

NUECES BAY CIRCULATION ASSESSMENT USING TILT CURRENT METERS

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PURSUANT TO SENATE BILL 1 AS APPROVED BY THE 83RD TEXAS LEGISLATURE, THIS STUDY REPORT WAS FUNDED FOR THE PURPOSE OF STUDYING ENVIRONMENTAL FLOW NEEDS FOR TEXAS RIVERS AND ESTUARIES AS PART OF THE ADAPTIVE MANAGEMENT PHASE OF THE SENATE BILL 3 PROCESS FOR ENVIRONMENTAL FLOWS ESTABLISHED BY THE 80TH TEXAS LEGISLATURE. THE VIEWS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE AUTHOR(S) AND DO NOT NECESSARILY REFLECT THE VIEWS OF THE TEXAS WATER DEVELOPMENT BOARD.

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1.0.0 PROJECT OVERVIEW

The purpose of this project was to collect water circulation data in Nueces Bay in order to assess circulation patterns in the area and provide the baseline data needed to determine how freshwater inflows are moving within the bay. Specifically, this project consisted of:

1. Deployment of an array of 10 tilt current meters covering Nueces Bay from SALT01 west to the Nueces Delta, the lower portion of the Nueces River, and the mouth of Rincon Bayou
2. Quality control of all collected circulation data
3. Generation of data summaries and visualization tools

There is great interest in how freshwater input patterns affect the Nueces Estuary. When combined with water quality and biological monitoring data, circulation data may provide important additional insights into how freshwater inflows influence the ecology in different areas of the system. Current pattern data gathered in Nueces Bay will also be valuable for both the validation of existing circulation models for the bay, such as the Texas Water Development Board's TxBLEND model, and for the development of future circulation models for the bay.

Over 1 year of continuous circulation monitoring data was collected in Nueces Bay from June 29, 2016 to September 3, 2017 using tilt current meters. Tilt meters are novel in that their low cost allows multiple instruments to be deployed in an array so that spatially synoptic data can be gathered. They also lack external moving parts, which makes them less susceptible to data loss from fouling than mechanical flow meters.

An array of 10 tilt meters was deployed over the back end of Nueces Bay from SALT01 west to the Nueces Delta. Meters were also placed at the Nueces River mouth and at the entrance to Rincon Bayou from Nueces Bay to assess water exchange between the main inflow connections and the bay.

The tilt meters were retrieved roughly every two weeks to remove fouling and offload data. Raw data from the meters was manually processed and subjected to quality control procedures. The final results include baseline data for water circulation patterns in upper Nueces Bay and visual representations of current movements at the monitoring stations under various conditions (wind, tide, freshwater inflow events).

2.0.0 BACKGROUND

2.1.0 Study area

Nueces Bay is the uppermost bay within the Nueces Estuary, which consists of consists of Nueces Bay, the Nueces River, Oso Bay, Oso Creek, and Corpus Christi Bay (Figure XX). Mustang Island and North Padre Island limit water exchange between the Nueces Estuary and the Gulf of Mexico to two passes: Aransas Pass near the northeast corner of Corpus Christi Bay and Packery Channel near the southwest corner of Corpus Christi Bay. Several smaller passes on Mustang Island linking Corpus Christi Bay to the Gulf of Mexico (Newport Pass, Corpus Christi Pass, and Fish Pass) are primarily closed. In addition to the limited connectivity of Nueces Estuary to the Gulf of Mexico, Nueces Bay's secondary status to Corpus Christi Bay and its shallow depth (~0.5 m average) result in notable tidal attenuation in the bay, such that the semidiurnal component observed in other parts of the system is filtered out and only diurnal tides are observed.

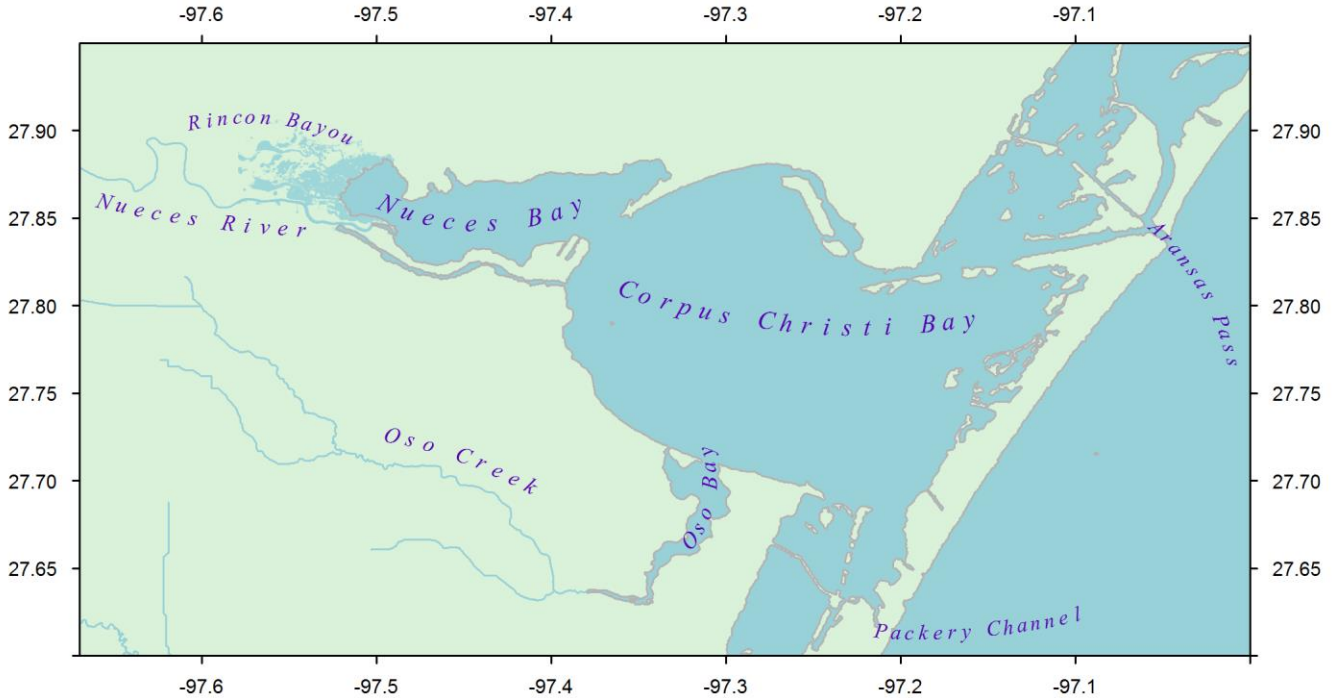


Figure XX Map of the Nueces Estuary.

Nueces Bay receives freshwater inputs from the mouth of the Nueces River on its southwest shore and exchanges water with the Nueces delta along its western shore. The Nueces delta receives freshwater input via overbanking of the Nueces River into Rincon Bayou during flood events. A channel constructed between the river and Rincon Bayou just south of Calallen is intended to improve freshwater inflow to the Nueces delta. River flow to the Nueces Estuary is impacted by two large reservoirs in the Nueces River Basin, Choke Canyon on the Frio River and Lake Corpus Christi on the Nueces River.

2.2.0 Tilt current meters

OkeanoLog SeaHorse tilt current meters consist of a buoyant 2.5 cm diameter PVC rod with a HOBOTM Pendant G Data Logger fixed to the top and a 4 cm flexible tether to moor the meter at the bottom. These tilt current meters are well adapted for use in shallow estuaries. Their relatively low cost allows for the deployment of multiple meters in different locations, and internal data storage allows them to be deployed for extended periods of time. They also lack external moving parts, which makes them less susceptible to data loss from fouling than mechanical flow meters. Data collected during side-by-side field deployments of tilt meters and acoustic Doppler current meters have shown very good agreement between the two instruments despite their vast difference in complexity (unpublished data).



Figure XX Pre-deployment photograph of a tilt current meter attached to its tether and a close-up of the HOBOTM pendant underneath the cap on top of the meter.

The waterproof pendant at the top of each meter contains a three-axis accelerometer that measures acceleration in gravitations along an x-, y-, and z-axis. These measurements indicate how much the instrument is leaning as it is pushed by the current. The pendant is equipped with 64K bytes of memory and can log at various rates ranging from multiple times per second to once every 18.2 hours. The amount of time it takes for the pendant memory to fill depends on the logging rate. Data is read from the pendant via an optical USB connection, which allows for data offload without the need to break the waterproof seal. An adapter can transfer data directly from the pendant to a computer, or data can be read out onto the HOBOTM Waterproof Shuttle and later transferred to a computer. The raw data files are in .hobo format and must be offloaded, opened, and saved using HOBOWare Pro software.

OkeanoLog provides its own software for converting the acceleration values offloaded from the instruments to North and East velocity vectors. The software runs in Python, must be calibrated for the region in which the meters will be deployed, and requires configuration files for the model number and serial number of each tilt meter it will be converting data from.

Documents that include detailed descriptions and instructions for using the tilt meters, HOBO pendants, and OkeanoLog conversion software are included in the Documentation and Data Package submitted with this report (see Appendix A).

3.0.0 METHODS

3.1.0 Monitoring stations

Potential monitoring stations at which to deploy current meters were scouted on June 17, 2016 to assess their depth and whether any structures were nearby that might affect flow measurements. It was necessary for selected monitoring stations to have a water depth of at least 50 cm during low tide to accommodate the tilt meters and for them to be relatively clear of any reefs or sandbars that might obstruct flow.

A total of 10 monitoring station locations were selected in the upper Nueces Bay. Stations were assigned names consisting of “NB” appended with a number 1-10 in roughly a counter-clockwise pattern starting at the mouth of the river (Figure XX). Station NB-01 was therefore located at the mouth of the Nueces River. Station NB-08 was located at the entrance to lower Rincon Bayou adjacent to the City of Corpus Christi’s SALT08 salinity monitoring station, and NB-10 was located at the entrance to the channel leading to the US Army Corps of Engineers Nueces Delta Mitigation Project site and South Lake. The other 7 stations were distributed within the bay in areas relatively clear of reefs or other obstructions. NB-03 and NB-10 were deepest on average, each with a mean measured depth of 1.8 m, and NB-9 was the shallowest station, with a mean depth of 1.1 m (Table XX).

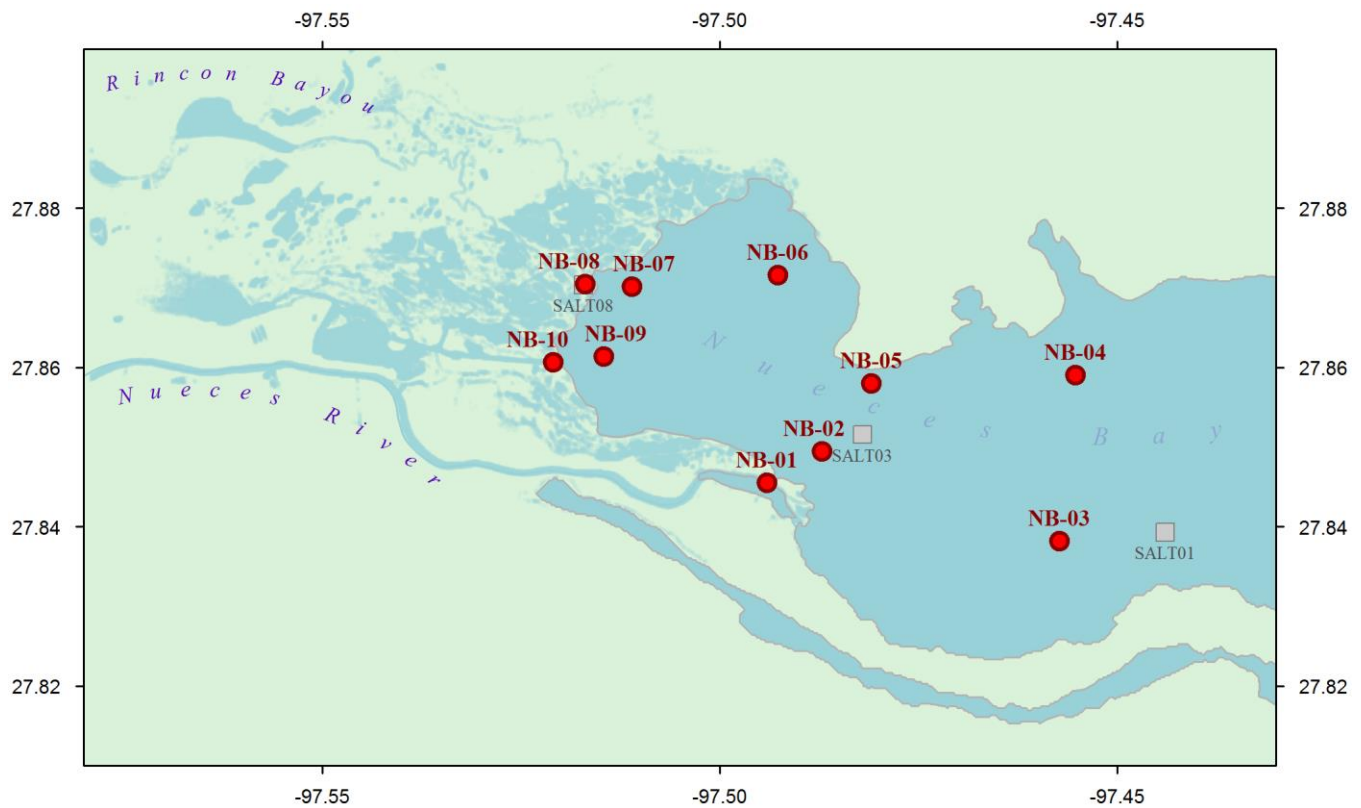


Figure XX Map of final current monitoring stations in Nueces Bay (red points), as well as the locations of City of Corpus Christi Salinity Monitoring stations SALT01, SALT03, and SALT08 (gray squares).

Table XX Brief location description and average longitude, latitude, and depth of each tilt meter station.

Station	Longitude	Latitude	Depth (m)	Description
NB-01	-97.49399	27.84553	1.6	just inside mouth of Nueces River
NB-02	-97.48705	27.84947	1.6	600 meters NE of Nueces River mouth
NB-03	-97.45725	27.83821	1.8	southeastern-most station, approximately mid-bay
NB-04	-97.45521	27.85901	1.7	northeastern-most station, approximately mid-bay
NB-05	-97.48090	27.85798	1.2	parallel station ~1.1 km NE of NB-02
NB-06	-97.49267	27.87157	1.3	northern portion of upper bay
NB-07	-97.51099	27.87014	1.2	500 meters E of Rincon Bayou exchange channel
NB-08	-97.51688	27.87050	1.7	adjacent to SALT08 salinity monitoring station within Rincon Bayou exchange channel
NB-09	-97.51452	27.86135	1.1	eastern-most portion of upper bay
NB-10	-97.52086	27.86067	1.8	at entrance to channel leading to Nueces Delta Mitigation Project site and South Lake

3.2.0 Deployment and retrieval

Tilt meter models vary in length. The depths of the final monitoring stations selected determined the lengths of the tilt meters that could be placed at them. The tilt meters used in this study were 50, 25, and 10 cm long (Table XX). The 50 cm long meters were ballasted models for use in areas with currents $<30 \text{ cm s}^{-1}$.

