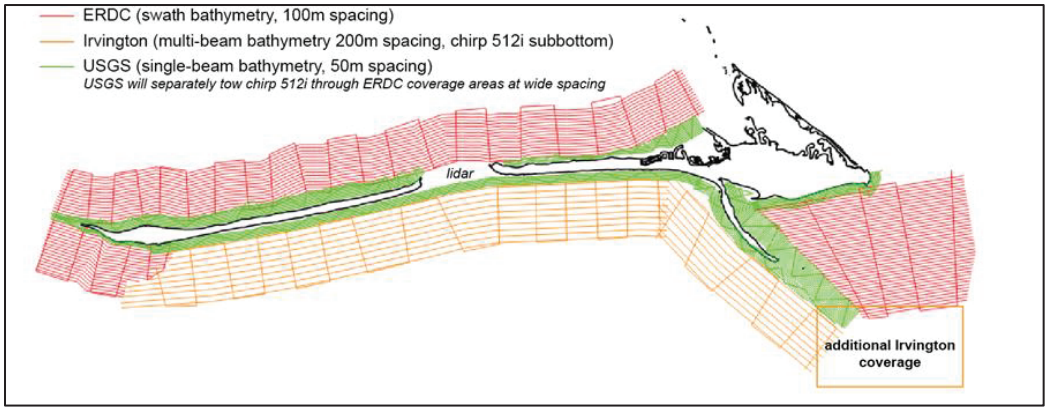

Figure 14: Multi-beam Survey Swaths.

Horizontal and Vertical Datum

The horizontal datum for the surveys was the UTM Zone 16 projection, in the WGS84 horizontal datum. The surveys were performed using Differential Global Positioning System (DGPS) and Real Time Kinematic (RTK) equipment. The differential correction signal broadcast from the Continuous Operating Reference Stations (CORS) was used to provide DGPS positions. RTK corrections were received in real time from a base station occupying different NGS monuments along the survey area. The vertical datum for the area was the North American Vertical Datum of 1988 (NAVD88) (Geoid12B). The horizontal and vertical unit of measure used was meter. These projections and datums are outlined in the bathymetric metadata files.

Survey monuments used:

Tidal BM 873 5180 B TIDAL Lat: 30°14’58.82004” N Long: 088°04’33.67684” W Ellip Ht: -25.176m Ortho Ht: 2.517m (Geoid12B)	TBM Iron Rod House Lat: 30°15'04.93565" N Long: 88°08'03.84617" W Ellip Ht: -26.916 Ortho Ht: 0.799m (Geoid12B)	WDAU 2015 Lat: 30°14'58.43136" N Long: 88°11'30.32748" W Ellip Ht: -26.212 Ortho Ht: 1.506m (Geoid12B)

Hydrographic Survey Operations

Prior to the start of the hydrographic survey, areas to be surveyed were pre-established and used to create “matrix files” in HYPACK. These matrix files were then uploaded to the survey vessel computer and were used to navigate the survey vessel.

A “Hydrographic Survey Log” was prepared for each day’s survey operation. This log was used to record the progress of the survey. Items recorded in this log include: calibration check data; line numbers run; time of survey of each line; computer data file identification; description of conditions that may affect the progress or quality of the survey.

Hydrographic Survey Operations Continued

After the survey was completed, the data files were checked and edited. The editing process was performed by use of HYPACK software. The purpose of the manual editing process is to remove extraneous and erroneous data typical of hydrographic surveys such as “spikes” in the horizontal position and depth measuring systems. After editing, the survey data points were thinned via averaging to the appropriate scale or grid distance desired. After editing and thinning, ASCII text files or .XYZ files were created.

Calibration Procedures

The echo sounder (GeoSwath Plus) was calibrated at the start and end of each workday by the use of a "speed of sound" probe (Castaway) operated in the deepest part of the survey area.

An Applanix POSMV 320 was used for roll, pitch, yaw, and heave compensation. It uses an internal program to adjust for its mounting angles and for logging raw observables at 100 Hz for post-processing. The program was run all day of each workday. These corrections were applied to the multi-beam data in post-processing.

The vertical (Tide) was checked at the start and end of each workday either at the Dauphin Island, AL - Station ID: 8735180 or at the TBM IR location at a rental house.

