The National Academies of SCIENCES ENGINEERING MEDICINE

GULF RESEARCH PROGRAM

Project Title: Building Coastal Community Subject Matter Expert Capacity through an Innovative "Citizen Science" Program to Collect Quantitative Beach Dynamic and Tar Ball Data for Oil Spill Planning and Response in Coastal Regions with Offshore Oil and Gas Operations
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I.   PROJECT SUMMARY (from proposal)

The strategic objective of this exploratory project is to test a community-based, shoreline data generation program to collect valuable pre-spill data and for community groups and volunteers to better understand the local shoreline environments through interactive training and collaboration with experienced shoreline oil-spill response scientists and coastal geomorphologists. This innovative and non-traditional approach to the generation of high quality and valuable pre-spill time-series field data will translate science from the technical realm to the community and simultaneously generate better quantitative data for planners and responders to mitigate and adapt to potential chronic oil spill effects. This capability-building concept would provide new perspectives for communities and enable them to understand better the shoreline environment, the disruption caused by oil spills, the potential subsequent environmental changes and socio-economic impacts, as well as the risks and the decision process after an oil spill as they would become local "citizen scientists" and Subject Matter Experts who could take a lead and manage important data to improve oil spill preparedness and response.

The tools for this type of data collection are straightforward and, on the basis of our experience, readily transferable from the technical to non-technical realms. Community members can learn first-hand the key geological and oceanographic parameters that influence oil behavior and treatment options. This program will test the ability of community groups to collect two critical key data sets that typically are lacking at the time of a spill response: Seasonal Beach and Sediment Dynamics, and Background Shoreline Oiling. Local community groups will learn and understand the value of the data required for effective spill treatment plans. This proposed project will explore and test a non-traditional and novel technique to collaborative, interactive, cross-disciplinary (geology, oceanography) shoreline monitoring

to generate long-term, valuable, quantitative, shoreline data that currently do not exist for oil spill planning and to mitigate oil spill stresses.

The proposed first phase is to engage Louisiana decision making end-users (e.g. LOSCO, NOAA), and community leaders (e.g. Town of Grand Isle) and volunteers. The second phase would build on this effort and refine and apply the method for community groups in the Bon Secours/Dauphin Island area of Alabama. An outcome of this Pilot Study would be a generic program template that could be applied and benefit coastal communities throughout the Gulf of Mexico and other coastal regions in the US Outer Continental Shelf that may be influenced by offshore Oil and Gas operations.

This innovative approach breaks new ground because traditionally this type of data and information on shoreline character and dynamics: 1) is collected by scientists or academics, 2) is rarely available and not generated until a spill incident occurs, and 3) is not typically translated from the technical realm to the local community level. New insights into the dynamics of local shoreline environments and oil behavior will be based on community-generated, quantitative data that can be integrated into existing and future scientific coastal environmental databases.

II.   PROJECT SUMMARY (from final report)

The primary objective of the project was to test whether a community-based, shoreline data generation program could collect valuable pre-spill data and for community members to gain an understanding of the local shoreline environments through interaction with experienced shoreline oil-spill response scientists and coastal geomorphologists. Background sediment dynamics and oiling conditions are typically lacking during oil-spill responses but important for spill response efforts.

This project developed an innovative community-based approach for documenting shoreline processes. Community members in Dauphin Island, Alabama were trained and mentored by oil spill and coastal geomorphology experts to collect shoreline data using a simple, beach profiling method, hand-held geographic positioning units, and cameras.

Cycles of deposition and erosion were documented providing an understanding of beach dynamics, critical when evaluating whether burial or remobilization of oil may take place. Participants also learned to identify tar balls and collected tar ball distribution data during the surveys, providing the first year-long perspective of background oiling on sections of Dauphin Island.

These data are publicly available to contingency planners, responders, and researchers. Data products processed during 2018 are available for view and download at the University of New Orleans long-term repository https://dauphin.cs.uno.edu/. Our approach provides a template for other communities who wish to build a coastal citizen science program that generates critically important baseline data for local shoreline spill response efforts.