Table XX Details for individual meters deployed during this study, including which stations they were deployed at and their status at the end of the study.

Owner	Purchase date	Model	Serial number	Length (cm)	Station	Final status	Notes
NERR	2012-02-09	SH1p50	10113974	50	NB-02	functional	attacked by shark 2013-08-27; LOGGER SWITCHED TO SH1p25 METER 2017-07-13
NERR	2012-02-09	SH1p50b15	10113973	50	NB-03	damaged	offload fail 2017-09-22; able to connect after battery replacement; some corrosion visible
NERR	2014-01-17	SH1p50b15	10094433	50	NB-03	functional	offload fail 2017-02-08; able to connect after battery replacement
NERR	2012-02-09	SH1p50b15	10113981	50	NB-04	functional	offload fail on 2016-10-20; able to connect after battery replacement; data values bad
NERR	2012-02-09	SH1p50b15	10113984	50	NB-04	functional	
NERR	2015-04-01	SH1p50b15	10331913	50	NB-10	functional	

TWDB	2016-06-03	SH2p25	10094428	25	NB-09 NB-10	damaged	offload fail 2017-09-22; able to connect after cleaning & battery replacement; forced offload; circuit board corroded
TWDB	2016-06-03	SH2p25	10495331	25	NB-08	damaged	offload fail 2016-11-10; unable to connect after cleaning & battery replacement; no visible corrosion
TWDB	2016-06-03	SH2p25	10505035	25	NB-01	missing	lost 2017-02-01 Nueces Bay deployment; hit by boat
TWDB	2016-06-03	SH2p25	10114006	25	NB-08	functional	
TWDB	2016-06-03	SH2p25	10424545	25	NB-01	functional	
TWDB	2016-06-03	SH2p25	10505030	25	NB-02	damaged	offload fail 2017-06-15; pendant dead; replaced with 10113974 from SH1p50 meter 2017-07-13
TWDB	2016-06-03	SHB10	9801562	10	NB-09	missing	lost during 2017-03-20 Nueces Bay deployment
TWDB	2016-06-03	SHB10	9801564	10	NB-05 NB-06	missing	lost during 2016-11-10 Nueces Bay deployment
TWDB	2016-06-03	SHB10	9953411	10	NB-05	missing	lost during 2016-09-09 Nueces Bay deployment
TWDB	2016-06-03	SHB10	9953412	10	NB-05 NB-06	damaged	plastic rod on bottom of meter for tubing connection broken
TWDB	2016-06-03	SHB10	9953388	10	NB-07	functional	
TWDB	2016-06-03	SHB10	9953395	10	NB-06 NB-07	functional	

Prior to deployment, the data loggers on the tilt meters were set to record acceleration and angular displacement in 3 axes once every two minutes. In the field, the tethers at the base of the meters were attached to 1 m long, 2.5 cm (1 inch) diameter PVC stakes (Figure XX), and a pole extendable to 2.5 m was used to drive the stakes into the sediment from the boat. After setting each stake, a weight attached to the stake with a 9 m long polypropylene rope was dropped as far away from the meter as possible, and the locations of both the meter and the weight were marked as waypoints on a handheld GPS unit. This deployment technique allowed for meter recovery without the need for surface markers, which tend to attract unwanted attention from boaters and fishermen.



Figure XX Pre-deployment photograph of the tilt meter deployment assembly consisting of the meter tethered to a PVC stake and a weight attached to the stake with a polypropylene rope.

The meters were retrieved roughly once every 2-4 weeks (2 weeks during warmer seasons, 4 weeks during cooler seasons) to offload data and check for fouling. A grappling hook was used to snag the rope strung between the meter and the weight at each station, and the rope was used to pull the stake loose from the sediment and bring the meter to the surface. A HOBOWaterproof Shuttle was used to offload data from the loggers in the field and reset them for immediate redeployment after the removal of any fouling. Instruments that were damaged or missing were replaced if extra tilt meters were available.

Scans of the field datasheets that were used to record the serial numbers of the instruments deployed at each station, the station depths at the time of deployment, fouling extent and type on recovered instruments, and other deployment/retrieval notes are included in the Documentation and Data Package submitted with this report (see Appendix A). All field metadata were transferred to a csv file included in the Documentation and Data Package and are also given in Appendix B.

All offloaded data were backed up to a hard drive upon return to the lab.

3.3.0 Data processing

3.3.1 Raw data files

Data files were offloaded from the waterproof shuttle using Onset Computer Corporation HOBOWare® Pro 3.7.4 software and saved as text files. Data in the text files were examined using R statistical software (R Core Team 2015), data values logged while the instrument was out of the water at the beginning and end of each deployment were trimmed from the time-series, and the data were re-saved in files named with the deployment ID, station number, and meter serial number (e.g., NERR-20170320_NB-04_SN10113984.txt). The raw .hobo files, raw .txt files, and trimmed .txt files are included in the

Raw_Hobo_Files_Nueces, Raw_Text_Files_Nueces, and Formatted_Text_Files_Nueces folders of the Documentation and Data Package.

3.3.2 Tilt to velocity conversion

The trimmed text files were run through custom OkeanoLog Python (Python Software Foundation 2015) scripts to convert the acceleration and tilt data to north and east velocity vectors. For conversion, each meter requires a calibration file specific to the model number, as well as a calibration file specific to the instrument serial number. The model calibration files were provided by OkeanoLog. For the serial number calibration files, instrument-specific 0 and 1 g offsets and 0 velocity offsets were estimated by examining the extreme values of all data recorded by each logger and by taking the median values of near-0 x- and y-axis readings during deployment, respectively. All calibration files, Python scripts, trimmed raw text files, and converted text files are included in the Python_Seahorse_HOBO folder of the Documentation and Data Package.

3.3.3 Fouling effects and direction adjustments

R was used to examine the converted data to determine approximate dates at which fouling noticeably began to affect the velocity readings (most visually apparent in cumulative sum plots of current speed over time) and to calculate any direction alignment adjustments that needed to be made for each meter on each deployment. Although an effort was made to always align the y-axis of the logger on each meter to North, it was difficult to be exact with orientation when deploying the instruments. Misalignment could result from several factors, including slight rotation of the meters on their tethers, slight rotation of the mooring stake within the deployment tube while the stake was being pushed into the sediment, and rotation of the mooring stake if too much tension was applied to the attached rope when the weight at the other end was being strung out.

To calculate direction adjustments, the recorded direction data were aligned with water level data from the NOAA monitoring station 8775296 at the USS Lexington in Corpus Christi Bay (<https://tidesandcurrents.noaa.gov/stationhome.html?id=8775296>). The water level data for this station are well-correlated with the water depth data taken at the SALT salinity monitoring stations within Nueces Bay (with the SALT station water depths lagging the Lexington water levels by ~1.5-2 hours), and the Lexington time-series is more complete. Tilt meter current directions were divided into 15 degree bins and the number of measurements in each bin aligned with the highest and the lowest daily water level quantiles were tallied. The number of degrees each dataset needed to be rotated to align with the overall median high and low water level directions for each station was then calculated. Direction adjustment estimates were done for each station except NB-06, where current speeds were generally too low to get reliable direction readings.

The direction adjustment and fouling begin date for each data file, along with other information such as temporal coverage, were recorded in the TiltMeter_Metadata_DataFiles.csv file included in the Documentation and Data Package. Most of the information in the metadata file is also included in

[Appendix C](#). Plots depicting the water level-based direction corrections made for each station on each deployment are included in [Appendix D](#).

4.0.0 DATA SUMMARY

4.1.0 Temporal coverage

Sampling occurred from June 29, 2016 to September 3, 2017. Damage and loss of some instruments caused data gaps for various periods at some stations (Table XX).

Table 4-1 The serial number of the meter logging at each station during each deployment. Serial numbers are only listed if a data file was successfully retrieved from the meter at the end of the deployment.

	Deployment_ID	NB.01	NB.02	NB.03	NB.04	NB.05	NB.06	NB.07	NB.08	NB.09	NB.10
1	NERR-20160629	10505035	10505030	10094433	10113981	9953411	9801564	9953395	10495331	9801562	10094428
2	NERR-20160714	10505035	10505030	10094433	10113981	9953411	9801564	9953395	10495331	9801562	10094428
3	NERR-20160802	10505035	10505030	10094433	10113981	9953411	9801564	9953395	10495331	9801562	10094428
4	NERR-20160825	10505035	10505030	10094433	10113981	9953411	9801564	9953395	10495331	9801562	10094428
5	NERR-20160909	10505035	10505030	10094433	10113981	NA	9801564	9953395	10495331	9801562	10094428
6	NERR-20160928	10505035	10505030	10094433	NA	9953412	9801564	9953395	10495331	9801562	NA
7	NERR-20161020	10505035	10505030	10094433	10113984	9953412	9801564	9953395	NA	9801562	10094428
8	NERR-20161110	10505035	10505030	10094433	10113984	NA	NA	9953395	10114006	9801562	10094428
9	NERR-20161201	10505035	10505030	10094433	10113984	9801564	9953412	9953395	10114006	9801562	10094428
10	NERR-20161213	10505035	10505030	10094433	NA	NA	NA	9953388	10114006	9801562	10094428
11	NERR-20170111	NA	NA	10094433	10113984	9801564	9953395	9953388	10114006	NA	10094428
12	NERR-20170201	NA	10505030	NA	10113984	9801564	9953395	9953388	10114006	9801562	10094428
13	NERR-20170303	10424545	10505030	10113973	10113984	9801564	9953395	9953388	10114006	9801562	10094428
14	NERR-20170320	10424545	10505030	10113973	10113984	9801564	9953395	9953388	10114006	NA	NA
15	NERR-20170406	10424545	10505030	10113973	10113984	9801564	9953395	9953388	10114006	NA	10094428
16	NERR-20170424	10424545	10505030	10113973	10113984	9801564	9953395	9953388	10114006	NA	NA
17	NERR-20170511	10424545	10505030	10113973	10113984	9801564	9953395	9953388	10114006	10094428	NA
18	NERR-20170530	10424545	NA	10113973	NA	NA	NA	9953388	10114006	10094428	10331913
19	NERR-20170615	10424545	NA	10113973	10113984	9801564	9953395	9953388	10114006	10094428	10331913
20	NERR-20170628	10424545	NA	10113973	10113984	9801564	9953395	9953388	10114006	10094428	10331913
21	NERR-20170713	10424545	10113974	10113973	10113984	9801564	9953395	9953388	10114006	10094428	10331913
22	NERR-20170726	10424545	10113974	10113973	10113984	9801564	9953395	9953388	10114006	10094428	10331913
23	NERR-20170804	10424545	10113974	10113973	10113984	9801564	9953395	9953388	10114006	10094428	10331913

4.4.0 Patterns

Velocity data were smoothed using a 1 hour running average prior to analysis. All analyses described below were done in R.

Average current patterns under different environmental conditions were determined.

Animations of the data were generated to help visualize spatial and temporal patterns of flow among the stations.

5.0.0 CONCLUSIONS

6.0.0 FUTURE DIRECTIONS

REFERENCES

APPENDIX A: DOCUMENTATION AND DATA

The following is the README file content for the documentation and data package submitted with this report. It depicts the structure of the package and contains descriptions of the included folders and files.

APPENDIX B: FIELD METADATA

The following table shows the content of the **Tilt_Meter_Metadata_Deployments.csv** file included in the Documentation and Data Package submitted with this report. Fouling index is a scale ranging from 0 for no fouling to 4 for 100% instrument coverage. The Data file names are the names of the raw .txt files converted from the .hobo files offloaded from the HOBO® Waterproof Shuttle. These raw .txt files can be found in the Raw_Text_Files_Nueces folder of the Documentation and Data Package.