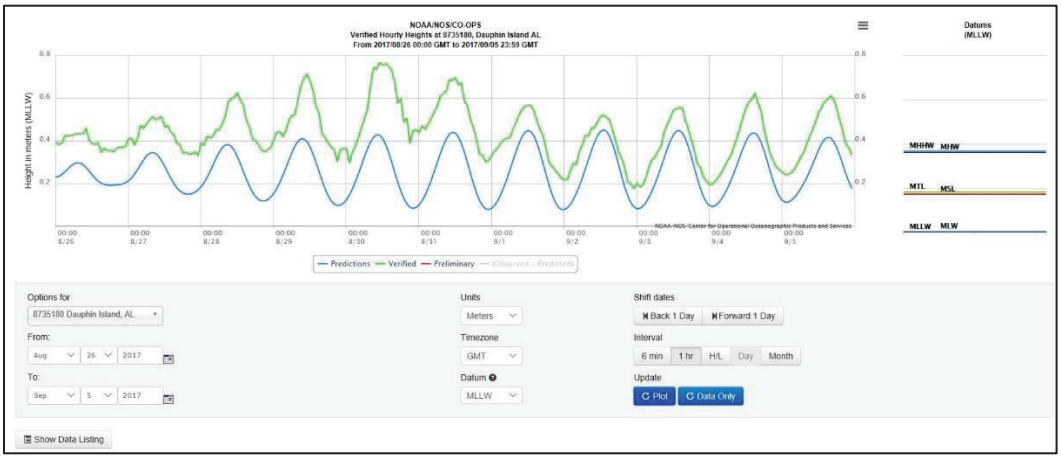

Figure 15: Vertical Tide at Start of Day.

Figure 16: Vertical Tide at End of Day.

Hydrographic Survey Equipment

Survey Vessel

A 25 foot Safeboat vessel with twin 225hp outboard engines was used for multi-beam collection.

Navigation and Positioning System

The integration of positioning equipment and specialized computer software permits “real-time” navigation capabilities. The Safeboat survey vessel was navigated and positioned by use of an Applanix POSMV 320. The Applanix POSMV 320 is a high-performance GPS/IMU with radio beacon DGPS and RTK capability to achieve centimeter accuracy. A Trimble R8 with Trimble Access was used to collect single point water surface data.

Echosounder

A GeoAcoustics GeoSwath Plus 250kHz system was used to collect bathymetric data in shallow (less than 100m) water. The GeoAcoustics GeoSwath Plus offers very efficient simultaneous swath bathymetry and side scan seabed mapping with accuracies that have been shown to exceed the IHO Standards for Hydrographic Surveys. The applied phase measuring bathymetric sonar technology provides data coverage of up to 12 times the water depth, giving greater survey efficiency in shallow water environments than traditional multi-beam echosounders.

Heave Compensator

Applanix POSMV 320 measures the heave, pitch, and roll of the survey vessel for data corrections.

Bathymetric Survey Areas

Figure 17 outlines the bathymetric survey areas for the August 26, 2015 - September 4, 2015 data collection efforts.

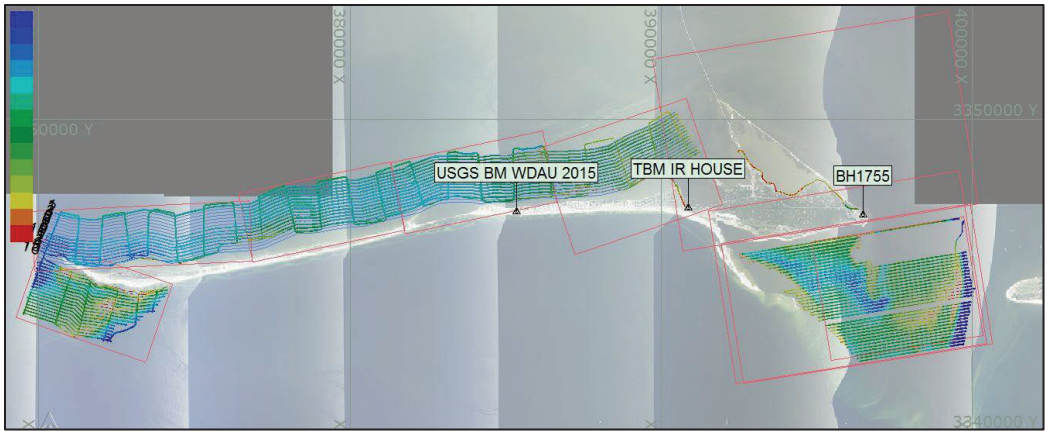

Figure 17: Survey Collection Dates - August 26, 2015 - September 4, 2015.