III. PROJECT RESULTS

<u>Accomplishments</u>
The fundamental problem addressed by the project is the need for critical baseline data sets typically lacking at the time of a spill response. These data include seasonal beach and sediment dynamics, and background shoreline oiling. The strategic objective of this exploratory project is to test a community-based, shoreline data generation program to collect valuable pre-spill data and for community groups and volunteers to better understand the local shoreline environments through interactive training and collaboration with experienced shoreline oil-spill response scientists and coastal geomorphologists. This innovative and non-traditional approach brings science from the technical realm to the community and simultaneously generates quantitative data for planners and responders to mitigate and adapt to potential chronic and acute oil spill effects. This approach also builds capacity in the community to become local "citizen scientists" and Subject Matter Experts who can take a lead and manage important data to improve oil spill preparedness and response.

The primary objective of Year 1 was to develop and test the effectiveness of a community-based shoreline data collection program on Grand Isle Louisiana, the only inhabited barrier shoreline of coastal Louisiana. Specifically, the Year 1 goals were to:
1) establish a Grand Isle citizen scientist group that resides in the community,
2) educate the group about coastal processes and oil spill responses, and
3) teach the citizen scientists how to regularly collect beach profile elevation data and shoreline oiling conditions.

Building on this first phase, the primary objective of Year 2 was to apply lessons learned in Year 1 and follow similar steps to establish a citizen science program in Dauphin Island, Alabama, to collect the same data types, and refine the process in order to create a template for replication in other coastal communities.

In year 2, community members in Dauphin Island, Alabama were trained and mentored by oil spill response and coastal geomorphology experts to collect shoreline data using a simple, standard beach profiling method with inexpensive tools, hand-held GPS units, and cameras.

The project provided educational opportunities and field-based training for citizen scientists to build knowledge and develop the skills to collect valuable data to inform the oil spill response community. Community members attended a series of workshops addressing (1) key factors affecting the nearshore environment, (2) coastal spill science and response strategies, and (3) field training in shoreline data collection.

Results
Year 1 was designed as a pilot study, allowing for mid-course corrections and enabling protocol and implementation refinements to be applied to the second-year extension into Alabama. This in turn provides the basis for the design of a program template.

Results in year 1 included the discovery that Grand Isle did not meet the criteria necessary for the development of a citizen science program inasmuch that few community volunteers came forth with interest in participating, in spite of our repeated attempts to generate interest.

In contrast, in year 2, the mayor of Dauphin Island offered immediate support and a team of citizen science volunteers quickly emerged in the Dauphin Island community. After initial training the group demonstrated a strong capacity for collecting and recording accurate and reliable data. Shoreline data were collected at least once a month at seven Gulf beach transects to build a picture of the shoreline dynamics and background oiling present on the Gulf shoreline of the island.

Cycles of sediment deposition and erosion were documented by the volunteers, providing an understanding of seasonal beach dynamics, which becomes critical when evaluating whether burial or remobilization of oil may take place. Participants also learned how to identify tar balls and collected tar ball distribution data during the beach surveys, providing the first year-long perspective of background oiling data on select sections of Dauphin Island.

The citizen scientists have generated important datasets for the program. These data are being compiled for long-term preservation and will be made publicly available for all end-users including contingency planners, responders, and researchers.

All data products processed during 2018 are available for view and download at the University of New Orleans long-term repository https://dauphin.cs.uno.edu/. These data include elevation surveys, tarball surveys and photos and are organized by geolocation and date that the survey was completed.

These data will additionally be archived within NOAA's NCEI (National Centers for Environmental Information) to be easily referenced through metadata written in ISO (19115-2).

One key outcome of this program is a generic program template that can be applied to benefit coastal communities throughout the Gulf of Mexico and other US Outer Continental Shelf areas with oil and gas operations.

A second key outcome, and a key tangible product of this program, was generation of a background data base on beach dynamics and background tar ball oiling conditions, which could be used by coastal scientists and oil spill planners. There exists a substantial need for such data with the possibility of future significant changes to the beaches of sandy barrier systems along coastal Gulf of Mexico states due to relative sea level rise and tropical cyclones. Further there is a lack of long-term background oiling conditions along these shorelines and therefore no basis for comparison should future oil spills occur.

The citizen science team in Dauphin Island is continuing to collect data after the end of the project and we additionally developed a similar program along the Florida Panhandle using lessons learned in Dauphin Island.