Deployment ID	Date deployed	Time deployed (gmt)	Station	Meter sn	Lat	Lon	Depth (m)	Notes deployment	Date retrieved	Fouling index	Fouling type	Notes retrieval	Data file
NERR-20160629	2016-06-29	15:31:59	NB-01	10505035	27.846	-97.494	1.6	first project deployment	2016-07-14	0	slight brown slime	NA	NERR-SN10505035.txt
NERR-20160629	2016-06-29	15:17:58	NB-02	10505030	27.849	-97.487	1.5	first project deployment	2016-07-14	0	NA	NA	NERR-SN10505030.txt
NERR-20160629	2016-06-29	17:10:16	NB-03	10094433	27.838	-97.457	1.75	first project deployment	2016-07-14	0	NA	NA	NERR_SN10094433.txt
NERR-20160629	2016-06-29	16:57:16	NB-04	10113981	27.859	-97.455	1.6	first project deployment	2016-07-14	0	NA	NA	NERR_SN10113981.txt
NERR-20160629	2016-06-29	16:42:20	NB-05	9953411	27.858	-97.481	0.9	first project deployment	2016-07-14	0	NA	NA	NERR-SN9953411.txt
NERR-20160629	2016-06-29	16:30:36	NB-06	9801564	27.871	-97.493	1.2	first project deployment	2016-07-14	0	NA	NA	NERR-SN9801564.txt
NERR-20160629	2016-06-29	16:09:47	NB-07	9953395	27.87	-97.511	1.1	first project deployment	2016-07-14	0	NA	NA	NERR-SN9953395.txt
NERR-20160629	2016-06-29	16:19:20	NB-08	10495331	27.87	-97.517	1.6	first project deployment	2016-07-14	0	NA	NA	NERR-SN10495331.txt
NERR-20160629	2016-06-29	15:51:14	NB-09	9801562	27.861	-97.515	1	first project deployment	2016-07-14	0	NA	NA	NERR-SN9801562.txt
NERR-20160629	2016-06-29	15:59:23	NB-10	10094428	27.861	-97.521	2	first project deployment	2016-07-14	0	NA	NA	NERR-SN10094428.txt
NERR-20160714	2016-07-14	15:07:47	NB-01	10505035	27.845	-97.494	1.7	NA	2016-08-02	2	med barnacles	NA	NERR-SN10505035 (2).txt
NERR-20160714	2016-07-14	14:47:20	NB-02	10505030	27.849	-97.487	1.55	NA	2016-08-02	1.5	med barnacles	NA	NERR-SN10505030 (2).txt
NERR-20160714	2016-07-14	14:12:07	NB-03	10094433	27.838	-97.457	1.7	NA	2016-08-02	1	med barnacles	NA	NERR_SN10094433 (2).txt
NERR-20160714	2016-07-14	16:47:17	NB-04	10113981	27.859	-97.455	1.7	NA	2016-08-02	0	NA	NA	NERR_SN10113981 (2).txt
NERR-20160714	2016-07-14	16:36:46	NB-05	9953411	27.858	-97.481	1.2	NA	2016-08-02	0.5	barnacles	NA	NERR-SN9953411 (2).txt
NERR-20160714	2016-07-14	16:27:40	NB-06	9801564	27.871	-97.493	1.3	NA	2016-08-02	0.5	barnacles	NA	NERR-SN9801564 (2).txt
NERR-20160714	2016-07-14	16:16:50	NB-07	9953395	27.87	-97.511	1.2	NA	2016-08-02	0.5	barnacles	NA	NERR-SN9953395 (2).txt
NERR-20160714	2016-07-14	16:04:39	NB-08	10495331	27.87	-97.517	2.2	NA	2016-08-02	0.5	barnacles and algae	NA	NERR-SN10495331 (2).txt
NERR-20160714	2016-07-14	15:27:58	NB-09	9801562	27.861	-97.515	1.1	meter ripped off top of tether; reattached	2016-08-02	0.5	barnacles	NA	NERR-SN9801562 (2).txt
NERR-20160714	2016-07-14	15:44:25	NB-10	10094428	27.861	-97.521	2	NA	2016-08-02	0.5	barnacles and algae	NA	NERR-SN10094428 (2).txt
NERR-20160802	2016-08-02	14:47:25	NB-01	10505035	27.845	-97.494	1.35	NA	2016-08-25	2	med barnacles	NA	NERR-SN10505035 (3).txt
NERR-20160802	2016-08-02	14:37:05	NB-02	10505030	27.849	-97.487	1.6	NA	2016-08-25	3.5	med barnacles	NA	NERR-SN10505030 (3).txt
NERR-20160802	2016-08-02	14:14:53	NB-03	10094433	27.838	-97.457	1.7	NA	2016-08-25	3.5	med barnacles	NA	NERR_SN10094433 (3).txt
NERR-20160802	2016-08-02	16:35:53	NB-04	10113981	27.859	-97.455	1.6	NA	2016-08-25	0	some medium barnacles	NA	NERR_SN10113981 (3).txt
NERR-20160802	2016-08-02	16:23:52	NB-05	9953411	27.858	-97.481	1.2	NA	2016-08-25	0	couple med barnacles	NA	NERR-SN9953411 (3).txt
NERR-20160802	2016-08-02	16:13:56	NB-06	9801564	27.871	-97.493	1.3	NA	2016-08-25	2	med barnacles	NA	NERR-SN9801564 (3).txt
NERR-20160802	2016-08-02	16:02:42	NB-07	9953395	27.87	-97.511	1.2	NA	2016-08-25	1	med barnacles	NA	NERR-SN9953395 (3).txt
NERR-20160802	2016-08-02	15:54:08	NB-08	10495331	27.87	-97.517	2	strong incoming tidal current	2016-08-25	0.5	few medium barnacles	NA	NERR-SN10495331 (3).txt

NERR-20160802	2016-08-02	15:08:21	NB-09	9801562	27.861	-97.515	1.1	NA	2016-08-25	2	med barnacles	NA	NERR-SN9801562 (3).txt
NERR-20160802	2016-08-02	15:37:41	NB-10	10094428	27.861	-97.521	2.2	NA	2016-08-25	0.5	med barnacles	NA	NERR-SN10094428 (3).txt
NERR-20160825	2016-08-25	14:47:29	NB-01	10505035	27.846	-97.494	1.5	NA	2016-09-09	0.5	barnacles	NA	NERR-SN10505035 (4).txt
NERR-20160825	2016-08-25	14:32:16	NB-02	10505030	27.85	-97.487	1.6	NA	2016-09-09	0.5	barnacles	NA	NERR-SN10505030 (4).txt
NERR-20160825	2016-08-25	14:07:18	NB-03	10094433	27.838	-97.457	1.7	NA	2016-09-09	1.5	barnacles	NA	NERR_SN10094433 (4).txt
NERR-20160825	2016-08-25	16:35:06	NB-04	10113981	27.859	-97.455	1.6	NA	2016-09-09	0.5	barnacles	NA	NERR_SN10113981 (4).txt
NERR-20160825	2016-08-25	16:20:26	NB-05	9953411	27.858	-97.481	1.2	NA	2016-09-09	0.5	barnacles	NA	NERR-SN9953411 (4).txt
NERR-20160825	2016-08-25	16:09:05	NB-06	9801564	27.872	-97.493	1.3	NA	2016-09-09	1.5	barnacles	NA	NERR-SN9801564 (4).txt
NERR-20160825	2016-08-25	15:53:36	NB-07	9953395	27.87	-97.511	1.2	NA	2016-09-09	2	barnacles	NA	NERR-SN9953395 (4).txt
NERR-20160825	2016-08-25	15:39:40	NB-08	10495331	27.87	-97.517	2.2	NA	2016-09-09	3.5	barnacles	NA	NERR-SN10495331 (4).txt
NERR-20160825	2016-08-25	15:15:20	NB-09	9801562	27.862	-97.515	1.1	NA	2016-09-09	1	barnacles	NA	NERR-SN9801562 (4).txt
NERR-20160825	2016-08-25	15:25:07	NB-10	10094428	27.861	-97.521	2	short rope on stake	2016-09-09	1	barnacles	NA	NERR-SN10094428 (4).txt
NERR-20160909	2016-09-09	14:54:42	NB-01	10505035	27.846	-97.494	1.5	NA	2016-09-28	1	barnacles	ran over; cut on cap	NERR-SN10505035 (5).txt
NERR-20160909	2016-09-09	14:42:53	NB-02	10505030	27.85	-97.487	1.8	NA	2016-09-28	1	barnacles	NA	NERR-SN10505030 (5).txt
NERR-20160909	2016-09-09	14:28:50	NB-03	10094433	27.838	-97.457	2	NA	2016-09-28	2.5	barnacles	NA	NERR_SN10094433 (5).txt
NERR-20160909	2016-09-09	16:14:52	NB-04	10113981	27.859	-97.455	1.85	NA	2016-09-28	2	barnacles	NA	NERR_SN10113981 (5).txt
NERR-20160909	2016-09-09	16:04:24	NB-05	9953411	27.858	-97.481	1.4	NA	2016-09-28	NA	NA	missing; sn 9953412 deployed	NA
NERR-20160909	2016-09-09	15:53:02	NB-06	9801564	27.872	-97.493	1.5	NA	2016-09-28	2.5	barnacles	NA	NERR-SN9801564 (5).txt
NERR-20160909	2016-09-09	15:42:54	NB-07	9953395	27.87	-97.511	1.35	NA	2016-09-28	1.5	barnacles	NA	NERR-SN9953395 (5).txt
NERR-20160909	2016-09-09	15:33:02	NB-08	10495331	27.87	-97.517	2.5	NA	2016-09-28	2	barnacles	NA	NERR-SN10495331 (5).txt
NERR-20160909	2016-09-09	15:12:41	NB-09	9801562	27.862	-97.515	1.3	NA	2016-09-28	3	barnacles	NA	NERR-SN9801562 (5).txt
NERR-20160909	2016-09-09	15:22:24	NB-10	10094428	27.861	-97.521	1.75	NA	2016-09-28	2	barnacles	NA	NERR-SN10094428 (5).txt
NERR-20160928	2016-09-28	14:27:15	NB-01	10505035	27.845	-97.494	1.6	NA	2016-10-20	1	barnacles	NA	NERR-SN10505035 (6).txt
NERR-20160928	2016-09-28	14:16:05	NB-02	10505030	27.85	-97.487	1.8	NA	2016-10-20	2	barnacles	NA	NERR-SN10505030 (6).txt
NERR-20160928	2016-09-28	13:56:02	NB-03	10094433	27.838	-97.457	2	NA	2016-10-20	3	barnacles	NA	NERR_SN10094433 (6).txt
NERR-20160928	2016-09-28	16:35:46	NB-04	10113981	27.859	-97.455	1.2	NA	2016-10-20	0.25	barnacles	LPS no data readout; seems to have been replaced with 10113984; replaced battery and read out; only 2 days of bad data	NA
NERR-20160928	2016-09-28	16:20:26	NB-05	9953412	27.858	-97.481	1.4	NA	2016-10-20	0	NA	NA	NERR-SN9953412.txt
NERR-20160928	2016-09-28	15:45:57	NB-06	9801564	27.872	-97.492	1.45	NA	2016-10-20	1.75	barnacles	NA	NERR-SN9801564 (6).txt
NERR-20160928	2016-09-28	15:29:53	NB-07	9953395	27.87	-97.511	1.3	NA	2016-10-20	3.75	barnacles	NA	NERR-SN9953395 (6).txt
NERR-20160928	2016-09-28	15:04:15	NB-08	10495331	27.87	-97.517	2	NA	2016-10-20	3.5	barnacles	NA	NERR-SN10495331 (6).txt
NERR-20160928	2016-09-28	14:41:38	NB-09	9801562	27.861	-97.515	1.3	NA	2016-10-20	2.5	barnacles	NA	NERR-SN9801562 (6).txt
NERR-20160928	2016-09-28	14:54:02	NB-10	10094428	27.861	-97.521	2	NA	2016-10-20	0.25	barnacles	barnacles just on cap	NA
NERR-20161020	2016-10-20	14:16:05	NB-01	10505035	27.845	-97.494	1.85	NA	2016-11-10	0.2	barnacles	NA	NERR-SN10505035 (7).txt
NERR-20161020	2016-10-20	14:06:28	NB-02	10505030	27.849	-97.487	1.9	NA	2016-11-10	NA	barnacles	NA	NERR-SN10505030 (7).txt

NERR-20161020	2016-10-20	13:53:32	NB-03	10094433	27.838	-97.458	2	NA	2016-11-10	2.5	barnacles	NA	NERR_SN10094433 (7).txt
NERR-20161020	2016-10-20	15:57:09	NB-04	10113984	27.859	-97.455	1.8	LPS new meter? 10113984?	2016-11-10	0	NA	LPS new sn in readout file 10113984	NERR_SN10113984.txt
NERR-20161020	2016-10-20	15:36:09	NB-05	9953412	27.858	-97.481	1.4	NA	2016-11-10	1.5	barnacles	NA	NERR-SN9953412 (2).txt
NERR-20161020	2016-10-20	15:21:36	NB-06	9801564	27.872	-97.493	1.45	NA	2016-11-10	3.5	barnacles	NA	NERR-SN9801564 (7).txt
NERR-20161020	2016-10-20	15:10:22	NB-07	9953395	27.87	-97.511	1.35	NA	2016-11-10	2	barnacles	NA	NERR-SN9953395 (7).txt
NERR-20161020	2016-10-20	14:53:35	NB-08	10495331	27.87	-97.517	2.05	NA	2016-11-10	1	barnacles	LPS no data readout; not reading after cleaning and battery replacement	NA
NERR-20161020	2016-10-20	14:32:57	NB-09	9801562	27.861	-97.515	1.3	NA	2016-11-10	3	barnacles	NA	NERR-SN9801562 (7).txt
NERR-20161020	2016-10-20	14:42:31	NB-10	10094428	27.861	-97.521	1.5	NA	2016-11-10	1.5	barnacles	NA	NERR-SN10094428 (7).txt
NERR-20161110	2016-11-10	15:02:23	NB-01	10505035	27.845	-97.494	1.8	NA	2016-12-01	0.5	algae	NA	NERR-SN10505035 (8).txt
NERR-20161110	2016-11-10	14:44:37	NB-02	10505030	27.849	-97.487	2	NA	2016-12-01	1	barnacles	NA	NERR-SN10505030 (8).txt
NERR-20161110	2016-11-10	14:30:21	NB-03	10094433	27.838	-97.457	2.1	NA	2016-12-01	0.5	barnacles	NA	NERR_SN10094433 (8).txt
NERR-20161110	2016-11-10	16:51:49	NB-04	10113984	27.859	-97.455	2	NA	2016-12-01	0	NA	NA	NERR_SN10113984 (2).txt
NERR-20161110	2016-11-10	16:38:29	NB-05	9953412	27.858	-97.481	1.5	NA	NA	NA	NA	meter broken off in tubing	NA
NERR-20161110	2016-11-10	16:19:03	NB-06	9801564	27.872	-97.493	1.5	NA	NA	NA	NA	no meter on end of tubing; 8 and 9 were switched; read off new 9; delete it	NA
NERR-20161110	2016-11-10	16:04:18	NB-07	9953395	27.87	-97.511	1.5	NA	2016-12-01	1.5	barnacles	NA	NERR-SN9953395 (8).txt
NERR-20161110	2016-11-10	15:53:06	NB-08	10114006	27.871	-97.517	2	LPS no meter readout from station last deployment; new sn deployed	2016-12-01	0	NA	NA	NERR-SN10114006.txt
NERR-20161110	2016-11-10	15:17:50	NB-09	9801562	27.861	-97.515	1.4	NA	2016-12-01	2.5	barnacles	NA	NERR-SN9801562 (8).txt
NERR-20161110	2016-11-10	15:39:07	NB-10	10094428	27.861	-97.521	2	NA	2016-12-01	1.5	barnacles	NA	NERR-SN10094428 (8).txt
NERR-20161201	2016-12-01	14:54:33	NB-01	10505035	27.845	-97.494	1.8	NA	2017-01-11	0	little bit of algae	NA	NERR-SN10505035_0.txt
NERR-20161201	2016-12-01	14:42:52	NB-02	10505030	27.849	-97.487	1.7	NA	2017-01-11	0	NA	NA	NERR-SN10505030_0.txt
NERR-20161201	2016-12-01	14:29:10	NB-03	10094433	27.838	-97.457	1.9	NA	2017-01-11	0	little bit of algae	NA	NERR_SN10094433_0.txt
NERR-20161201	2016-12-01	16:30:12	NB-04	10113984	27.859	-97.455	1.6	NA	2017-01-11	0	NA	not deployed; would not read	NERR_SN10113984 (3).txt
NERR-20161201	2016-12-01	16:18:56	NB-05	9801564	27.858	-97.481	1.3	LPS replacement for 9953412	2017-01-11	0	NA	not deployed; would not read	NERR-SN9801564 (8).txt
NERR-20161201	2016-12-01	16:06:56	NB-06	9953412	27.872	-97.493	1.3	LPS replacement for 9801564	2017-01-11	0	NA	not deployed; would not read	NERR-SN9953412 (3).txt
NERR-20161201	2016-12-01	15:51:00	NB-07	9953395	27.87	-97.511	1.2	NA	2017-01-11	0	NA	would not read; replaced with 9953388	NERR-SN9953395 (9).txt
NERR-20161201	2016-12-01	15:35:49	NB-08	10114006	27.871	-97.517	1.2	NA	2017-01-11	0	NA	NA	NERR-SN10114006 (2).txt
NERR-20161201	2016-12-01	15:12:43	NB-09	9801562	27.861	-97.515	1.2	NA	2017-01-11	0	NA	NA	NERR-SN9801562_0.txt