November 2015

Sensor Retrieval

A trip was made to the study area November 20, 2015, to retrieve the deployed sensors. The AWAC instrument was successfully retrieved, but the Aquadopp was not located. Figure 18 gives the wave statistics time series from the August-November 2015 AWAC deployment. Noisy data at the beginning and end of the time series are from the instrument recording out of the water during deployment and retrieval.

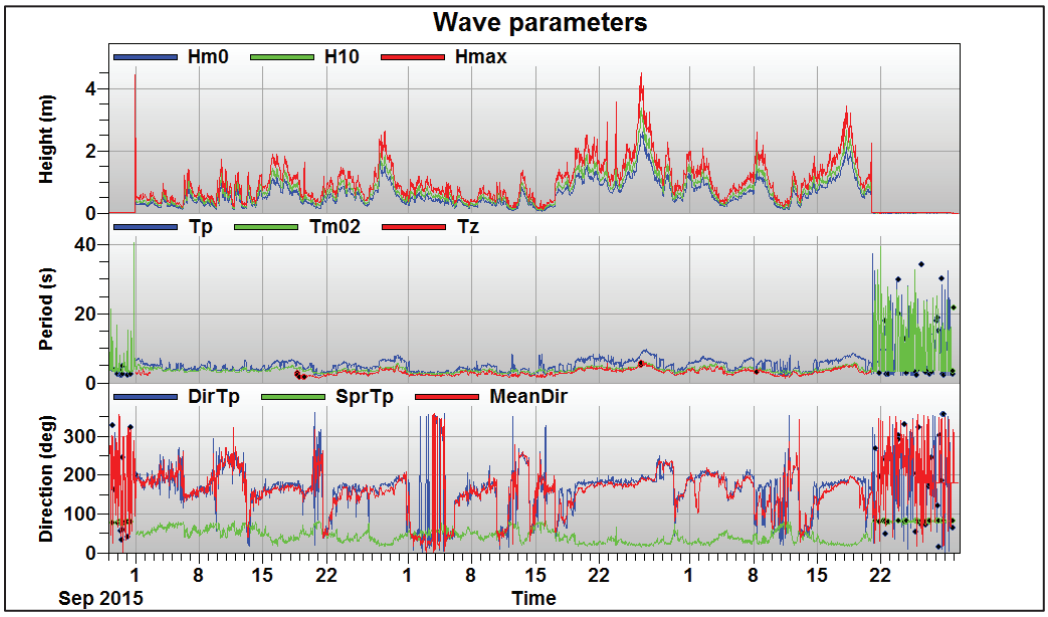

Figure 18. Wave statistics time series from the August-November 2015 AWAC deployment. Noisy data at the beginning and end of the time series are from the instrument recording out of the water during deployment and retrieval.

December 2015

ADCP Survey

A return trip was made in December 2015 to complete the ADCP survey of the passes during a flood tide cycle. The same three research vessels were used for these surveys, and the data are organized by vessel name. Select velocity magnitudes through the Petit Bois Island Pass is included in Figure 19, Figure 20, Figure 21, Figure 22, and Figure 23.