Implications
The success of this project indicates that citizen scientist groups can readily be developed and effectively collect robust environmental datasets. The data sets generated by the citizen science programs of this project have the potential to inform oil spill responders, state and federal agencies, and coastal researchers seeking baseline oiling and shoreline data on the Gulf coast, which may lead to new collaborations for members of the project team. The project team members have been introduced to and communicated about the project with a large number of people from Gulf Coast agencies and organizations.

The project team has gained a much more solid understanding of what it takes to set up an effective citizen scientist group and a much broader appreciation of how high quality coastal data can be developed by such groups. The template we have developed provides guidance for development of any type of citizen scientist program, regardless of the discipline involved and may influence how others undergo setting up similar citizen program. For example, one of our learning outcomes for a sustainable citizen science program is that there needs to be a core team to manage volunteer coordination as well as data management. Development of streamlined methods for data recording, QA/QC and storage, as well as public access are critical.

Unexpected Results
Initial expectations for developing a citizen science program in the Grand isle, Louisiana community in year one of the project were based on the projects team's prior experiences working in this community. After initial exploration, these expectations had to be rethought after numerous attempts to secure interest from volunteers were unsuccessful.

The key assumption was that there would be enough residents of Grand Isle with an interest in volunteering and learning about the island geomorphology and oil spill impacts. Although unexpected, the result was instructive and provided a basis for developing guidelines that could be used in the future when choosing coastal communities in which to work.

Project Relevance
The following audiences would be most interested in the results of this project:
- Researchers
- Educators
- Community Leaders
- Local Government Officials
- State Government Officials
- Federal Government Officials
- Non-Profit Private Sector
- For-Profit Private Sector

The data generated by the citizen science program and made publicly available has the potential for value to all individuals and agencies who are interested in seasonal beach dynamics and background oiling conditions, including oil spill contingency planners, oil spill responders, and coastal science researchers. The types of data that this project has been generating provides baseline data that is

informative during the development of spill contingency plans as well as during actual response efforts. Additionally, because we developed a template for the establishment of a citizen scientist group the project may be of interest to educators who are considering similar types of programs.

Education and Training
Number of students, postdoctoral scholars, or educational components involved in the project:
- Undergraduate students: 2
- Graduate students: 3
- Postdoctoral scholars: 0
- Other educational components: 15

IV. DATA AND INFORMATION PRODUCTS
This project produced data and information products of the following types:
- Data
- Information Products
- Scholarly publications, reports or monographs, workshop summaries or conference proceedings
- Websites or data portals
- Curricula for education and training
- Software packages or digital tools, or other interactive media

DATA

Data Management Report:
See attached Data Management Report.

Relationships Between Data Sets:
Within the Data Management Reporting workbook all three listed data sets align to raw data gathered by survey teams throughout the course of the project. The dataset listed in A5-K5 of the reporting table are the elevation surveys generated using the Emery Method. They are described by date, time (CST), and geolocation. The cumulative horizontal distance was calculated in meters and the change in elevation in centimeters. In conjunction with the elevation surveys are tarball sightings; however, there were some elevation surveys where either no tarball survey was conducted (due to incoming weather or other constraints) or a survey was conducted but no tarballs were sighted. When a tarball survey resulted in a positive identification it is noted in the tarball survey dataset, which is located in A6-K6 of the Data Management Reporting workbook. The tarball survey data only accounts for positive sightings of background oiling. A7-K7 refers to photographs generated throughout the project. Each survey had a minimum of 4 photographs taken in designated areas, which are outlined in the volunteer manual. (Note: A few exceptions occurred due to batteries dying in the field and file corruption). Within the data portal, photographs are associated to a specific transect site and survey date, they are all available for viewing or for download.

Additional Documentation Produced to Describe Data:
Final technical report, metadata processes, beach volume changes, and volunteer manuals

Other Activities to Make Data Discoverable:
During the course of the project a website: https://sites.google.com/view/dicitizenscience/ and social media page through Facebook "Dauphin Island Citizen Science Beach Monitoring Program" found @DIcitizenscience were generated to promote social engagement and open idea flow among the community. This allowed us to find future citizens scientists while generating a platform for people to learn about project goals. Within these sites are links to the data portal/repository: https://dauphin.cs.uno.edu/, housed at the Canizaro Livingston Gulf States Center for Environmental Informatics (GulfSCEI) on the University of New Orleans campus. Within the data portal any potential end user can download either full datasets or query specific dates and survey locations. Additionally, the metadata, which will be stored at NCEI will have direct links to these data. All data can be downloaded in the form of an Excel workbook, or in the case of the photographs a jpeg file. Through these platforms the data generated from the project will be available for public consumption.

