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Evaluating Physical, Chemical, and Biological Impacts from the Savannah Harbor Expansion Project

Cooperative Agreement Number W912HZ-13-2-0013

First Quarterly Report - 2017

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Dear Ms Richards –

The following paragraphs summarize the progress on the project for the period October 1, 2016 through December 31, 2016, according to the five objectives outlined in the Statement of Work and summarized below.

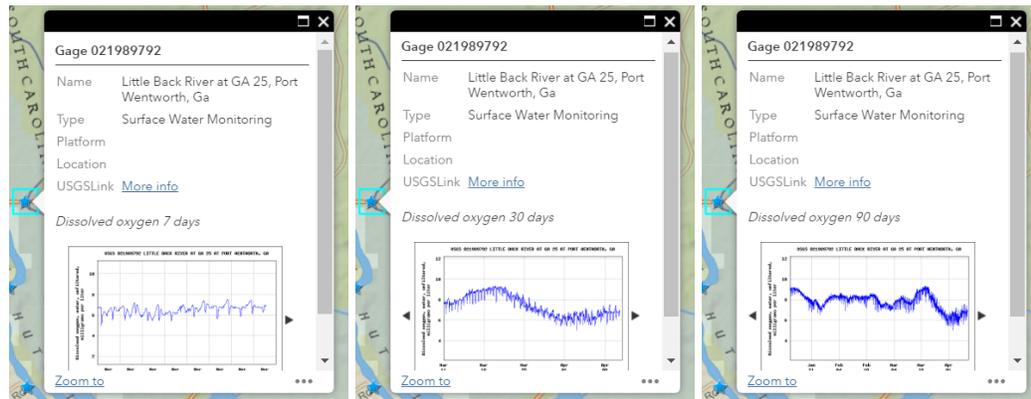
Progress by Objective

1. **Research and develop data analysis tools and standardized maps; Analyze and integrate multiple, complex datasets to provide detailed map**
 - a. **Bathymetric Data** – Multiple updates have been applied to the bathymetric data sets with acquisition dates ranging from 2012 to 2016. Six vector datasets of Savannah Harbor bathymetry have been uploaded to the new online map: 2012 Upper Estuary, 2013-2014 Lower River (a combination of eight raw data sets), 2014 Upper Estuary, 2015 Sediment Basin, 2015 Tidal Gate (a combination of three raw datasets including one LiDAR data set), and 2016 Sediment Basin. In addition to vector datasets, raster images of some datasets have been created. An entire raster image of the Savannah River was created by interpolating between bathymetric points using the 2013-2014 Lower River and 2014 Upper Estuary data sets. A second, smaller scale raster dataset was made by combining the 2015 Sediment Basin and 2015 Tidal Gate datasets. All datasets are projected to horizontal datum: NAD 1983 Georgia State Plane East, US Survey Feet and vertical datum: MLLW, Epoch 1983-2001.
 - b. **Sturgeon Data** – On October 21 2016 the Center for Geospatial Research met with the South Carolina Department of Natural Resources and discussed strategies for sturgeon data processing, analysis and representation using the SHEP Monitoring Program web portal. The same day South Carolina DNR shared an updated



sturgeon movement dataset including all receivers and dates with our center. The sturgeon data were processed for the compilation of statistics and sturgeon counts considering total counts and species specific counts for Atlantic and Shortnose sturgeon. In addition, manual tracking counts containing time stamps were added to a time-enabled layer allowing the selection of period for data analysis and sturgeon count animation, using the new features of the SHEP Monitoring Program map portal. We received monthly reports on sturgeon distribution for August, September and October 2016. We also received the annual report for sturgeon distribution (FY 2016). Reports have been posted to the SHEP monitoring website.

- c. **Water Quality** – Water quality is being monitored by accessing real time and historical gage data using USGS online services. Data for dissolved oxygen and specific conductance are being graphed for three time periods (7 days, 30 days and 90 days). The figure below shows examples of these graphs for dissolved oxygen and gage 021989792 (Little Back River at GA 25, Port Wentworth, Ga).



7 days

30 days

90 days

- d. **Vegetation/Marsh Monitoring Data** – We have received monthly reports for vegetation monitoring for September, October and November 2016. In addition, we received the Vegetation Third Quarterly Report for 2016. Reports have been posted to the SHEP monitoring website.
- e. **Avian Tissue Monitoring** – We have not received any data or reports for the avian tissue monitoring study during this quarter.
- f. **Marsh Edge Fishes** – Pre-construction monitoring was completed in May 2014. Additional monitoring is scheduled to occur during years 1, 3, 5, and 9 of the post-construction monitoring period but not during the construction timeframe.