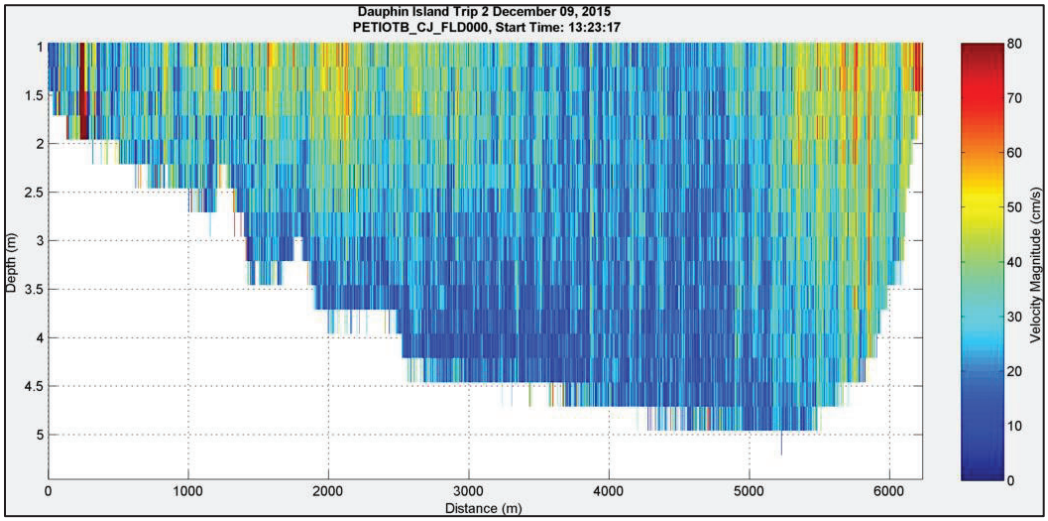

Figure 19. Velocity magnitude through Petit Bois Island Pass at 13:23 UTC, 9 December, 2015.

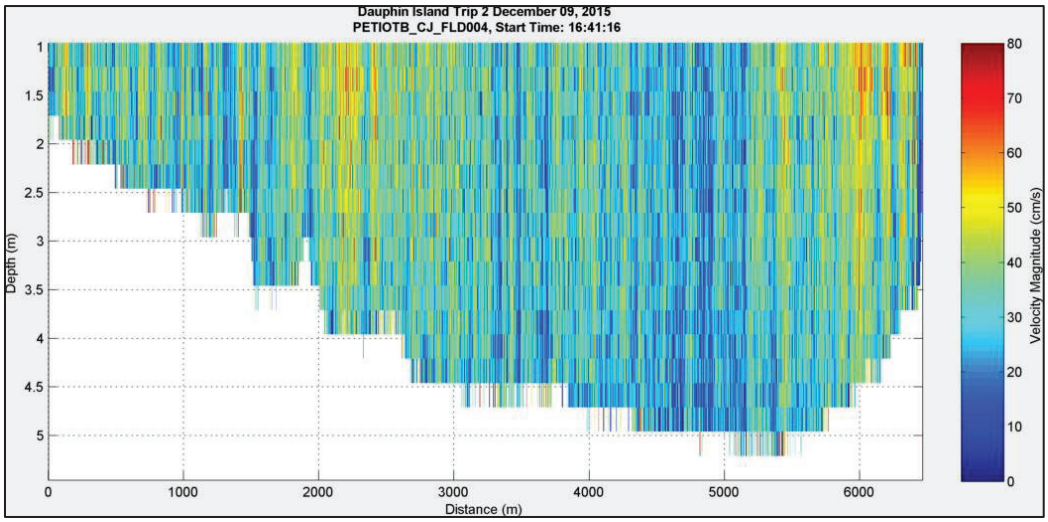

Figure 20. Velocity magnitude through Petit Bois Island Pass at 16:41 UTC, 9 December, 2015.

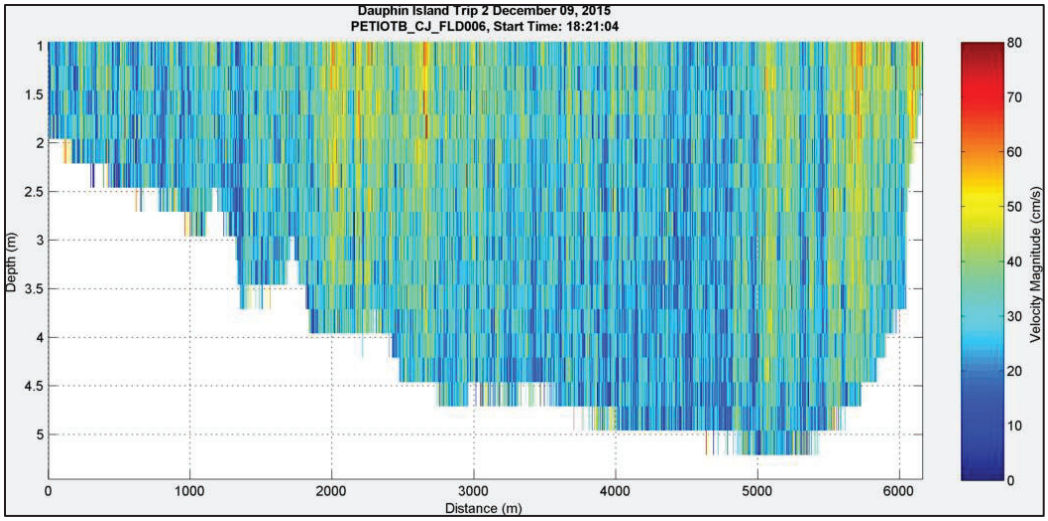

Figure 21. Velocity magnitude through Petit Bois Island Pass at 18:21 UTC, 9 December, 2015.