NERR-20161201	2016-12-01	15:25:11	NB-10	10094428	27.861	-97.521	2.2	NA	2017-01-11	0	NA	NA	NERR-SN10094428_0.txt
NERR-20161213	2016-12-13	15:19:10	NB-01	10505035	27.845	-97.494	1.3	NA	2017-01-11	1	algae	NA	NERR-SN10505035 (10).txt
NERR-20161213	2016-12-13	15:08:00	NB-02	10505030	27.849	-97.487	1.2	NA	2017-01-11	1	algae	NA	NERR-SN10505030 (13).txt
NERR-20161213	2016-12-13	14:50:44	NB-03	10094433	27.838	-97.457	1.4	NA	2017-01-11	1	mostly algae	NA	NERR_SN10094433 (10).txt
NERR-20161213	2016-12-13	16:08:25	NB-07	9953388	27.87	-97.511	0.9	NA	2017-01-11	0	NA	NA	NERR-SN9953388 (6).txt
NERR-20161213	2016-12-13	15:55:59	NB-08	10114006	27.87	-97.517	2.1	NA	2017-01-11	0.25	barnacles	NA	NERR-SN10114006_0.txt
NERR-20161213	2016-12-13	15:32:24	NB-09	9801562	27.861	-97.515	0.7	NA	2017-01-11	1	algae and few barnacles	NA	NERR-SN9801562 (12).txt
NERR-20161213	2016-12-13	15:43:24	NB-10	10094428	27.861	-97.521	1.5	NA	2017-01-11	1	algae and barnacles	NA	NERR-SN10094428 (14).txt
NERR-20170111	2017-01-11	15:25:50	NB-01	10505035	27.845	-97.494	1.6	NA	2017-02-01	3	algae	file offload not successful	NA
NERR-20170111	2017-01-11	15:07:21	NB-02	10505030	27.849	-97.487	1.65	NA	2017-02-01	3	algae	file offload not successful	NA
NERR-20170111	2017-01-11	14:54:22	NB-03	10094433	27.838	-97.457	1.7	NA	2017-02-01	2	algae and barnacles	file offload not successful	NERR_SN10094433_1.txt
NERR-20170111	2017-01-11	17:00:47	NB-04	10113984	27.859	-97.455	1.6	NA	2017-02-01	1	algae and barnacles	NA	NERR_SN10113984 (4).txt
NERR-20170111	2017-01-11	16:51:50	NB-05	9801564	27.858	-97.481	1.5	NA	2017-02-01	1.25	algae and barnacles	NA	NERR-SN9801564 (14).txt
NERR-20170111	2017-01-11	16:44:22	NB-06	9953395	27.871	-97.493	1.25	NA	2017-02-01	2	barnacles and algae	NA	NERR-SN9953395 (10).txt
NERR-20170111	2017-01-11	16:27:40	NB-07	9953388	27.871	-97.511	1.05	NA	2017-02-01	0.25	baby barnacles	NA	NERR-SN9953388 (2).txt
NERR-20170111	2017-01-11	16:17:25	NB-08	10114006	27.87	-97.517	2.1	NA	2017-02-01	0	NA	NA	NERR-SN10114006 (3).txt
NERR-20170111	2017-01-11	15:40:04	NB-09	9801562	27.861	-97.515	1.1	NA	2017-02-01	1	algae couple barnacles	file offload not successful	NA
NERR-20170111	2017-01-11	15:52:12	NB-10	10094428	27.861	-97.521	1.65	NA	2017-02-01	3	algae and few barnacles	NA	NERR-SN10094428 (10).txt
NERR-20170201	2017-02-01	15:41:36	NB-01	10505035	27.845	-97.494	1	file offload not successful	2017-02-08	NA	NA	hit by boat before 2017-02-08; meter gone	NA
NERR-20170201	2017-02-01	15:32:18	NB-02	10505030	27.849	-97.487	1.5	file offload not successful	2017-02-08	0	NA	NA	NERR-SN10505030 (10).txt
NERR-20170201	2017-02-08	15:17:06	NB-02	10505030	27.849	-97.487	1.4	redeployed	2017-03-03	3	algae and a few barnacles	NA	NERR-SN10505030 (10).txt
NERR-20170201	2017-02-01	15:12:22	NB-03	10094433	27.839	-97.457	1.55	file offload not successful	2017-02-08	0	NA	hobo not working; meter not redeployed; LPS replaced battery and offloaded; only a few hours of data	NA
NERR-20170201	2017-02-01	17:20:13	NB-04	10113984	27.859	-97.455	1.4	NA	2017-03-03	1	barnacles	NA	NERR_SN10113984 (5).txt
NERR-20170201	2017-02-01	17:09:15	NB-05	9801564	27.858	-97.481	1.05	NA	2017-03-03	3	barnacles	NA	NERR-SN9801564 (10).txt
NERR-20170201	2017-02-01	17:00:04	NB-06	9953395	27.872	-97.492	1.1	NA	2017-03-03	3	barnacles	NA	NERR-SN9953395 (11).txt
NERR-20170201	2017-02-01	16:51:41	NB-07	9953388	27.87	-97.511	0.9	NA	2017-03-03	1	barnacles	NA	NERR-SN9953388 (3).txt
NERR-20170201	2017-02-01	16:29:17	NB-08	10114006	27.87	-97.517	2	NA	2017-03-03	2	algae	NA	NERR-SN10114006 (4).txt
NERR-20170201	2017-02-01	16:03:18	NB-09	9801562	27.861	-97.514	0.75	file offload not successful	2017-02-08	0	NA	NA	NERR-SN9801562 (10).txt
NERR-20170201	2017-02-08	15:53:48	NB-09	9801562	27.861	-97.514	0.9	redeployed	2017-03-03	2.5	algae	NA	NERR-SN9801562 (10).txt

NERR-20170201	2017-02-01	16:18:45	NB-10	10094428	27.861	-97.52	1	NA	2017-03-03	4	algae and a few barnacles	NA	NERR-SN10094428 (11).txt
NERR-20170303	2017-03-03	15:13:49	NB-01	10424545	27.846	-97.494	1.6	deployment only; no retrieval	2017-03-20	1	algae and few small barnacles	NA	NERR-SN10424545 (4).txt
NERR-20170303	2017-03-03	15:02:44	NB-02	10505030	27.849	-97.487	1.6	NA	2017-03-20	3.75	algae and a few small barnacles	NA	NERR-SN10505030 (11).txt
NERR-20170303	2017-03-03	14:42:44	NB-03	10113973	27.838	-97.457	1.7	deployment only; no retrieval	2017-03-20	0	NA	NA	NERR_SN10113973.txt
NERR-20170303	2017-03-03	17:18:22	NB-04	10113984	27.859	-97.455	1.7	NA	2017-03-20	2	algae	NA	NERR_SN10113984 (6).txt
NERR-20170303	2017-03-03	17:05:50	NB-05	9801564	27.858	-97.481	1.2	NA	2017-03-20	3	algae and small barnacles	NA	NERR-SN9801564 (11).txt
NERR-20170303	2017-03-03	16:42:37	NB-06	9953395	27.872	-97.493	1.2	NA	2017-03-20	2	algae and small barnacles	NA	NERR-SN9953395 (12).txt
NERR-20170303	2017-03-03	16:27:53	NB-07	9953388	27.87	-97.511	1.15	NA	2017-03-20	1	barnacles	NA	NERR-SN9953388 (4).txt
NERR-20170303	2017-03-03	16:15:24	NB-08	10114006	27.871	-97.517	1.7	NA	2017-03-20	2.5	algae and barnacles	NA	NERR-SN10114006 (5).txt
NERR-20170303	2017-03-03	15:32:22	NB-09	9801562	27.862	-97.514	1.15	NA	2017-03-20	2.5	barnacles and algae	NA	NERR-SN9801562 (11).txt
NERR-20170303	2017-03-03	15:55:18	NB-10	10094428	27.861	-97.52	1.2	NA	2017-03-20	3.75	algae	NA	NERR-SN10094428 (12).txt
NERR-20170320	2017-03-20	14:40:16	NB-01	10424545	27.846	-97.494	1.2	NA	2017-04-06	2	small barnacles	NA	NERR-SN10424545 (2).txt
NERR-20170320	2017-03-20	14:14:08	NB-02	10505030	27.85	-97.487	1.3	NA	2017-04-06	4	half algae half barnacles	NA	NERR-SN10505030 (12).txt
NERR-20170320	2017-03-20	13:51:01	NB-03	10113973	27.838	-97.457	1.5	NA	2017-04-06	0.25	NA	NA	NERR_SN10113973 (2).txt
NERR-20170320	2017-03-20	17:06:45	NB-04	10113984	27.859	-97.455	1.5	NA	2017-04-06	2	algae and few barnacles	NA	NERR_SN10113984 (7).txt
NERR-20170320	2017-03-20	16:52:36	NB-05	9801564	27.858	-97.481	1	NA	2017-04-06	4	algae	NA	NERR-SN9801564 (12).txt
NERR-20170320	2017-03-20	16:38:06	NB-06	9953395	27.872	-97.493	1	NA	2017-04-06	3.5	barnacles and algae	NA	NERR-SN9953395 (13).txt
NERR-20170320	2017-03-20	16:19:56	NB-07	9953388	27.87	-97.511	1	NA	2017-04-06	1	barnacles	NA	NERR-SN9953388 (5).txt
NERR-20170320	2017-03-20	16:03:15	NB-08	10114006	27.871	-97.517	1.5	NA	2017-04-06	2.5	barnacles	NA	NERR-SN10114006 (6).txt
NERR-20170320	2017-03-20	15:00:16	NB-09	9801562	27.862	-97.514	0.75	NA	NA	NA	NA	could not find; lost black grapple hook	NA
NERR-20170320	2017-03-20	15:18:57	NB-10	10094428	27.861	-97.52	1.7	NA	2017-04-06	3.5	algae	LPS hoboware reads file as having no samples	NA
NERR-20170406	2017-04-06	18:42:16	NB-01	10424545	27.846	-97.494	1.8	NA	2017-04-24	1	algae and few barnacles	NA	NERR-SN10424545 (3).txt
NERR-20170406	2017-04-06	18:31:35	NB-02	10505030	27.85	-97.487	1.4	NA	2017-04-24	3	algae some small barnacles	NA	NERR-SN10505030_0 (2).txt
NERR-20170406	2017-04-06	18:18:44	NB-03	10113973	27.838	-97.457	1.5	NA	2017-04-24	0.25	barnacles	NA	NERR_SN10113973 (3).txt
NERR-20170406	2017-04-06	20:38:14	NB-04	10113984	27.859	-97.455	1.5	NA	2017-04-24	2	algae some barnacles	NA	NERR_SN10113984 (8).txt
NERR-20170406	2017-04-06	20:25:59	NB-05	9801564	27.858	-97.481	1	NA	2017-04-24	4	algae	NA	NERR-SN9801564_1.txt
NERR-20170406	2017-04-06	20:14:16	NB-06	9953395	27.872	-97.493	1.1	NA	2017-04-24	3.5	algae barnacles	NA	NERR-SN9953395_0.txt
NERR-20170406	2017-04-06	20:01:14	NB-07	9953388	27.87	-97.511	1	NA	2017-04-24	0.25	barnacles	NA	NERR-SN9953388_0.txt
NERR-20170406	2017-04-06	19:46:35	NB-08	10114006	27.871	-97.517	1.5	NA	2017-04-24	3.5	algae few barnacles	NA	NERR-SN10114006 (7).txt
NERR-20170406	2017-04-06	19:33:31	NB-10	10094428	27.861	-97.52	1.8	NA	2017-04-24	3.5	algae few small barnacles	hobo downloaded but broke	NERR-SN10094428_0 (2).txt

												off when removing meter cap; 10424546 deployed	
NERR-20170424	2017-04-24	14:30:43	NB-01	10424545	27.846	-97.494	1.9	NA	2017-05-11	3	algae few barnacles	NA	NERR-SN10424545_1.txt
NERR-20170424	2017-04-24	14:19:25	NB-02	10505030	27.85	-97.487	1.6	NA	2017-05-11	3	barnacles and algae	NA	NERR-SN10505030_0 (3).txt
NERR-20170424	2017-04-24	13:53:54	NB-03	10113973	27.838	-97.457	1.8	NA	2017-05-11	2	barnacles	NA	NERR_SN10113973 (4).txt
NERR-20170424	2017-04-24	16:20:38	NB-04	10113984	27.859	-97.455	1.6	NA	2017-05-11	1.5	algae	NA	NERR_SN10113984_0.txt
NERR-20170424	2017-04-24	16:04:26	NB-05	9801564	27.858	-97.481	1.2	NA	2017-05-11	3.5	algae	NA	NERR-SN9801564_0 (2).txt
NERR-20170424	2017-04-24	15:36:52	NB-06	9953395	27.872	-97.493	1.2	NA	2017-05-11	3	algae barnacles	NA	NERR-SN9953395 (15).txt
NERR-20170424	2017-04-24	15:26:45	NB-07	9953388	27.87	-97.511	1.15	NA	2017-05-11	1.5	barnacles	NA	NERR-SN9953388 (7).txt
NERR-20170424	2017-04-24	15:12:07	NB-08	10114006	27.871	-97.517	1.6	NA	2017-05-11	4	algae and barnacles	NA	NERR-SN10114006_0 (2).txt
NERR-20170424	2017-04-24	14:59:02	NB-10	10424546	27.861	-97.52	1.8	LPS replacement for 10094428	2017-05-11	0	NA	would not read; bringing in; LPS no power to chip even with fresh battery; no visible corrosion	NA
NERR-20170511	2017-05-11	14:29:21	NB-01	10424545	27.846	-97.494	2	NA	2017-05-30	3	algae	NA	NERR-SN10424545_2.txt
NERR-20170511	2017-05-11	14:05:32	NB-02	10505030	27.85	-97.487	1.7	NA	2017-05-30	3.5	algae barnacles	NA	NERR-SN10505030_1.txt
NERR-20170511	2017-05-11	13:53:00	NB-03	10113973	27.838	-97.457	1.9	NA	2017-05-30	2	algae barnacles	NA	NERR_SN10113973_0.txt
NERR-20170511	2017-05-11	16:50:27	NB-04	10113984	27.859	-97.455	1.8	NA	2017-05-30	3	barnacles and algae	did not read	NERR_SN10113984 (10).txt
NERR-20170511	2017-05-11	16:31:28	NB-05	9801564	27.858	-97.481	1.4	NA	2017-05-30	4	algae	would not read	NERR-SN9801564 (15).txt
NERR-20170511	2017-05-11	16:17:23	NB-06	9953395	27.872	-97.493	1.5	NA	2017-05-30	3.5	algae barnacles	would not read; brought back in	NERR-SN9953395 (16).txt
NERR-20170511	2017-05-11	16:02:19	NB-07	9953388	27.87	-97.511	1.25	NA	2017-05-30	1	algae barnacles	NA	NERR-SN9953388_0 (2).txt
NERR-20170511	2017-05-11	15:50:06	NB-08	10114006	27.871	-97.517	1.2	NA	2017-05-30	2	algae	NA	NERR-SN10114006_1.txt
NERR-20170511	2017-05-11	14:43:45	NB-09	10094428	27.862	-97.514	1.2	LPS new meter	2017-05-30	1.5	barnacles and algae	NA	NERR-SN10094428 (15).txt
NERR-20170530	2017-05-30	14:19:40	NB-01	10424545	27.846	-97.494	1.9	NA	2017-06-15	1.5	algae barnacles	NA	NERR-SN10424545 (5).txt
NERR-20170530	2017-05-30	14:07:28	NB-02	10505030	27.85	-97.487	1.5	NA	2017-06-15	4	algae barnacles	would not read into shuttle	NA
NERR-20170530	2017-05-30	NA	NB-03	10113973	NA	NA	1.8	LPS no gps waypoints but there are data readouts for 20170530 and 20170615	2017-06-15	3	algae barnacles	NA	NERR_SN10113973 (5).txt
NERR-20170530	2017-05-30	15:11:32	NB-07	9953388	27.87	-97.511	1.15	NA	2017-06-15	1.5	algae barnacles	NA	NERR-SN9953388 (8).txt
NERR-20170530	2017-05-30	15:01:26	NB-08	10114006	27.871	-97.517	1.5	NA	2017-06-15	3	algae barnacles	NA	NERR-SN10114006 (10).txt
NERR-20170530	2017-05-30	14:36:12	NB-09	10094428	27.861	-97.514	1.1	NA	2017-06-15	2	algae barnacles	NA	NERR-SN10094428 (16).txt
NERR-20170530	2017-05-30	14:46:39	NB-10	10331913	27.861	-97.521	2.2	new deployment; LPS changed sn to match 20170615 retrieval sn	2017-06-15	0.5	algae	NA	SN10331913 (2).txt
NERR-20170615	2017-06-15	15:01:47	NB-01	10424545	27.846	-97.494	1.7	NA	2017-06-28	2.5	algae	NA	NERR-SN10424545_0 (2).txt