Beyond making the data publicly accessible, we have made efforts to ensure others are aware of the project through conference proceedings, notifications in the local paper, and a community meeting. An oral presentation was given at the Bays and Bayous symposium held in Mobile, AL where academics, federal and state officials, and non-profit personnel were in the audience. A poster will be presented at AMOP Technical Seminar on Environmental Contamination and Response, June 4-6 in Halifax, Canada. Additionally, a community meeting was held on September 14, 2018 to inform the general public, local government, federal and state oil spill response personnel, and academics. Additionally, a notice in the Town Crier, Dauphin Island's local newsletter will be posted with project updates and results.

Sensitive, Confidential, or Proprietary Data:
N/A

INFORMATION PRODUCTS

Information Products Report:
See attached Information Products Report.

Citations for Project Publications, Reports and Monographs, and Workshop and Conference Proceedings:
Owens, E.O., Kulp, M.A., MayGarden, D., Miller, C., Ownes, T., and Scott, T., 2019, Shoreline change and tarball data for pre-spill planning collected by a Dauphin Island citizen scientist group, International Oil Spill Conference, New Orleans, LA, to be submitted.

Kulp, M.A., Owens, E., Maygarden, D., Miller, C., and Glushik, L., 2019, The creation of citizen scientist groups as an invaluable approach to pre-impact response planning: an example from Dauphin Island, Alabama, USA, Amop Technical Seminar on Environmental Contamination and Response, Halifax, Canada, accepted for publication.

Miller, C., Maygarden, D., Kulp, M.A., Owens, E., and Glushik, L., 2018, Dauphin Island Citizen Science Program: Assessing Shoreline Change and Background Oiling Data for Spill Response and Planning, 2018 Alabama Mississippi Bays and Bayous Symposium, Mobile, Alabama.

University of New Orleans and Owens Coastal Consulting, 2018, Beach profile and tar ball monitoring for oil spill response planning: Dauphin Island volunteer manual, Gulf Research Program Grant #200007351, 49 pp.

University of New Orleans and Owens Coastal Consulting, 2018, Beach profile and tar ball monitoring for oil spill response planning: Florida volunteer manual, Gulf Research Program Grant #200007351, 46 pp.

University of New Orleans and Owens Coastal Consulting, 2019, Dauphin Island 2018 citizen science shoreline monitoring program: Technical Report, Gulf Research Program Grant #200007351, 35 pp.

Websites and Data Portals:
https://dauphin.cs.uno.edu/ Canizaro Livingston Gulf States Center for Environmental Informatics at the University of New Orleans

Additionally metadata with links to the Canizaro Livingston center will be housed with NOAA at National Centers for Environmental Information (NCEI). Work is continuing on the metadata and completion was temporarily interrupted by the 2019 US government shutdown.

Indefinitely. The Canizaro Livingston Gulf States Center for Environmental Informatics at the University of New Orleans where the data are currently housed is a permanent center within the University.

NCEI is a permanently funded component of NOAA.

Additional Documentation Produced to Describe Information Products:
N/A

Other Activities to Make Information Products Accessible and Discoverable:
We have advertised our work through presentations at professional meetings, will be advertising our data and data portals through a Dauphin Island town newsletter, have provided links on social media, and conducted a fall 2018 town hall meeting with representatives from the Dauphin Island community, US Coast Guard Mobile Sector, and Florida SeaGrant.

Confidential, Proprietary, Specially Licensed Information Products:
Yes

V. PUBLIC INTEREST AND COMMUNICATIONS

Most Unique or Innovative Aspect of the Project
The most innovative aspect of the project is the ability demonstrated by the volunteers to successfully collect accurate shoreline change and background oiling data, a task which is typically performed by the technical community. The project's results demonstrate that, with adequate training and support, a group of citizen scientists can create a data set for a dynamic shoreline, which provides valuable baseline data for coastal managers and oil spill responders. In addition, the citizen science team in Dauphin Island indicated that their involvement in the program empowered them by providing an

understanding of the oil spill response process, as well as a greater appreciation of shoreline processes, which they are able to share with others in their community.