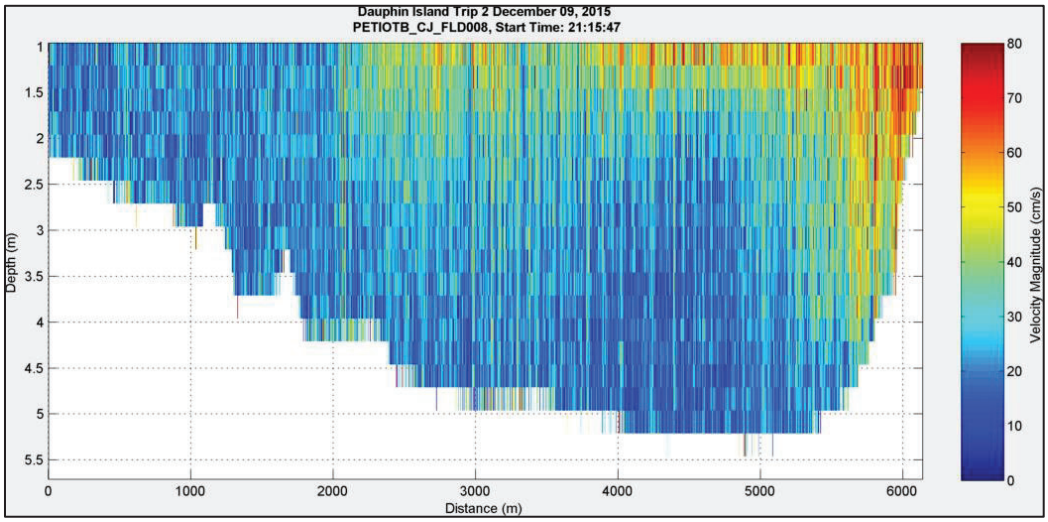

Figure 22. Velocity magnitude through Petit Bois Island Pass at 21:15 UTC, 9 December, 2015.

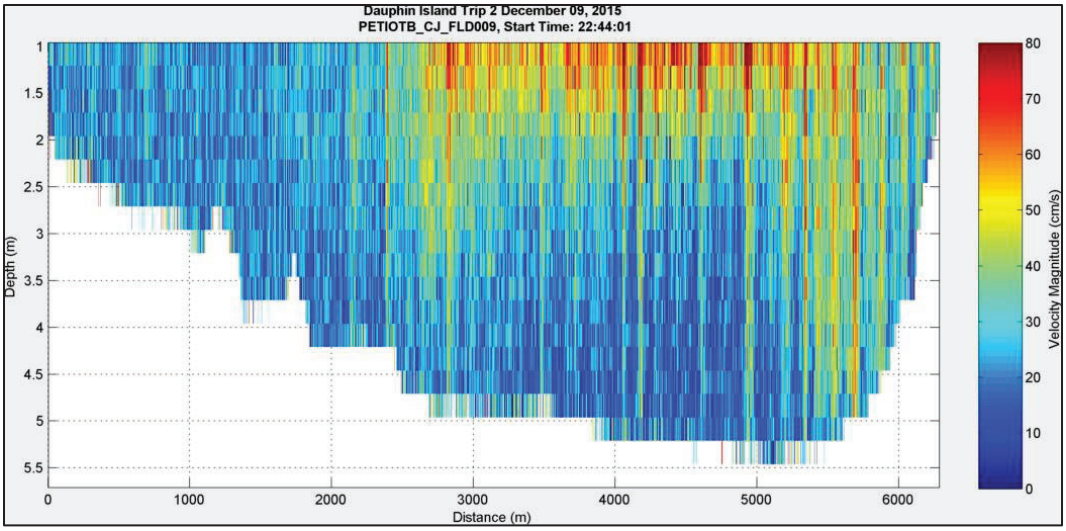

Figure 23. Velocity magnitude through Petit Bois Island Pass at 22:44 UTC, 9 December, 2015.