NERR-20170615	2017-06-15	14:35:32	NB-02	10505030	27.85	-97.487	1.65	NA	2017-06-28	3.5	barnacles	did not read; hobo dead	NA
NERR-20170615	2017-06-15	17:06:21	NB-03	10113973	27.838	-97.457	1.9	NA	2017-06-28	3.5	algae barnacles	NA	NERR_SN10113973_0 (2).txt
NERR-20170615	2017-06-15	16:24:41	NB-04	10113984	27.859	-97.455	1.7	NA	2017-06-28	2.5	algae	NA	NERR_SN10113984 (11).txt
NERR-20170615	2017-06-15	16:14:24	NB-05	9801564	27.858	-97.481	1.3	NA	2017-06-28	3	algae barnacles	NA	NERR-SN9801564 (16).txt
NERR-20170615	2017-06-15	16:06:20	NB-06	9953395	27.872	-97.493	1.4	NA	2017-06-28	2.5	barnacles	NA	NERR-SN9953395 (17).txt
NERR-20170615	2017-06-15	15:58:58	NB-07	9953388	27.87	-97.511	1.2	NA	2017-06-28	1	algae	NA	NERR-SN9953388_0 (3).txt
NERR-20170615	2017-06-15	15:48:52	NB-08	10114006	27.87	-97.517	1.1	NA	2017-06-28	3	algae barnacles	NA	NERR-SN10114006_0 (3).txt
NERR-20170615	2017-06-15	15:18:18	NB-09	10094428	27.861	-97.514	1.1	NA	2017-06-28	4	barnacles	NA	NERR-SN10094428_0 (3).txt
NERR-20170615	2017-06-15	15:37:21	NB-10	10331913	27.861	-97.521	2	NA	2017-06-28	2	algae	NA	SN10331913_0.txt
NERR-20170628	2017-06-28	14:21:27	NB-01	10424545	27.846	-97.494	1.9	NA	2017-07-13	2.5	algae few barnacles	NA	NERR-SN10424545 (7).txt
NERR-20170628	2017-06-28	13:52:58	NB-03	10113973	27.838	-97.457	1.9	NA	2017-07-13	3	algae	NA	NERR_SN10113973 (7).txt
NERR-20170628	2017-06-28	16:10:37	NB-04	10113984	27.859	-97.455	1.85	NA	2017-07-13	1.5	algae	NA	NERR_SN10113984 (12).txt
NERR-20170628	2017-06-28	15:57:34	NB-05	9801564	27.858	-97.481	1.45	NA	2017-07-13	2.5	algae	NA	NERR-SN9801564 (17).txt
NERR-20170628	2017-06-28	15:47:53	NB-06	9953395	27.871	-97.493	1.5	NA	2017-07-13	2.5	algae	NA	NERR-SN9953395 (18).txt
NERR-20170628	2017-06-28	15:39:11	NB-07	9953388	27.87	-97.511	1.3	NA	2017-07-13	2	algae few barnacles	NA	NERR-SN9953388 (10).txt
NERR-20170628	2017-06-28	15:27:48	NB-08	10114006	27.871	-97.517	1.4	NA	2017-07-13	4	algae	NA	NERR-SN10114006 (11).txt
NERR-20170628	2017-06-28	14:40:04	NB-09	10094428	27.861	-97.514	1.2	NA	2017-07-13	3.5	algae	NA	NERR-SN10094428 (18).txt
NERR-20170628	2017-06-28	15:12:57	NB-10	10331913	27.861	-97.521	2.1	NA	2017-07-13	2	algae	NA	SN10331913 (3).txt
NERR-20170713	2017-07-13	13:37:06	NB-01	10424545	27.846	-97.494	1.65	NA	2017-07-26	3	algae few barnacles	NA	NERR-SN10424545 (8).txt
NERR-20170713	2017-07-13	13:26:03	NB-02	10113974	27.849	-97.487	1.45	LPS new deployment; pendant 10113974 from SH1p50 meter on SH1p25 meter	2017-07-26	2	barnacles	NA	SC_SN10113974 (2).txt
NERR-20170713	2017-07-13	13:16:19	NB-03	10113973	27.838	-97.457	1.6	NA	2017-07-26	2.5	barnacles and algae	NA	NERR_SN10113973 (8).txt
NERR-20170713	2017-07-13	15:13:08	NB-04	10113984	27.859	-97.455	1.6	NA	2017-07-26	1	algae small barnacles	NA	NERR_SN10113984 (13).txt
NERR-20170713	2017-07-13	15:01:17	NB-05	9801564	27.858	-97.481	1.1	NA	2017-07-26	3.5	algae	NA	NERR-SN9801564 (18).txt
NERR-20170713	2017-07-13	14:35:51	NB-06	9953395	27.871	-97.493	1.2	NA	2017-07-26	2	algae	NA	NERR-SN9953395 (19).txt
NERR-20170713	2017-07-13	14:25:11	NB-07	9953388	27.87	-97.511	1	NA	2017-07-26	1.5	barnacles	NA	NERR-SN9953388 (11).txt
NERR-20170713	2017-07-13	14:16:37	NB-08	10114006	27.871	-97.517	1	NA	2017-07-26	3.5	algae few barnacles	NA	NERR-SN10114006 (12).txt
NERR-20170713	2017-07-13	13:52:30	NB-09	10094428	27.861	-97.514	0.9	NA	2017-07-26	3	algae barnacles	NA	NERR-SN10094428 (19).txt
NERR-20170713	2017-07-13	14:04:12	NB-10	10331913	27.861	-97.521	1.9	NA	2017-07-26	1.5	algae few barnacles	NA	SN10331913 (4).txt
NERR-20170726	2017-07-26	13:48:36	NB-01	10424545	27.846	-97.494	1.4	NA	2017-08-04	1	algae	NA	NERR-SN10424545 (10).txt
NERR-20170726	2017-07-26	13:30:45	NB-02	10113974	27.849	-97.487	1.4	NA	2017-08-04	1	barnacles	NA	SC_SN10113974 (3).txt
NERR-20170726	2017-07-26	13:15:08	NB-03	10113973	27.838	-97.457	1.55	NA	2017-08-04	1	algae	NA	NERR_SN10113973 (10).txt
NERR-20170726	2017-07-26	15:31:50	NB-04	10113984	27.859	-97.455	1.5	NA	2017-08-04	0.5	worms and barnacles	NA	NERR_SN10113984 (15).txt
NERR-20170726	2017-07-26	15:12:43	NB-05	9801564	27.858	-97.481	1.1	NA	2017-08-04	2	algae barnacles	NA	NERR-SN9801564 (20).txt
NERR-20170726	2017-07-26	14:59:20	NB-06	9953395	27.872	-97.493	1.1	NA	2017-08-04	2	algae and worms	NA	NERR-SN9953395 (21).txt
NERR-20170726	2017-07-26	14:45:13	NB-07	9953388	27.87	-97.511	1	NA	2017-08-04	0.75	barnacles and worms	NA	NERR-SN9953388 (13).txt

NERR-20170726	2017-07-26	14:32:11	NB-08	10114006	27.87	-97.517	1.5	NA	2017-08-04	2	algae	NA	NERR-SN10114006 (14).txt
NERR-20170726	2017-07-26	14:04:06	NB-09	10094428	27.861	-97.514	0.95	NA	2017-08-04	1	barnacles	NA	NERR-SN10094428 (21).txt
NERR-20170726	2017-07-26	14:20:24	NB-10	10331913	27.861	-97.521	1.9	NA	2017-08-04	1.5	algae	NA	SN10331913 (6).txt
NERR-20170804	2017-08-04	13:30:26	NB-01	10424545	27.845	-97.494	1.6	LPS last pre-Harvey deployment	2017-09-22	3.9	barnacles	NA	NERR-SN10424545_0 (4).txt
NERR-20170804	2017-08-04	13:18:10	NB-02	10113974	27.85	-97.487	1.6	LPS last pre-Harvey deployment	2017-09-22	3.5	barnacles	NA	SC_SN10113974_0 (2).txt
NERR-20170804	2017-08-04	13:05:47	NB-03	10113973	27.838	-97.457	1.8	LPS last pre-Harvey deployment	2017-09-22	3	barnacles	would not download; LPS downloaded needs new battery	NERR_SN10113973_1.txt
NERR-20170804	2017-08-04	14:44:47	NB-04	10113984	27.859	-97.455	1.7	LPS last pre-Harvey deployment	2017-09-22	2.5	barnacles	NA	NERR_SN10113984_0 (4).txt
NERR-20170804	2017-08-04	14:35:55	NB-05	9801564	27.858	-97.481	1.3	LPS last pre-Harvey deployment	2017-09-22	3.8	barnacles	NA	NERR-SN9801564_0 (4).txt
NERR-20170804	2017-08-04	14:26:23	NB-06	9953395	27.872	-97.493	1.3	LPS last pre-Harvey deployment	2017-09-22	3	barnacles	NA	NERR-SN9953395_0 (3).txt
NERR-20170804	2017-08-04	14:15:13	NB-07	9953388	27.87	-97.511	NA	LPS last pre-Harvey deployment	2017-09-22	2	barnacles	NA	NERR-SN9953388_0 (5).txt
NERR-20170804	2017-08-04	14:04:57	NB-08	10114006	27.87	-97.517	1.7	LPS last pre-Harvey deployment	2017-09-22	4	barnacles	NA	NERR-SN10114006_0 (5).txt
NERR-20170804	2017-08-04	13:44:15	NB-09	10094428	27.861	-97.515	1.1	LPS last pre-Harvey deployment	2017-09-22	4	barnacles	would not download; LPS was able to clean and force offload; corroded and needs new battery	ForceOffload_SN10094428_txt_B.txt
NERR-20170804	2017-08-04	13:53:43	NB-10	10331913	27.861	-97.521	1.6	LPS last pre-Harvey deployment	2017-09-22	3.5	barnacles	NA	SN10331913_0 (3).txt

APPENDIX C: DATA FILE METADATA

The following table shows the content of the **Tilt_Meter_Metadata_DataFiles.csv** file included in the Documentation and Data Package submitted with this report. Information included in the file but omitted here includes the minimum and maximum timestamp values recorded, the time format of the raw data file (either GMT-05:00 or GMT-06:00), and the time format of the formatted data file (always GMT-6:00).

The names in the Raw file name column correspond to the file names in the Raw_Text_Files_Nueces folder. The corresponding Formatted_Text_Files_Nueces file names consist of the Deployment ID, Station, and Meter SN of each data file. For example, the Formatted_Text_Files_Nueces file that corresponds to the first file listed in the table is NERR-20160629_NB-01_10505035.txt.

The Deploy data column indicates whether the file includes valid velocity readings, the Duplicate file column indicates whether the file is a duplicate (some files were backed up multiple times), and the Deploy start and end columns show the temporal coverage of the deployment velocity data in the file. The Direction adjustment column contains the values, in degrees, to be added to the direction values in each data file to correct for instrument misalignment in the field. The dates in the Fouling date start column are the dates where fouling appears to begin to influence velocity readings. Fouling effects were not evident in most of the data files.