Most Exciting or Surprising Thing Learned During the Project

1) The most interesting take-away was a renewed appreciation for what is necessary for a successful citizen science program that is truly community-based. The support of the Dauphin Island community, where we received a very positive response and were able to quickly assemble enough volunteers, was the most exciting part of the project. More recently the enthusiasm for building a new program shown by communities in the Florida Panhandle is also exciting and demonstrates that there are more communities where this concept could easily be developed.

2) One of the things I found exciting during the course of the project was watching the volunteers grow through the experience. At the beginning some people could not work a GPS or were having a hard time remembering which stake to read off of during elevation surveying. They have now become so proficient that they have taught a new group of volunteers. This indicates that with the right group of people the program can be sustainable. Additionally, it is not just about collecting the data and making friends for them…they want to see what the results are and have been actively engaged in evaluating the data with our help and guidance. Also, this project is a platform where community members from different educational, political, and religious backgrounds can come together to work toward a common goal (innovative and unique in its own right). The synergy created through such a dynamic fosters community engagement that transcends socio-political barriers.

Most Important Outcome or Benefit of Project

In addition to the value of the actual data generated by the citizen science program, the empowerment of the volunteers through the educational aspects of the project is the most important outcome. The volunteers expressed ways in which they had personally gained from involvement in the project. We conducted an informal survey to understand better what aspects of the project resonated most with the team. "Being part of a team collecting valuable data for the community" was an aspect within which most volunteers felt they had gained the most. They also expressed that they were much better informed about the oil spill response process and understood and appreciated shoreline processes affecting Dauphin Island much better as a result of participation in the program. The Dauphin Island citizen scientists demonstrated that they were able to meet the challenge of collecting quality data and to sustain the effort throughout an entire year to date.

Communications, Outreach, and Dissemination Activities of Project

Yes, in the February and September editions of the Town Crier, Dauphin Island's monthly, community-wide newsletter. The newsletter archive can be found at: Town Crier (http://townofdauphinisland.org/updates-and-events/newsletters). Additionally, a website (https://sites.google.com/view/dicitizenscience/) was generated as well as a Facebook page ("Dauphin Island Citizen Science Beach Monitoring Program") to serve as a communication platform. An oral presentation was given by the undergraduate student worker of this project at the Bays and Bayous symposium held in Mobile, AL where academics, federal and state officials, and non-profit personnel were in the audience. A poster will be presented at the AMOP Technical Seminar on Environmental Contamination and Response, June 4-6 in Halifax, Canada. An abstract will also be submitted to the fall

2019 International Oil Spill Conference in New Orleans. Additionally, a widely advertised community meeting was held on September 14, 2018 to inform the general public, local government, federal and state oil spill response personnel, and academics about our project.

Data Report

DataType	DigitalResourceType	Title	FileName	Creators	PointofContact	PublicationYear	RepositoryName	DOIorPersistentURL	Keywords	Publications
Earth and Environmental Sciences	Tabular/Spreadsheet	Dauphin Island Elevation Survey	All Elevation Data	Kulp, Mark; Miller, Carrie; Maygarden, Diane; Owens, Ed	PI	2019	Canizaro Livingston Gulf States Center for Environmental Informatics; University of New Orleans	https://dauphin.cs.uno.edu/transects	beach profile, citizen science, Sediment transport, longshore transport	N/A
Earth and Environmental Sciences	Tabular/Spreadsheet	Dauphin Island Tarball Survey	All Tarball Data	Kulp, Mark; Miller, Carrie; Maygarden, Diane; Owens, Ed	PI	2019	Canizaro Livingston Gulf States Center for Environmental Informatics; University of New Orleans	https://dauphin.cs.uno.edu/transects	Sediment transport, Barrier Islands, Coastal Processes, Citizen Science, Background Oiling, Tarball	N/A
Earth and Environmental Sciences	Images	Dauphin Island Survey Photographs	Profile Images	Kulp, Mark; Miller, Carrie; Maygarden, Diane	PI	2019	Canizaro Livingston Gulf States Center for Environmental Informatics; University of New Orleans	https://dauphin.cs.uno.edu	Barrier Islands, Coastal Processes, Citizen Science, Background Oiling	N/A