ADCP Files

The files for ADCP raw, exported ASCII, and cross-sectional velocity magnitude plots are organized into directories, based on file type (e.g. binary, ASCII, plot), trip number (Trip 1 in August 2015, and Trip 2 in December 2015), and vessel name (*Clara Jean* surveyed Petit Bois Island Pass, *Curtis* Surveyed Grant's Pass, and *Waller* surveyed Fort Morgan Pass). Additionally, the ADCP data are shown in the attached "Dauphin Island 2015.kmz" file.

Date	Time	Pass	Vessel	Files
27 August 2015	13:12:14	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\ClaraJean\PETIT_CUT_002r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\ClaraJean\PETIT_CUT_002_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\ClaraJean\PETIT_CUT_002_vmag.jpg
27 August 2015	14:37:25	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\ClaraJean\PETIT_CUT_003r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\ClaraJean\PETIT_CUT_003_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\ClaraJean\PETIT_CUT_003_vmag.jpg
27 August 2015	15:57:04	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\ClaraJean\PETIT_CUT_004r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\ClaraJean\PETIT_CUT_004_ASC.TXT

Date	Time	Pass	Vessel	Files
				Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\ClaraJean\PETIT_CUT_004_vmag.jpg
27 August 2015	17:17:48	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\ClaraJean\PETIT_CUT_005r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\ClaraJean\PETIT_CUT_005_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\ClaraJean\PETIT_CUT_005_vmag.jpg
27 August 2015	18:29:15	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\ClaraJean\PETIT_CUT_006r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\ClaraJean\PETIT_CUT_006_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\ClaraJean\Trip1_PETIT_CUT_006_vmag.jpg
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27 August 2015	20:55:02	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\ClaraJean\PETIT_CUT_008r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\ClaraJean\PETIT_CUT_008_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\ClaraJean\Trip1_PETIT_CUT_008_vmag.jpg
27 August 2015	21:59:28	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\ClaraJean\PETIT_CUT_009r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\ClaraJean\PETIT_CUT_009_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\ClaraJean\Trip1_PETIT_CUT_009_vmag.jpg
27 August 2015	23:04:43	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\ClaraJean\PETIT_CUT_010r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\ClaraJean\PETIT_CUT_010_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\ClaraJean\Trip1_PETIT_CUT_010_vmag.jpg
27 August 2015	12:01:29	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\Curtis\DI_BRIDGE_007r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\Curtis\DI_BRIDGE_007_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\Curtis\Trip1_DI_BRIDGE_007_vmag.jpg

Date	Time	Pass	Vessel	Files
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27 August 2015	16:00:13	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\Curtis\DI_BRIDGE_011r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\Curtis\DI_BRIDGE_011_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\Curtis\Trip1_DI_BRIDGE_011_vmag.jpg
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27 August 2015	18:00:47	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\Curtis\DI_BRIDGE_013r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\Curtis\DI_BRIDGE_013_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\Curtis\Trip1_DI_BRIDGE_013_vmag.jpg
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Date	Time	Pass	Vessel	Files
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27 August 2015	22:00:50	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\Curtis\DI_BRIDGE_017r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\Curtis\DI_BRIDGE_017_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\Curtis\Trip1_DI_BRIDGE_017_vmag.jpg
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27 August 2015	13:25:24	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\Waller\DI_TWALLER_008r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\Waller\DI_TWALLER_008_ASC.TXT

Date	Time	Pass	Vessel	Files
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27 August 2015	20:04:44	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\Waller\DI_TWALLER_016r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\Waller\DI_TWALLER_016_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\Waller\Trip1_DI_TWALLER_016_vmag.jpg
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27 August 2015	21:52:17	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\Waller\DI_TWALLER_018r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\Waller\DI_TWALLER_018_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\Waller\Trip1_DI_TWALLER_018_vmag.jpg
27 August 2015	22:49:29	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 1\Waller\DI_TWALLER_019r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 1\Waller\DI_TWALLER_019_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 1\Waller\Trip1_DI_TWALLER_019_vmag.jpg