Raw file name	Deploy data	Duplicate file	Deployment ID	Station	Meter SN	Deploy start	Deploy end	Direction adjustment	Fouling date start
NERR-SN10505035.txt	TRUE	FALSE	NERR-20160629	NB-01	10505035	2016-06-29 09:34:00	2016-07-14 09:00:00	-27	NA
NERR-SN10505030.txt	TRUE	FALSE	NERR-20160629	NB-02	10505030	2016-06-29 09:24:00	2016-07-14 08:38:00	13	NA
NERR_SN10094433.txt	TRUE	FALSE	NERR-20160629	NB-03	10094433	2016-06-29 11:14:42	2016-07-14 08:00:42	-36	NA
NERR_SN10113981.txt	TRUE	FALSE	NERR-20160629	NB-04	10113981	2016-06-29 11:02:13	2016-07-14 10:42:13	-6	NA
NERR-SN9953411.txt	TRUE	FALSE	NERR-20160629	NB-05	9953411	2016-06-29 10:48:00	2016-07-14 10:32:00	-47	NA
NERR-SN9801564.txt	TRUE	FALSE	NERR-20160629	NB-06	9801564	2016-06-29 10:40:00	2016-07-14 10:22:00	0	NA
NERR-SN9953395.txt	TRUE	FALSE	NERR-20160629	NB-07	9953395	2016-06-29 10:14:00	2016-07-14 10:14:00	3	NA
NERR-SN10495331.txt	TRUE	FALSE	NERR-20160629	NB-08	10495331	2016-06-29 10:28:00	2016-07-14 09:06:00	-13	NA
NERR-SN9801562.txt	TRUE	FALSE	NERR-20160629	NB-09	9801562	2016-06-29 09:58:00	2016-07-14 09:10:00	-15	NA
NERR-SN10094428.txt	TRUE	FALSE	NERR-20160629	NB-10	10094428	2016-06-29 10:04:00	2016-07-14 09:34:00	15	NA
NERR-SN10505035 (2).txt	TRUE	FALSE	NERR-20160714	NB-01	10505035	2016-07-14 09:16:00	2016-08-02 08:44:00	-17	NA
NERR-SN10505030 (2).txt	TRUE	FALSE	NERR-20160714	NB-02	10505030	2016-07-14 08:44:00	2016-08-02 08:34:00	-89	NA
NERR_SN10094433 (2).txt	TRUE	FALSE	NERR-20160714	NB-03	10094433	2016-07-14 08:14:42	2016-08-02 08:10:42	-10	NA
NERR_SN10113981 (2).txt	TRUE	FALSE	NERR-20160714	NB-04	10113981	2016-07-14 10:48:13	2016-08-02 10:30:13	-29	NA
NERR-SN9953411 (2).txt	TRUE	FALSE	NERR-20160714	NB-05	9953411	2016-07-14 10:42:00	2016-08-02 10:22:00	23	NA
NERR-SN9801564 (2).txt	TRUE	FALSE	NERR-20160714	NB-06	9801564	2016-07-14 10:30:00	2016-08-02 10:08:00	0	NA
NERR-SN9953395 (2).txt	TRUE	FALSE	NERR-20160714	NB-07	9953395	2016-07-14 10:20:00	2016-08-02 09:58:00	-41	NA

NERR-SN10495331 (2).txt	TRUE	FALSE	NERR-20160714	NB-08	10495331	2016-07-14 10:06:00	2016-08-02 09:48:00	-84	NA
NERR-SN9801562 (2).txt	TRUE	FALSE	NERR-20160714	NB-09	9801562	2016-07-14 09:30:00	2016-08-02 09:04:00	-35	NA
NERR-SN10094428 (2).txt	TRUE	FALSE	NERR-20160714	NB-10	10094428	2016-07-14 09:54:00	2016-08-02 09:30:00	6	NA
NERR-SN10505035 (3).txt	TRUE	FALSE	NERR-20160802	NB-01	10505035	2016-08-02 08:50:00	2016-08-25 08:40:00	-24	NA
NERR-SN10505030 (3).txt	TRUE	FALSE	NERR-20160802	NB-02	10505030	2016-08-02 08:38:00	2016-08-25 08:20:00	48	2016-08-14
NERR_SN10094433 (3).txt	TRUE	FALSE	NERR-20160802	NB-03	10094433	2016-08-02 08:18:42	2016-08-25 07:50:42	34	2016-08-13
NERR_SN10113981 (3).txt	TRUE	FALSE	NERR-20160802	NB-04	10113981	2016-08-02 10:44:13	2016-08-25 10:24:13	-19	NA
NERR-SN9953411 (3).txt	TRUE	FALSE	NERR-20160802	NB-05	9953411	2016-08-02 10:26:00	2016-08-25 10:14:00	5	NA
NERR-SN9801564 (3).txt	TRUE	FALSE	NERR-20160802	NB-06	9801564	2016-08-02 10:20:00	2016-08-25 09:56:00	0	NA
NERR-SN9953395 (3).txt	TRUE	FALSE	NERR-20160802	NB-07	9953395	2016-08-02 10:06:00	2016-08-25 09:48:00	-73	2016-08-23
NERR-SN10495331 (3).txt	TRUE	FALSE	NERR-20160802	NB-08	10495331	2016-08-02 10:02:00	2016-08-25 09:32:00	-47	NA
NERR-SN9801562 (3).txt	TRUE	FALSE	NERR-20160802	NB-09	9801562	2016-08-02 09:12:00	2016-08-25 09:06:00	-36	NA
NERR-SN10094428 (3).txt	TRUE	FALSE	NERR-20160802	NB-10	10094428	2016-08-02 09:40:00	2016-08-25 09:18:00	-10	NA
NERR-SN10505035 (4).txt	TRUE	FALSE	NERR-20160825	NB-01	10505035	2016-08-25 08:50:00	2016-09-09 08:48:00	0	NA
NERR-SN10505030 (4).txt	TRUE	FALSE	NERR-20160825	NB-02	10505030	2016-08-25 08:36:00	2016-09-09 08:36:00	19	NA
NERR_SN10094433 (4).txt	TRUE	FALSE	NERR-20160825	NB-03	10094433	2016-08-25 08:08:42	2016-09-09 08:20:42	56	NA
NERR_SN10113981 (4).txt	TRUE	FALSE	NERR-20160825	NB-04	10113981	2016-08-25 10:36:13	2016-09-09 10:08:13	-5	NA
NERR-SN9953411 (4).txt	TRUE	FALSE	NERR-20160825	NB-05	9953411	2016-08-25 10:24:00	2016-09-09 10:00:00	-41	NA
NERR-SN9801564 (4).txt	TRUE	FALSE	NERR-20160825	NB-06	9801564	2016-08-25 10:12:00	2016-09-09 09:48:00	0	NA
NERR-SN9953395 (4).txt	TRUE	FALSE	NERR-20160825	NB-07	9953395	2016-08-25 09:56:00	2016-09-09 09:36:00	26	2016-09-08
NERR-SN10495331 (4).txt	TRUE	FALSE	NERR-20160825	NB-08	10495331	2016-08-25 11:08:00	2016-09-09 09:30:00	-39	NA
NERR-SN9801562 (4).txt	TRUE	FALSE	NERR-20160825	NB-09	9801562	2016-08-25 09:18:00	2016-09-09 09:06:00	-59	NA
NERR-SN10094428 (4).txt	TRUE	FALSE	NERR-20160825	NB-10	10094428	2016-08-25 09:28:00	2016-09-09 09:14:00	-53	NA
NERR-SN10505035 (5).txt	TRUE	FALSE	NERR-20160909	NB-01	10505035	2016-09-09 08:56:00	2016-09-28 08:22:00	117	NA
NERR-SN10505030 (5).txt	TRUE	FALSE	NERR-20160909	NB-02	10505030	2016-09-09 08:44:00	2016-09-28 08:10:00	52	NA
NERR_SN10094433 (5).txt	TRUE	FALSE	NERR-20160909	NB-03	10094433	2016-09-09 08:30:42	2016-09-28 07:46:42	-170	2016-09-20
NERR_SN10113981 (5).txt	TRUE	FALSE	NERR-20160909	NB-04	10113981	2016-09-09 10:18:13	2016-09-28 10:28:13	145	NA
NERR-SN9801564 (5).txt	TRUE	FALSE	NERR-20160909	NB-06	9801564	2016-09-09 09:54:00	2016-09-28 09:40:00	0	NA
NERR-SN9953395 (5).txt	TRUE	FALSE	NERR-20160909	NB-07	9953395	2016-09-09 09:44:00	2016-09-28 09:24:00	-96	NA
NERR-SN10495331 (5).txt	TRUE	FALSE	NERR-20160909	NB-08	10495331	2016-09-09 09:38:00	2016-09-28 09:00:00	-23	NA
NERR-SN9801562 (5).txt	TRUE	FALSE	NERR-20160909	NB-09	9801562	2016-09-09 09:16:00	2016-09-28 08:38:00	-55	2016-09-26
NERR-SN10094428 (5).txt	TRUE	FALSE	NERR-20160909	NB-10	10094428	2016-09-09 09:24:00	2016-09-28 08:48:00	-40	NA
NERR-SN10505035 (6).txt	TRUE	FALSE	NERR-20160928	NB-01	10505035	2016-09-28 08:28:00	2016-10-20 08:10:00	-7	NA
NERR-SN10505030 (6).txt	TRUE	FALSE	NERR-20160928	NB-02	10505030	2016-09-28 08:20:00	2016-10-20 07:58:00	-8	NA
NERR_SN10094433 (6).txt	TRUE	FALSE	NERR-20160928	NB-03	10094433	2016-09-28 07:56:42	2016-10-20 07:44:42	-64	2016-10-13

NERR-SN9953412.txt	TRUE	FALSE	NERR-20160928	NB-05	9953412	2016-09-28 10:26:00	2016-10-20 09:32:00	-2	NA
NERR-SN9801564 (6).txt	TRUE	FALSE	NERR-20160928	NB-06	9801564	2016-09-28 09:46:00	2016-10-20 09:14:00	0	2016-10-13
NERR-SN9953395 (6).txt	TRUE	FALSE	NERR-20160928	NB-07	9953395	2016-09-28 09:30:00	2016-10-20 09:00:00	-15	NA
NERR-SN10495331 (6).txt	TRUE	FALSE	NERR-20160928	NB-08	10495331	2016-09-28 09:12:00	2016-10-14 01:24:00	0	2016-10-13
NERR-SN9801562 (6).txt	TRUE	FALSE	NERR-20160928	NB-09	9801562	2016-09-28 08:44:00	2016-10-20 08:26:00	-55	2016-10-15
NERR-SN10505035 (7).txt	TRUE	FALSE	NERR-20161020	NB-01	10505035	2016-10-20 08:20:00	2016-11-10 08:58:00	-64	NA
NERR-SN10505030 (7).txt	TRUE	FALSE	NERR-20161020	NB-02	10505030	2016-10-20 08:10:00	2016-11-10 08:38:00	-19	NA
NERR_SN10094433 (7).txt	TRUE	FALSE	NERR-20161020	NB-03	10094433	2016-10-20 07:54:42	2016-11-10 08:20:42	18	NA
NERR_SN10113984.txt	TRUE	FALSE	NERR-20161020	NB-04	10113984	2016-10-20 10:00:00	2016-11-10 10:46:00	-11	NA
NERR-SN9953412 (2).txt	TRUE	FALSE	NERR-20161020	NB-05	9953412	2016-10-20 09:38:00	2016-11-10 10:32:00	-83	NA
NERR-SN9801564 (7).txt	TRUE	FALSE	NERR-20161020	NB-06	9801564	2016-10-20 09:22:00	2016-11-10 10:12:00	0	2016-11-02
NERR-SN9953395 (7).txt	TRUE	FALSE	NERR-20161020	NB-07	9953395	2016-10-20 09:14:00	2016-11-10 09:56:00	-72	NA
NERR-SN9801562 (7).txt	TRUE	FALSE	NERR-20161020	NB-09	9801562	2016-10-20 08:36:00	2016-11-10 09:12:00	-143	NA
NERR-SN10094428 (7).txt	TRUE	FALSE	NERR-20161020	NB-10	10094428	2016-10-20 08:46:00	2016-11-10 09:30:00	130	NA
NERR-SN10505035 (8).txt	TRUE	FALSE	NERR-20161110	NB-01	10505035	2016-11-10 09:06:00	2016-12-01 08:44:00	1	NA
NERR-SN10505030 (8).txt	TRUE	FALSE	NERR-20161110	NB-02	10505030	2016-11-10 08:46:00	2016-12-01 08:36:00	-23	NA
NERR_SN10094433 (8).txt	TRUE	FALSE	NERR-20161110	NB-03	10094433	2016-11-10 08:30:42	2016-12-01 08:22:42	21	NA
NERR_SN10113984 (2).txt	TRUE	FALSE	NERR-20161110	NB-04	10113984	2016-11-10 10:52:00	2016-12-01 10:24:00	43	NA
NERR-SN9953395 (8).txt	TRUE	FALSE	NERR-20161110	NB-07	9953395	2016-11-10 10:08:00	2016-12-01 09:38:00	-89	NA
NERR-SN10114006.txt	TRUE	FALSE	NERR-20161110	NB-08	10114006	2016-11-10 10:02:00	2016-12-01 09:30:00	5	NA
NERR-SN9801562 (8).txt	TRUE	FALSE	NERR-20161110	NB-09	9801562	2016-11-10 09:22:00	2016-12-01 09:02:00	-102	NA
NERR-SN10094428 (8).txt	TRUE	FALSE	NERR-20161110	NB-10	10094428	2016-11-10 09:42:00	2016-12-01 09:14:00	-113	NA
NERR-SN10505035_0.txt	TRUE	FALSE	NERR-20161201	NB-01	10505035	2016-12-01 08:58:00	2016-12-13 09:14:00	6	NA
NERR-SN10505030_0.txt	TRUE	FALSE	NERR-20161201	NB-02	10505030	2016-12-01 08:46:00	2016-12-13 09:00:00	0	NA
NERR_SN10094433_0.txt	TRUE	FALSE	NERR-20161201	NB-03	10094433	2016-12-01 08:32:42	2016-12-13 08:46:42	74	NA
NERR_SN10113984 (3).txt	TRUE	FALSE	NERR-20161201	NB-04	10113984	2016-12-01 10:34:00	2016-12-13 10:28:00	7	NA
NERR-SN9801564 (8).txt	TRUE	FALSE	NERR-20161201	NB-05	9801564	2016-12-01 10:24:00	2016-12-13 10:10:00	20	NA
NERR-SN9953412 (3).txt	TRUE	FALSE	NERR-20161201	NB-06	9953412	2016-12-01 10:12:00	2016-12-13 10:10:00	0	NA
NERR-SN9953395 (9).txt	TRUE	FALSE	NERR-20161201	NB-07	9953395	2016-12-01 09:52:00	2016-12-13 09:58:00	29	NA
NERR-SN10114006 (2).txt	TRUE	FALSE	NERR-20161201	NB-08	10114006	2016-12-01 09:36:00	2016-12-13 09:46:00	-12	NA
NERR-SN9801562_0.txt	TRUE	FALSE	NERR-20161201	NB-09	9801562	2016-12-01 09:20:00	2016-12-13 09:26:00	64	NA
NERR-SN10094428_0.txt	TRUE	FALSE	NERR-20161201	NB-10	10094428	2016-12-01 09:30:00	2016-12-13 09:36:00	-80	NA
NERR-SN10505035 (10).txt	TRUE	FALSE	NERR-20161213	NB-01	10505035	2016-12-13 09:20:00	2017-01-11 09:18:00	9	NA
NERR-SN10505030 (13).txt	TRUE	FALSE	NERR-20161213	NB-02	10505030	2016-12-13 09:08:00	2017-01-11 09:00:00	-25	NA
NERR_SN10094433 (10).txt	TRUE	FALSE	NERR-20161213	NB-03	10094433	2016-12-13 08:50:42	2016-12-26 17:40:42	2	NA