Information Products Report

InfoProductType	DigitalResourceType	Title	FileName	Creators	PublicationYear	Publisher	RepositoryName	PersistentURL	DatasetReference
Website or Data Portals	Web Based Resource	Dauphin Island Data Portal		Miller, Carrie; Cooper, Nathan; Kulp, Mark; Maygarden, Dinah	2018	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/	N/A
Workshop or Conference Proceeding	Text	Oral Abstract; Bays and Bayous Symposium 2018, Mobile, AL	Dauphin Island Citizen Science Program: Assessing Shoreline Change and Background Oiling Data for Spill Response and Planning	Miller, Carrie; Maygarden, Diane; Kulp, Mark; Owens, Ed; Glushik, Lauren	2018	2018 Alabama Mississippi Bays and Bayous Symposium	Bays and Bayous	https://bbs.baysandbayous.com/ https://dauphin.cs.uno.edu/	https://dauphin.cs.uno.edu/
Workshop or Conference Proceeding	Text	Poster Abstract; AMOP Technical Seminar on Environmental Contamination and Response; June 4-6,2019; Halifax, Canada	The Creation of Citizen Scientist Groups as an Approach to Pre-impact Response Planning: An Example from Dauphin Island, Alabama, USA	Kulp, Mark; Owens, Ed; Maygarden, Dinah; Miller, Carrie	2019	AMOP	AMOP (Canada)	https://www.canada.ca/en/environment-climate-change/services/science-technology/arctic-marine-oilspill-program/final.html https://dauphin.cs.uno.edu/	https://dauphin.cs.uno.edu/
Report or Monograph	Text	Alabama Volunteer Manual	Alabama DIPS Volunteer Manual_2018	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie	2018	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/resources/Alabama%20DIPS%20Volunteer%20Manual_2018.pdf	https://dauphin.cs.uno.edu/
Report or Monograph	Text	Non-technical Summary	1_page_nontech_summary	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie	2018	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/resources/1_page_nontech_summary.pdf	N/A
Report or Monograph	Text	Beach Profile Volunteer Checklist	Beach Profile Checklist	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie	2018	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/resources/Beach%20Profile%20Checklist.pdf	N/A
Report or Monograph	Text	Dauphin Island Elevation Profile and Tarball data sheet (blank)	Dauphin Island_Profile-Tarball_Form	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie	2018	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/resources/Dauphin%20Island_Profile-Tarball_Form.pdf	N/A
Report or Monograph	Text	Dauphin Island Shoreline Monitoring program flyer	Electronic (Web) Flyer_Dauphin Island Shoreline Monitoring Program	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie	2018	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/resources/Electronic(Web)%20Flyer_Dauphin%20Island%20Shoreline%20Monitoring%20Program.pdf	N/A
Report or Monograph	Text	JSA(Job Survey Analysis)- Survey Safety Sheet	JSA_2018 Dauphin Island Beach Monitoring form	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie	2018	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/resources/JSA_2018%20Dauphin%20Island%20Beach%20Monitoring%20form.pdf	N/A
Report or Monograph	Image	DI Profile Sweep: Volume change	DI_Profile Sweep_2018	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie	2019	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/	https://dauphin.cs.uno.edu/
Report or Monograph	Text	Shoreline change and tarball data for pre-spill planning collected by a Dauphin Island citizen scientist group	Shoreline change and tarball data for pre-spill planning collected by a Dauphin Island citizen scientist group	Owens, E.O., Kulp, M.A., Maygarden, D., Miller, C., Owens, T., and Scott, T.	2019 to be submitted	International Oil Spill Conference 2019	2019 International Oil Spill Conference, New Orleans, LA	http://iosc.org/ https://dauphin.cs.uno.edu/	https://dauphin.cs.uno.edu/
Report or Monograph	Text	Florida Volunteer Manual	Florida Volunteer Manual 2018	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie	2018	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/resources/Florida%20Volunteer%20Manual_2018.pdf	https://dauphin.cs.uno.edu/
Report or Monograph	Text	Technical Report	Technical Repor	Kulp, Mark; Owens, Ed; Glushik, Lauren; Maygarden, Dinah; Miller, Carrie, Tristan Owens, Travis Scott	2019	University of New Orleans	Canizaro Livingston Gulf States Center for Environmental Informatics	https://dauphin.cs.uno.edu/resources/DauphinIsland%20Island%202018%20citizen science shoreline monitoring program: Technical%20Report_2018.pdf	https://dauphin.cs.uno.edu/