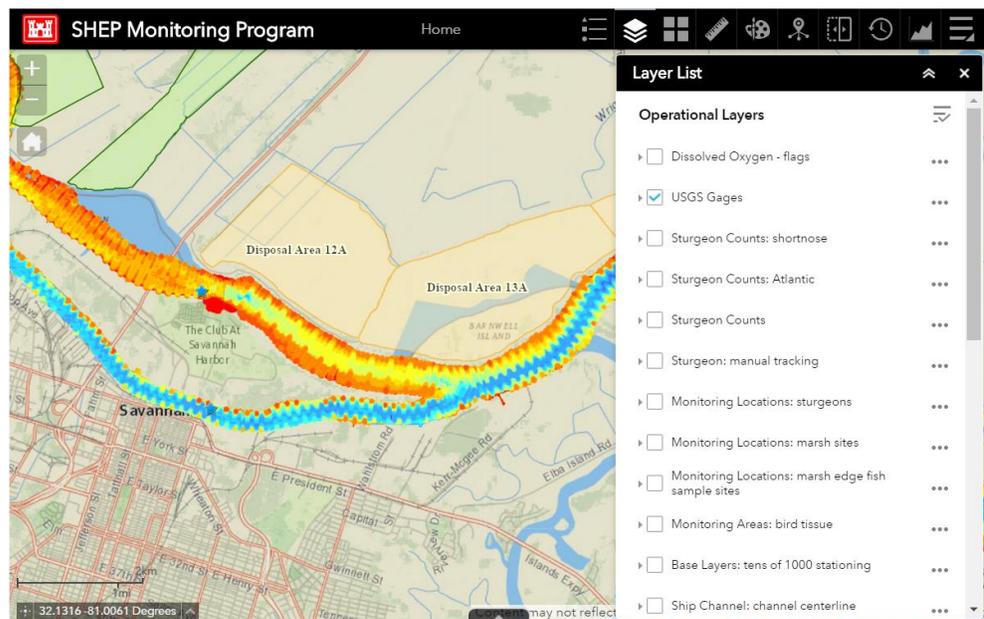
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3. Cursor coordinates (latitude/longitude) are now updated as user interacts with interface. Coordinates of a point can be retrieved by enabling "Click on maps" tool.
4. A pane at the bottom of the map can be opened to show data for individual layers. Using that pane, users can interact with the data and features displayed on the map:
 - a. Displayed data records can be filtered by map extent.
 - b. Specific features/data records can be zoomed into.
 - c. Selecting data records selects the feature on the map.
 - d. Data can be exported as csv files.
 - e. Users can select what data columns (fields) to show.
5. Side panes (to the right) can be turned on and off.
6. The Layer List (Content pane) received new functionalities:
 - a. Layers can be moved up and down controlling layer stacking and the layout of the map.
 - b. Attribute table with values for a specific layer can be opened and users can access data values when analyzing map.
 - c. Users can disable pop-up windows (tooltips).
7. Users can use a drawing tool to add markers, lines, polygons and text to the map.
 - a. Drawing tool allows for the selection of color, style, transparency, width for the features being drawn. Measurements can be retrieved from drawings.
8. An Info Summary tool allows for the display of a list of gages or stations (features) as they are presented by the map.
 - a. Only features displayed are listed by the Info summary, so users can target specific features when conducting analyses.
 - b. Clicking one instance of a feature locates that feature on the map and presents a tooltip with information on the feature.
9. Swipe tool allows for the selection of a layer for change in condition analysis. (e.g., change in bathymetry values).



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10. Time slider tool: allows for the display of changes in layer values over time by selecting periods for data display or by enabling data animations.
 11. Printing maps: allows for creation of PDF versions of the map being displayed for printing or storage.
 12. About tool: provides information on the map portal and on the Savannah Harbor Expansion Project.
 13. USGS gage tooltip: clicking on a USGS gage opens a tooltip showing previews for graphs for dissolved oxygen and specific conductance based on data provided by USGS.
 - a. Graphs are created for three time periods: 7 days, 30 days and 90 days.
 - b. Clicking on graphs will take the user to the full resolution version of the graph.
 14. Clicking on a feature opens a tooltip that allows users to pan to that feature and to open the attribute table to consult values for analyses.
- ii. The modifications to the map portal should facilitate user interaction and provides multiple new tools for data analysis. The figure below shows the new layout for the map portal, including its Layer List.