Date	Time	Pass	Vessel	Files
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9 December 2015	14:52:26	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\ClaraJean\PETIOTB_CJ_FLD001r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\ClaraJean\ PETIOTB_CJ_FLD001_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\ClaraJean\Trip2_ PETIOTB_CJ_FLD001_vmag.jpg
9 December 2015	16:41:18	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\ClaraJean\PETIOTB_CJ_FLD004r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\ClaraJean\ PETIOTB_CJ_FLD004_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\ClaraJean\Trip2_ PETIOTB_CJ_FLD004_vmag.jpg
9 December 2015	18:21:07	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\ClaraJean\PETIOTB_CJ_FLD006r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\ClaraJean\ PETIOTB_CJ_FLD006_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\ClaraJean\Trip2_ PETIOTB_CJ_FLD006_vmag.jpg
9 December 2015	19:40:13	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\ClaraJean\PETIOTB_CJ_FLD007r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\ClaraJean\ PETIOTB_CJ_FLD007_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\ClaraJean\Trip2_ PETIOTB_CJ_FLD007_vmag.jpg
9 December 2015	21:15:49	Petit Bois Island Pass	*Clara Jean*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\ClaraJean\PETIOTB_CJ_FLD008r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\ClaraJean\ PETIOTB_CJ_FLD008_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\ClaraJean\Trip2_ PETIOTB_CJ_FLD008_vmag.jpg

Date	Time	Pass	Vessel	Files
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9 December 2015	13:59:53	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD001r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD001_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD001_vmag.jpg
9 December 2015	15:00:17	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD002r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD002_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD002_vmag.jpg
9 December 2015	16:01:13	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD003r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD003_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD003_vmag.jpg
9 December 2015	17:08:30	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD004r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD004_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD004_vmag.jpg
9 December 2015	18:01:50	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD005r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD005_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD005_vmag.jpg
9 December 2015	18:59:15	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD006r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD006_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD006_vmag.jpg

Date	Time	Pass	Vessel	Files
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9 December 2015	21:01:18	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD008r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD008_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD008_vmag.jpg
9 December 2015	21:59:33	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD009r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD009_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD009_vmag.jpg
9 December 2015	22:56:25	Grant's Pass	*Curtis*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Curtis\DI_CURTIS_FLD010r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Curtis\ DI_CURTIS_FLD010_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Curtis\Trip2_ DI_CURTIS_FLD010_vmag.jpg
9 December 2015	13:01:59	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_000r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_000_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_000_vmag.jpg
9 December 2015	14:08:22	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_002r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_002_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_002_vmag.jpg
9 December 2015	15:01:55	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_003r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_003_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_003_vmag.jpg

Date	Time	Pass	Vessel	Files
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9 December 2015	17:03:42	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_006r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_006_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_006_vmag.jpg
9 December 2015	18:00:05	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_007r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_007_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_007_vmag.jpg
9 December 2015	19:00:04	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_008r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_008_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_008_vmag.jpg
9 December 2015	20:01:19	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_009r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_009_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_009_vmag.jpg
9 December 2015	21:00:05	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_010r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_010_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_010_vmag.jpg
9 December 2015	21:53:24	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_012r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_012_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_012_vmag.jpg

Date	Time	Pass	Vessel	Files
9 December 2015	22:53:34	Fort Morgan Pass	*Waller*	Raw: Dauphin Island 2015 Data and Plots\Binary Files\Trip 2\Waller\DI_TWALLER_013r.000 ASCII: Dauphin Island 2015 Data and Plots\ASCII Files\Trip 2\Waller\ DI_TWALLER_013_ASC.TXT Plots: Dauphin Island 2015 Data and Plots\Velocity Magnitude Plots\Trip 2\Waller\Trip2_ DI_TWALLER_013_vmag.jpg

Conclusions

In support of the USACE Mobile District, ERDC-CHL conducted field data collection and analysis to document the wave climatology, water levels, and circulation occurring in the vicinity of Dauphin Island, Alabama, and the entrance channel to Mobile Bay, Alabama, over a four month period. In addition to the circulation data, bathymetry and side scan data for the model initialization were also collected. This information will be utilized in a study to evaluate the feasibility level alternatives capable of increasing resiliency and sustainability of Dauphin Island, AL.

The field data collection and analysis efforts include full spectra directional wave data, wave height, wave period, wave direction, sea surface elevation, current velocities, roving tidal current measurement current velocities, and bathymetric survey. The results of those field data collection and analysis efforts are provided in this Letter Report.