NERR-SN9953388 (6).txt	TRUE	FALSE	NERR-20161213	NB-07	9953388	2016-12-13 10:16:00	2017-01-11 10:18:00	-17	NA
NERR-SN10114006_0.txt	TRUE	FALSE	NERR-20161213	NB-08	10114006	2016-12-13 09:58:00	2017-01-11 10:10:00	-27	NA
NERR-SN9801562 (12).txt	TRUE	FALSE	NERR-20161213	NB-09	9801562	2016-12-13 09:38:00	2017-01-11 09:28:00	47	NA
NERR-SN10094428 (14).txt	TRUE	FALSE	NERR-20161213	NB-10	10094428	2016-12-13 09:48:00	2017-01-11 09:44:00	-44	NA
NERR_SN10094433_1.txt	TRUE	FALSE	NERR-20170111	NB-03	10094433	2017-01-11 08:54:42	2017-01-11 11:40:42	0	NA
NERR_SN10113984 (4).txt	TRUE	FALSE	NERR-20170111	NB-04	10113984	2017-01-11 11:06:00	2017-02-01 11:10:00	0	NA
NERR-SN9801564 (14).txt	TRUE	FALSE	NERR-20170111	NB-05	9801564	2017-01-11 10:58:00	2017-02-01 11:04:00	71	NA
NERR-SN9953395 (10).txt	TRUE	FALSE	NERR-20170111	NB-06	9953395	2017-01-11 10:54:00	2017-02-01 10:46:00	0	NA
NERR-SN9953388 (2).txt	TRUE	FALSE	NERR-20170111	NB-07	9953388	2017-01-11 10:32:00	2017-02-01 10:46:00	-11	NA
NERR-SN10114006 (3).txt	TRUE	FALSE	NERR-20170111	NB-08	10114006	2017-01-11 10:18:00	2017-02-01 10:24:00	-26	NA
NERR-SN10094428 (10).txt	TRUE	FALSE	NERR-20170111	NB-10	10094428	2017-01-11 09:58:00	2017-02-01 10:12:00	74	NA
NERR-SN10505030 (10).txt	TRUE	FALSE	NERR-20170201	NB-02	10505030	2017-02-08 09:21:40	2017-03-03 08:53:40	-149	NA
NERR_SN10113984 (5).txt	TRUE	FALSE	NERR-20170201	NB-04	10113984	2017-02-01 11:28:00	2017-03-03 11:12:00	-49	NA
NERR-SN9801564 (10).txt	TRUE	FALSE	NERR-20170201	NB-05	9801564	2017-02-01 11:16:00	2017-03-03 10:46:00	-3	NA
NERR-SN9953395 (11).txt	TRUE	FALSE	NERR-20170201	NB-06	9953395	2017-02-01 11:02:00	2017-03-03 10:34:00	0	NA
NERR-SN9953388 (3).txt	TRUE	FALSE	NERR-20170201	NB-07	9953388	2017-02-01 10:52:00	2017-03-03 10:08:00	-31	NA
NERR-SN10114006 (4).txt	TRUE	FALSE	NERR-20170201	NB-08	10114006	2017-02-01 10:34:00	2017-03-03 10:02:00	-30	NA
NERR-SN9801562 (10).txt	TRUE	FALSE	NERR-20170201	NB-09	9801562	2017-02-08 09:58:52	2017-03-03 09:20:52	64	NA
NERR-SN10094428 (11).txt	TRUE	FALSE	NERR-20170201	NB-10	10094428	2017-02-01 10:22:00	2017-03-03 09:46:00	56	2017-02-22
NERR-SN10424545 (4).txt	TRUE	FALSE	NERR-20170303	NB-01	10424545	2017-03-03 09:22:00	2017-03-20 08:34:00	21	NA
NERR-SN10505030 (11).txt	TRUE	FALSE	NERR-20170303	NB-02	10505030	2017-03-03 09:07:40	2017-03-20 07:53:40	161	NA
NERR_SN10113973.txt	TRUE	FALSE	NERR-20170303	NB-03	10113973	2017-03-03 08:56:00	2017-03-20 07:46:00	-55	NA
NERR_SN10113984 (6).txt	TRUE	FALSE	NERR-20170303	NB-04	10113984	2017-03-03 11:24:00	2017-03-20 10:56:00	-12	NA
NERR-SN9801564 (11).txt	TRUE	FALSE	NERR-20170303	NB-05	9801564	2017-03-03 11:14:00	2017-03-20 10:40:00	4	NA
NERR-SN9953395 (12).txt	TRUE	FALSE	NERR-20170303	NB-06	9953395	2017-03-03 10:52:00	2017-03-20 10:30:00	0	NA
NERR-SN9953388 (4).txt	TRUE	FALSE	NERR-20170303	NB-07	9953388	2017-03-03 10:32:00	2017-03-20 10:06:00	36	NA
NERR-SN10114006 (5).txt	TRUE	FALSE	NERR-20170303	NB-08	10114006	2017-03-03 10:20:00	2017-03-20 09:52:00	25	NA
NERR-SN9801562 (11).txt	TRUE	FALSE	NERR-20170303	NB-09	9801562	2017-03-03 09:34:52	2017-03-20 08:28:52	52	NA
NERR-SN10094428 (12).txt	TRUE	FALSE	NERR-20170303	NB-10	10094428	2017-03-03 10:00:00	2017-03-20 09:08:00	77	NA
NERR-SN10424545 (2).txt	TRUE	FALSE	NERR-20170320	NB-01	10424545	2017-03-20 08:44:00	2017-04-06 12:28:00	4	NA
NERR-SN10505030 (12).txt	TRUE	FALSE	NERR-20170320	NB-02	10505030	2017-03-20 08:15:40	2017-04-06 12:23:40	-51	NA
NERR_SN10113973 (2).txt	TRUE	FALSE	NERR-20170320	NB-03	10113973	2017-03-20 07:58:00	2017-04-06 12:10:00	-10	NA
NERR_SN10113984 (7).txt	TRUE	FALSE	NERR-20170320	NB-04	10113984	2017-03-20 11:18:00	2017-04-06 14:28:00	-17	NA
NERR-SN9801564 (12).txt	TRUE	FALSE	NERR-20170320	NB-05	9801564	2017-03-20 10:58:00	2017-04-06 14:12:00	23	NA
NERR-SN9953395 (13).txt	TRUE	FALSE	NERR-20170320	NB-06	9953395	2017-03-20 10:38:00	2017-04-06 14:00:00	0	NA

NERR-SN9953388 (5).txt	TRUE	FALSE	NERR-20170320	NB-07	9953388	2017-03-20 10:26:00	2017-04-06 13:52:00	82	NA
NERR-SN10114006 (6).txt	TRUE	FALSE	NERR-20170320	NB-08	10114006	2017-03-20 10:06:00	2017-04-06 13:38:00	149	NA
NERR-SN10424545 (3).txt	TRUE	FALSE	NERR-20170406	NB-01	10424545	2017-04-06 12:42:00	2017-04-24 08:24:00	20	NA
NERR-SN10505030_0 (2).txt	TRUE	FALSE	NERR-20170406	NB-02	10505030	2017-04-06 12:37:40	2017-04-24 08:09:40	10	NA
NERR_SN10113973 (3).txt	TRUE	FALSE	NERR-20170406	NB-03	10113973	2017-04-06 12:22:00	2017-04-24 07:40:00	-52	NA
NERR_SN10113984 (8).txt	TRUE	FALSE	NERR-20170406	NB-04	10113984	2017-04-06 14:42:00	2017-04-24 10:12:00	-26	NA
NERR-SN9801564_1.txt	TRUE	FALSE	NERR-20170406	NB-05	9801564	2017-04-06 14:26:00	2017-04-24 09:52:00	-73	NA
NERR-SN9953395_0.txt	TRUE	FALSE	NERR-20170406	NB-06	9953395	2017-04-06 14:16:00	2017-04-24 09:30:00	0	NA
NERR-SN9953388_0.txt	TRUE	FALSE	NERR-20170406	NB-07	9953388	2017-04-06 14:06:00	2017-04-24 09:18:00	-61	NA
NERR-SN10114006 (7).txt	TRUE	FALSE	NERR-20170406	NB-08	10114006	2017-04-06 13:54:00	2017-04-24 09:04:00	51	NA
NERR-SN10094428_0 (2).txt	TRUE	FALSE	NERR-20170406	NB-10	10094428	2017-04-06 13:38:00	2017-04-24 08:48:00	-99	NA
NERR-SN10424545_1.txt	TRUE	FALSE	NERR-20170424	NB-01	10424545	2017-04-24 08:38:00	2017-05-11 08:10:00	-3	NA
NERR-SN10505030_0 (3).txt	TRUE	FALSE	NERR-20170424	NB-02	10505030	2017-04-24 08:19:40	2017-05-11 07:57:40	-6	NA
NERR_SN10113973 (4).txt	TRUE	FALSE	NERR-20170424	NB-03	10113973	2017-04-24 07:56:00	2017-05-11 07:44:00	-1	NA
NERR_SN10113984_0.txt	TRUE	FALSE	NERR-20170424	NB-04	10113984	2017-04-24 10:28:00	2017-05-11 10:42:00	-9	NA
NERR-SN9801564_0 (2).txt	TRUE	FALSE	NERR-20170424	NB-05	9801564	2017-04-24 10:06:00	2017-05-11 10:24:00	-51	NA
NERR-SN9953395 (15).txt	TRUE	FALSE	NERR-20170424	NB-06	9953395	2017-04-24 09:40:00	2017-05-11 10:08:00	0	NA
NERR-SN9953388 (7).txt	TRUE	FALSE	NERR-20170424	NB-07	9953388	2017-04-24 09:30:00	2017-05-11 09:54:00	1	NA
NERR-SN10114006_0 (2).txt	TRUE	FALSE	NERR-20170424	NB-08	10114006	2017-04-24 09:20:00	2017-05-11 09:42:00	39	NA
NERR-SN10424545_2.txt	TRUE	FALSE	NERR-20170511	NB-01	10424545	2017-05-11 08:32:00	2017-05-30 08:06:00	64	NA
NERR-SN10505030_1.txt	TRUE	FALSE	NERR-20170511	NB-02	10505030	2017-05-11 08:05:40	2017-05-30 07:55:40	30	NA
NERR_SN10113973_0.txt	TRUE	FALSE	NERR-20170511	NB-03	10113973	2017-05-11 07:58:00	2017-05-30 07:42:00	21	NA
NERR_SN10113984 (10).txt	TRUE	FALSE	NERR-20170511	NB-04	10113984	2017-05-11 10:52:00	2017-05-30 09:48:00	26	NA
NERR-SN9801564 (15).txt	TRUE	FALSE	NERR-20170511	NB-05	9801564	2017-05-11 10:34:00	2017-05-30 09:28:00	-46	2017-05-26
NERR-SN9953395 (16).txt	TRUE	FALSE	NERR-20170511	NB-06	9953395	2017-05-11 10:20:00	2017-05-30 09:12:00	0	NA
NERR-SN9953388_0 (2).txt	TRUE	FALSE	NERR-20170511	NB-07	9953388	2017-05-11 10:06:00	2017-05-30 08:54:00	0	NA
NERR-SN10114006_1.txt	TRUE	FALSE	NERR-20170511	NB-08	10114006	2017-05-11 09:54:00	2017-05-30 08:52:00	-28	NA
NERR-SN10094428 (15).txt	TRUE	FALSE	NERR-20170511	NB-09	10094428	2017-05-11 08:54:00	2017-05-30 08:22:00	31	NA
NERR-SN10424545 (5).txt	TRUE	FALSE	NERR-20170530	NB-01	10424545	2017-05-30 08:22:00	2017-06-15 08:52:00	-7	NA
NERR_SN10113973 (5).txt	TRUE	FALSE	NERR-20170530	NB-03	10113973	2017-05-30 07:52:00	2017-06-15 10:32:00	-31	NA
NERR-SN9953388 (8).txt	TRUE	FALSE	NERR-20170530	NB-07	9953388	2017-05-30 09:20:00	2017-06-15 09:52:00	17	NA
NERR-SN10114006 (10).txt	TRUE	FALSE	NERR-20170530	NB-08	10114006	2017-05-30 09:10:00	2017-06-15 09:42:00	-1	NA
NERR-SN10094428 (16).txt	TRUE	FALSE	NERR-20170530	NB-09	10094428	2017-05-30 08:44:00	2017-06-15 09:08:00	62	NA
SN10331913 (2).txt	TRUE	FALSE	NERR-20170530	NB-10	10331913	2017-05-30 08:54:00	2017-06-15 09:26:00	25	NA
NERR-SN10424545_0 (2).txt	TRUE	FALSE	NERR-20170615	NB-01	10424545	2017-06-15 09:06:00	2017-06-28 08:12:00	32	NA