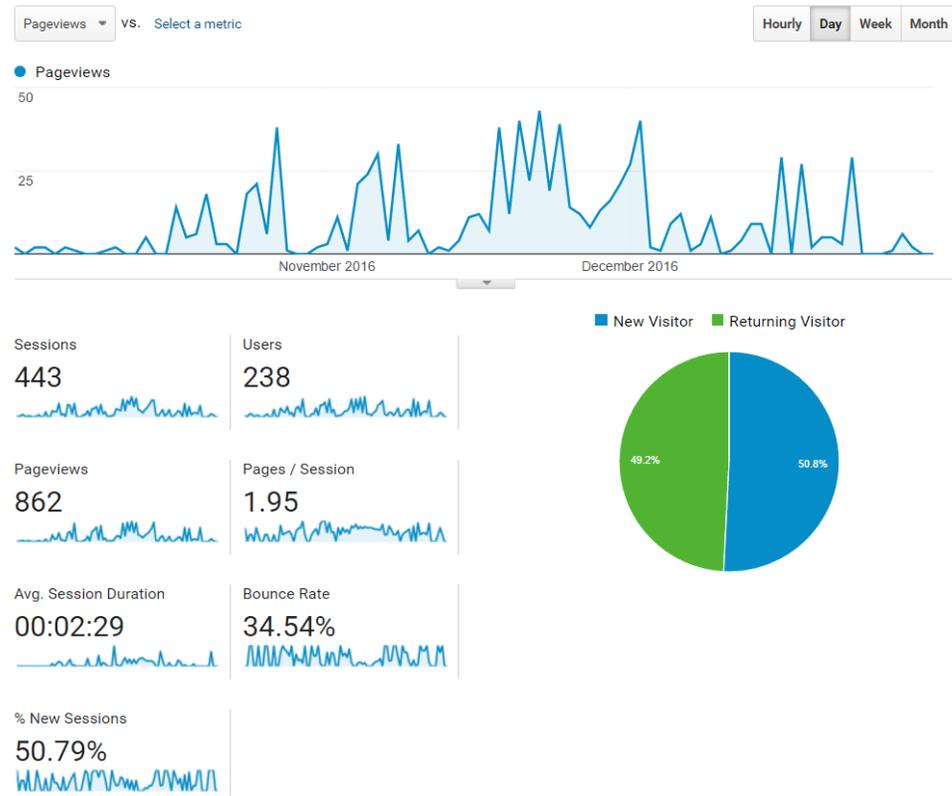
- iii. The updated version of the SHEP Monitoring Program map portal presented to the Army Corps in October 2016 brings multiple



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enhancements and increased data analysis capabilities. Because those extra capabilities increased map portal complexity, we will implement instructions on how to use the site. In this context, a help page containing descriptions of interface elements will be added to the portal. The page will be accessed by clicking the About button on the menu bar of the map portal, and then clicking on the "map portal help" link. In addition, descriptions of tools and functionalities will be incorporated into the help page.

- iv. In order to further understand how the website is accessed by the public, Google analytics were implemented on the SHEP website. These analytics currently can track the number of page views and information regarding the users accessing the site (figure below). The analytics information provided tells us if the user is a new or returning visitor, the operating system used by the visitor, and the country of origin of the user.



During the first quarter of 2017 there were 443 sessions (groups of interactions that may include one or more web pages), through which a



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total of 238 users actively engaged with the website. Statistics include new and returning users. In total, there were 862 page views during the period, including repeated views of a single page.

c. Develop Standard Operating Procedures (SOP)

- i. Standard Operating Procedures (SOP) for data reporting and handling have been established for the sturgeon, water quality, and bathymetry data. We have developed visualization and display methods for the sturgeon monitoring data, water quality, and the bathymetric surveys. We continue to develop methods for data reporting and handling, as new data become available.
- ii. In the process of updating the map portal we will review layer content and standardize attribute table fields for multiple layers. Standardization aims to: (1) ensure that relevant fields are being displayed to map portal users, (2) guarantee that field names are descriptive and provide information regarding field contents, and (3) to create a table describing layer and field contents in support of data analysis.

4. Update and maintain the GIS

- a. These efforts are on-going. We continue to monitor the availability of GIS data for Chatham and Effingham counties (Georgia) and Jasper County (South Carolina), including LiDAR, base GIS data layers (roads, hydrology, boundaries, etc.), multi-date aerial photography and satellite images in order to build a comprehensive geodatabase for the region. Sources of data include the Georgia GIS Data Clearinghouse, the USGS National Map, NOAA Coastal Services Center, and Savannah SAGIS.
- b. Additional data will be incorporated into the base GIS as they become available.

5. Prepare quarterly progress reports and annual reports

- a. This document represents the First Quarter Report of the 2017 fiscal year for this project.
- b. A budget summary is being provided as a separate document.



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Please feel free to contact either Sergio Bernardes or Marguerite Madden if you have questions or concerns regarding this report.

Respectfully submitted,

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