NERR_SN10113973_0 (2).txt	TRUE	FALSE	NERR-20170615	NB-03	10113973	2017-06-15 11:10:00	2017-06-28 07:42:00	-82	NA
NERR_SN10113984 (11).txt	TRUE	FALSE	NERR-20170615	NB-04	10113984	2017-06-15 10:28:00	2017-06-28 10:06:00	10	NA
NERR-SN9801564 (16).txt	TRUE	FALSE	NERR-20170615	NB-05	9801564	2017-06-15 10:16:00	2017-06-28 09:52:00	49	NA
NERR-SN9953395 (17).txt	TRUE	FALSE	NERR-20170615	NB-06	9953395	2017-06-15 10:14:00	2017-06-28 09:40:00	0	NA
NERR-SN9953388_0 (3).txt	TRUE	FALSE	NERR-20170615	NB-07	9953388	2017-06-15 10:02:00	2017-06-28 09:30:00	28	NA
NERR-SN10114006_0 (3).txt	TRUE	FALSE	NERR-20170615	NB-08	10114006	2017-06-15 09:56:00	2017-06-28 09:14:00	7	NA
NERR-SN10094428_0 (3).txt	TRUE	FALSE	NERR-20170615	NB-09	10094428	2017-06-15 09:20:00	2017-06-28 08:32:00	-56	NA
SN10331913_0.txt	TRUE	FALSE	NERR-20170615	NB-10	10331913	2017-06-15 09:40:00	2017-06-28 09:08:00	12	NA
NERR-SN10424545 (7).txt	TRUE	FALSE	NERR-20170628	NB-01	10424545	2017-06-28 08:24:00	2017-07-13 07:28:00	23	NA
NERR_SN10113973 (7).txt	TRUE	FALSE	NERR-20170628	NB-03	10113973	2017-06-28 07:58:00	2017-07-13 07:08:00	-18	NA
NERR_SN10113984 (12).txt	TRUE	FALSE	NERR-20170628	NB-04	10113984	2017-06-28 10:14:00	2017-07-13 09:06:00	45	NA
NERR-SN9801564 (17).txt	TRUE	FALSE	NERR-20170628	NB-05	9801564	2017-06-28 10:00:00	2017-07-13 08:52:00	4	NA
NERR-SN9953395 (18).txt	TRUE	FALSE	NERR-20170628	NB-06	9953395	2017-06-28 09:50:00	2017-07-13 08:30:00	0	NA
NERR-SN9953388 (10).txt	TRUE	FALSE	NERR-20170628	NB-07	9953388	2017-06-28 09:42:00	2017-07-13 08:20:00	56	NA
NERR-SN10114006 (11).txt	TRUE	FALSE	NERR-20170628	NB-08	10114006	2017-06-28 09:30:00	2017-07-13 08:08:00	20	NA
NERR-SN10094428 (18).txt	TRUE	FALSE	NERR-20170628	NB-09	10094428	2017-06-28 08:44:00	2017-07-13 07:44:00	73	NA
SN10331913 (3).txt	TRUE	FALSE	NERR-20170628	NB-10	10331913	2017-06-28 09:18:00	2017-07-13 07:56:00	1	NA
NERR-SN10424545 (8).txt	TRUE	FALSE	NERR-20170713	NB-01	10424545	2017-07-13 07:42:00	2017-07-26 07:38:00	68	NA
SC_SN10113974 (2).txt	TRUE	FALSE	NERR-20170713	NB-02	10113974	2017-07-13 07:27:00	2017-07-26 07:20:00	58	NA
NERR_SN10113973 (8).txt	TRUE	FALSE	NERR-20170713	NB-03	10113973	2017-07-13 07:20:00	2017-07-26 07:06:00	48	NA
NERR_SN10113984 (13).txt	TRUE	FALSE	NERR-20170713	NB-04	10113984	2017-07-13 09:18:00	2017-07-26 09:26:00	51	NA
NERR-SN9801564 (18).txt	TRUE	FALSE	NERR-20170713	NB-05	9801564	2017-07-13 09:06:00	2017-07-26 09:06:00	30	NA
NERR-SN9953395 (19).txt	TRUE	FALSE	NERR-20170713	NB-06	9953395	2017-07-13 08:38:00	2017-07-26 08:52:00	0	NA
NERR-SN9953388 (11).txt	TRUE	FALSE	NERR-20170713	NB-07	9953388	2017-07-13 08:30:00	2017-07-26 08:34:00	24	NA
NERR-SN10114006 (12).txt	TRUE	FALSE	NERR-20170713	NB-08	10114006	2017-07-13 08:24:00	2017-07-26 08:24:00	44	NA
NERR-SN10094428 (19).txt	TRUE	FALSE	NERR-20170713	NB-09	10094428	2017-07-13 07:54:00	2017-07-26 07:54:00	-25	NA
SN10331913 (4).txt	TRUE	FALSE	NERR-20170713	NB-10	10331913	2017-07-13 08:12:00	2017-07-26 08:08:00	33	NA
NERR-SN10424545 (10).txt	TRUE	FALSE	NERR-20170726	NB-01	10424545	2017-07-26 07:52:00	2017-08-04 07:22:00	-5	NA
SC_SN10113974 (3).txt	TRUE	FALSE	NERR-20170726	NB-02	10113974	2017-07-26 07:31:00	2017-08-04 07:12:00	-16	NA
NERR_SN10113973 (10).txt	TRUE	FALSE	NERR-20170726	NB-03	10113973	2017-07-26 07:16:00	2017-08-04 06:58:00	30	NA
NERR_SN10113984 (15).txt	TRUE	FALSE	NERR-20170726	NB-04	10113984	2017-07-26 09:32:00	2017-08-04 08:40:00	41	NA
NERR-SN9801564 (20).txt	TRUE	FALSE	NERR-20170726	NB-05	9801564	2017-07-26 09:16:00	2017-08-04 08:28:00	-59	NA
NERR-SN9953395 (21).txt	TRUE	FALSE	NERR-20170726	NB-06	9953395	2017-07-26 09:04:00	2017-08-04 08:18:00	0	NA
NERR-SN9953388 (13).txt	TRUE	FALSE	NERR-20170726	NB-07	9953388	2017-07-26 08:48:00	2017-08-04 08:10:00	33	NA
NERR-SN10114006 (14).txt	TRUE	FALSE	NERR-20170726	NB-08	10114006	2017-07-26 08:34:00	2017-08-04 07:52:00	2	NA

NERR-SN10094428 (21).txt	TRUE	FALSE	NERR-20170726	NB-09	10094428	2017-07-26 08:04:00	2017-08-04 07:36:00	5	NA
SN10331913 (6).txt	TRUE	FALSE	NERR-20170726	NB-10	10331913	2017-07-26 08:26:00	2017-08-04 07:38:00	-10	NA
NERR-SN10424545_0 (4).txt	TRUE	FALSE	NERR-20170804	NB-01	10424545	2017-08-04 07:34:00	2017-09-03 10:12:00	-36	NA
SC_SN10113974_0 (2).txt	TRUE	FALSE	NERR-20170804	NB-02	10113974	2017-08-04 07:20:00	2017-08-19 08:34:00	-42	NA
NERR_SN10113973_1.txt	TRUE	FALSE	NERR-20170804	NB-03	10113973	2017-08-04 07:08:00	2017-08-17 20:00:00	7	NA
NERR_SN10113984_0 (4).txt	TRUE	FALSE	NERR-20170804	NB-04	10113984	2017-08-04 08:48:00	2017-09-03 11:24:00	-4	NA
NERR-SN9801564_0 (4).txt	TRUE	FALSE	NERR-20170804	NB-05	9801564	2017-08-04 08:42:00	2017-09-03 11:16:00	38	NA
NERR-SN9953395_0 (3).txt	TRUE	FALSE	NERR-20170804	NB-06	9953395	2017-08-04 08:28:00	2017-09-03 11:06:00	0	NA
NERR-SN9953388_0 (5).txt	TRUE	FALSE	NERR-20170804	NB-07	9953388	2017-08-04 08:20:00	2017-09-03 10:54:00	95	NA
NERR-SN10114006_0 (5).txt	TRUE	FALSE	NERR-20170804	NB-08	10114006	2017-08-04 08:10:00	2017-09-03 10:40:00	33	NA
ForceOffload_SN10094428_txt_B.txt	TRUE	FALSE	NERR-20170804	NB-09	10094428	2017-08-04 07:44:00	2017-09-03 10:22:00	37	NA
SN10331913_0 (3).txt	TRUE	FALSE	NERR-20170804	NB-10	10331913	2017-08-04 07:54:00	2017-09-03 10:36:00	-11	NA
NERR-SN9801562 (9).txt	TRUE	TRUE	NA	NA	9801562	NA	NA	NA	NA
NERR-SN9801564 (13).txt	TRUE	TRUE	NA	NA	9801564	NA	NA	NA	NA
NERR-SN9801564 (19).txt	TRUE	TRUE	NA	NA	9801564	NA	NA	NA	NA
NERR-SN9801564 (9).txt	TRUE	TRUE	NA	NA	9801564	NA	NA	NA	NA
NERR-SN9801564_0 (3).txt	TRUE	TRUE	NA	NA	9801564	NA	NA	NA	NA
NERR-SN9801564_0.txt	TRUE	TRUE	NA	NA	9801564	NA	NA	NA	NA
NERR-SN9953388 (12).txt	TRUE	TRUE	NA	NA	9953388	NA	NA	NA	NA
NERR-SN9953388 (9).txt	TRUE	TRUE	NA	NA	9953388	NA	NA	NA	NA
NERR-SN9953388.txt	TRUE	TRUE	NA	NA	9953388	NA	NA	NA	NA
NERR-SN9953388_0 (4).txt	TRUE	TRUE	NA	NA	9953388	NA	NA	NA	NA
NERR-SN9953395 (14).txt	TRUE	TRUE	NA	NA	9953395	NA	NA	NA	NA
NERR-SN9953395 (20).txt	TRUE	TRUE	NA	NA	9953395	NA	NA	NA	NA
NERR-SN9953395_0 (2).txt	TRUE	TRUE	NA	NA	9953395	NA	NA	NA	NA
NERR-SN10094428 (17).txt	TRUE	TRUE	NA	NA	10094428	NA	NA	NA	NA
NERR-SN10094428 (20).txt	TRUE	TRUE	NA	NA	10094428	NA	NA	NA	NA
NERR-SN10094428 (9).txt	TRUE	TRUE	NA	NA	10094428	NA	NA	NA	NA
NERR-SN10094428_0 (4).txt	TRUE	TRUE	NA	NA	10094428	NA	NA	NA	NA
NERR_SN10094433 (11).txt	TRUE	TRUE	NA	NA	10094433	NA	NA	NA	NA
NERR_SN10094433 (9).txt	TRUE	TRUE	NA	NA	10094433	NA	NA	NA	NA
NERR_SN10113973 (11).txt	TRUE	TRUE	NA	NA	10113973	NA	NA	NA	NA
NERR_SN10113973 (6).txt	TRUE	TRUE	NA	NA	10113973	NA	NA	NA	NA
NERR_SN10113973 (9).txt	TRUE	TRUE	NA	NA	10113973	NA	NA	NA	NA
NERR_SN10113973_0 (3).txt	TRUE	TRUE	NA	NA	10113973	NA	NA	NA	NA
SC_SN10113974 (4).txt	TRUE	TRUE	NA	NA	10113974	NA	NA	NA	NA
SC_SN10113974.txt	TRUE	TRUE	NA	NA	10113974	NA	NA	NA	NA
SC_SN10113974_0.txt	TRUE	TRUE	NA	NA	10113974	NA	NA	NA	NA
NERR_SN10113984 (14).txt	TRUE	TRUE	NA	NA	10113984	NA	NA	NA	NA
NERR_SN10113984 (9).txt	TRUE	TRUE	NA	NA	10113984	NA	NA	NA	NA
NERR_SN10113984_0 (2).txt	TRUE	TRUE	NA	NA	10113984	NA	NA	NA	NA
NERR_SN10113984_0 (3).txt	TRUE	TRUE	NA	NA	10113984	NA	NA	NA	NA
NERR-SN10114006 (13).txt	TRUE	TRUE	NA	NA	10114006	NA	NA	NA	NA
NERR-SN10114006 (8).txt	TRUE	TRUE	NA	NA	10114006	NA	NA	NA	NA
NERR-SN10114006 (9).txt	TRUE	TRUE	NA	NA	10114006	NA	NA	NA	NA
NERR-SN10114006_0 (4).txt	TRUE	TRUE	NA	NA	10114006	NA	NA	NA	NA
SN10331913 (5).txt	TRUE	TRUE	NA	NA	10331913	NA	NA	NA	NA
SN10331913.txt	TRUE	TRUE	NA	NA	10331913	NA	NA	NA	NA
SN10331913_0 (2).txt	TRUE	TRUE	NA	NA	10331913	NA	NA	NA	NA
NERR-SN10424545 (11).txt	TRUE	TRUE	NA	NA	10424545	NA	NA	NA	NA
NERR-SN10424545 (6).txt	TRUE	TRUE	NA	NA	10424545	NA	NA	NA	NA
NERR-SN10424545 (9).txt	TRUE	TRUE	NA	NA	10424545	NA	NA	NA	NA
NERR-SN10424545.txt	TRUE	TRUE	NA	NA	10424545	NA	NA	NA	NA
NERR-SN10424545_0 (3).txt	TRUE	TRUE	NA	NA	10424545	NA	NA	NA	NA
NERR-SN10424545_0.txt	TRUE	TRUE	NA	NA	10424545	NA	NA	NA	NA
NERR-SN10505030 (14).txt	TRUE	TRUE	NA	NA	10505030	NA	NA	NA	NA

NERR-SN10505030 (9).txt	TRUE	TRUE	NA	NA	10505030	NA	NA	NA	NA
NERR-SN10505035 (9).txt	TRUE	TRUE	NA	NA	10505035	NA	NA	NA	NA
NERR-SN9801564_delete_this.txt	FALSE	FALSE	NA	NA	9801564	NA	NA	NA	NA
NERR-SN10094428 (13).txt	FALSE	FALSE	NA	NA	10094428	NA	NA	NA	NA
NERR-SN10094428 (6).txt	FALSE	FALSE	NA	NA	10094428	NA	NA	NA	NA
SC_SN10113974_0 (3).txt	FALSE	FALSE	NA	NA	10113974	NA	NA	NA	NA
NERR_SN10113981_0.txt	FALSE	FALSE	NA	NA	10113981	NA	NA	NA	NA

APPENDIX D: CURRENT DIRECTION ADJUSTMENTS

The following plots depict the direction adjustments made to the current data at each station for each deployment. Each segment represents a 15 degree direction bin. Segment lengths indicate mean velocity of water moving in the respective direction (a scale value giving the maximum value of the x- and y-axes is given for each set of plots). Segment colors differentiate between bins dominated by measurements made during high water (blue), low water (orange), or neither (gray). Segment transparency represents the relative number of all values falling into the direction bin, with darker segments representing more values.

To calculate the adjustments, the direction data were aligned with water level data from the NOAA monitoring station 8775296 at the USS Lexington in Corpus Christi Bay (<https://tidesandcurrents.noaa.gov/stationhome.html?id=8775296>). Alignment was accomplished by shifting the time-series by whichever lag produced the highest absolute cross-correlation coefficient between the direction data and water level data. The direction data for each deployment at each station were divided into 15 degree bins and the number of measurements in each bin aligned with the highest and the lowest daily water level quantiles were tallied. The number of degrees each dataset needed to be rotated to align with the overall median high and low water level directions for each station was then calculated. Direction adjustment estimates were done for each station except NB-06, where current speeds were generally too low to get reliable direction readings.

Station NB-01		Scale: 20 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-02		Scale: 10 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-03		Scale: 10 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-04		Scale: 10 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-05		Scale: 5 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-06		Scale: 5 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-07		Scale: 5 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-08		Scale: 25 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-09		Scale: 5 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

Station NB-10		Scale: 20 cm s ⁻¹	
Deployment ID	Direction adjustment	Raw	Adj
NERR-20160629			
NERR-20160714			
NERR-20160802			
NERR-20160825			
NERR-20160909			
NERR-20160928			
NERR-20161020			
NERR-20161110			
NERR-20161201			
NERR-20161213			
NERR-20170111			
NERR-20170201			
NERR-20170303			
NERR-20170320			
NERR-20170406			
NERR-20170424			
NERR-20170511			
NERR-20170530			
NERR-20170615			
NERR-20170628			
NERR-20170713			
NERR-20170726			
NERR-20170804			

