Center for Geospatial Research (CGR)
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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 – January 14, 2014

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Dear Ms McIntosh –

We received the signed contract for the SHEP Monitoring project on September 27, 2013 and visited the USACE office in Savannah on November 4 to receive a detailed briefing on the project as well as to meet several of the key people at USACE. During this meeting, we dropped off a LaCie 1TB portable hard drive for approval by your IT folks and picked up a CD-R disk of some preliminary GIS data. I was accompanied by Caren Remillard and Jiaying He, two graduate students who are assisting me on the project.

The following paragraphs summarize the progress on the project for the period September 27, 2013 through December 31, 2013, according to the five objectives outlined in the Statement of Work and summarized below.

1. **Research and develop data analysis tools and standardized maps** to facilitate comprehensive quantitative review of the physical, chemical, and biological indicators in the Savannah River Estuary, including the Savannah National Wildlife Refuge, a key public resource of importance to the Nation due to its unique ecological habitats. **Analyze and integrate multiple, complex datasets to provide detailed maps** displaying location and values of data points, analyses of datasets including recognizing patterns (e.g., congregation of fish species in a given location), identification of trends (e.g., over time, varying flow conditions), or relationships (e.g., salinity contours with vegetative species abundance).

2. **Research, identify, and catalogue existing study documents for the major resource areas** (e.g., hydrodynamic conditions, water quality, dissolved oxygen, chloride, marsh, fisheries) in the Savannah Harbor area. The resultant bibliography

and baseline databank shall be integrated into the web portal described below in Objective 3. Where possible and readily accessible, original datasets in a GIS-compatible format shall be obtained (for historical datasets) or made accessible (for datasets currently maintained by other agencies) so that they may be integrated into the GIS component of the work.

3. In conjunction with USACE, **A) determine appropriate attributes for the GIS** including geographic coordinates and elevations, water depth, continuous water quality data from fixed water quality stations, water quality data collected for discrete events, bathymetry, hydrologic parameters, chemical data including chloride and cadmium concentrations, plant/fish/invertebrate species distribution and abundance. **B) Develop a web portal to facilitate public access to the pertinent data** gathered in the Savannah River Estuary. **C) Develop a Standard Operating Procedure (SOP)** (e.g., a spreadsheet data entry form and accompanying instructions) for each major resource type to ensure researchers collect data in a standardized manner that is compatible with the GIS.

4. **Update and maintain the GIS**, including Quality Assurance/Quality Control of the data submitted by other researchers, within 30 days of receipt of a given dataset to ensure the USACE and public at large has access to most current sampling/data results.

5. **Prepare quarterly progress reports and annual reports** to include documentation of methods, software, and analyses conducted throughout the duration of the work. The recipient/awardee may be asked to present research findings at public and technical meetings to facilitate public awareness and general knowledge of conditions in the Savannah River Estuary.

Progress by Objective

1. **Research and develop data analysis tools and standardized maps; Analyze and integrate multiple, complex datasets to provide detailed maps**
    a. Much of the work on this objective will be performed after we begin receiving data from the other researchers involved in the SHEP Monitoring Program. We have initiated contact with all of the researchers and have so far heard back from three project managers:

    Brian McCallum (USGS) regarding USGS Water Quality data. He put me in touch with Suzie Grams of his office to coordinate the USGS data feed

with me. We are scheduled to have a telephone conversation about this data later this week or early next week. I have been investigating the website, http://ga.water.usgs.gov to find out the possibilities for displaying their data in real time and for querying data sets for use in maps and GIS models. I have updated the SHEP Monitoring web site to reflect a more complete data feed for each of the gaging stations in the Savannah River Harbor area.

Ned Durden (USACE) regarding bathymetric survey data of the Savannah Harbor. Ned will be sending me the data for the recent bathymetric survey of the Harbor. The data will be in Georgia State Plane East coordinates (feet) and will consist of a list of X,Y,Z point coordinates representing sounding data. The Z values will be converted to negative values before he submits them to UGA and are referenced to Mean Low Low Water (MLLW). He will provide a 'KTD' file that documents the change in slope along the reach of the River. He describes this slope as being only about 0.5 feet along the entire reach. I intend to convert this data to a raster format for display in the on-line web portal. The data will remain in its native coordinates for engineering work. However, I will also attempt to convert the Z values (on a copy of the dataset) to a standard vertical datum, NAVD88, using permanent above water features such as dikes and berms that appear in both the bathymetric and LiDAR datasets. When this is accomplished, I will create a continuous surface that includes both the terrain (from LiDAR) and bathymetry. As additional (or historical) bathymetric datasets are delivered, it will be possible to create profiles and volumetric calculations showing the progress of the dredging activities.

Bill Post (SC DNR) contacted me regarding sturgeon telemetry studies related to SHEP. He introduced his team and offered their help. He has sent me an example of sturgeon data from Charleston which looks fine. Next, we will get some data from Savannah and we can figure out the best way to organize and display his data.

2. **Research, identify, and catalogue existing study documents for the major resource areas**
    a. We conducted a literature search on the internet and UGA Libraries for topics listed in the various Statements of Work. Documents identified as being of possible interest were downloaded and saved on the UGA SHEP web site. These are listed in the Bibliography Section of the UGA SHEP

website (http://maestro.crms.uga.edu/shep or http://shep.uga.edu). This is considered to be a preliminary list and can be expanded, modified or reorganized at any time as new information is submitted. For now, the documents are listed under the general categories:

i. Dredging Impacts
ii. Engineering Reports
iii. Management
iv. Water Quality
v. Wildlife and Fisheries
vi. GIS Analysis

3. **GIS Data and Web Portal**
   a. **Determine appropriate attributes for the GIS**
      i. This is an on-going effort and depends on the data we receive from other researchers as described above in Objective 1. All mapping coordinates will be standardized on the Georgia State Plane Coordinate System, East Zone, NAD83. Vertical coordinates will be reference to NAVD88, except for raw bathymetric data, which will be referenced to local MLLW. Data sets with coordinates in other systems will be converted to State Plane for compatibility. The original coordinates will be preserved in the data sets as attributes.
   b. **Develop a web portal to facilitate public access to the pertinent data**
      i. We have completed a preliminary version of the SHEP Monitoring web site. It includes an online/interactive map of the Savannah River Harbor area, along with the data provided by your office, a copy of the SOWs for the various Monitoring Components, a page for the Monitoring Reports, a Bibliography, a Links page, a Contact page and a Login page. The Web address is http://maestro.crms.uga.edu/shep and is mirrored at http://shep.uga.edu.
      ii. Right now, the online GIS basemap is hosted by ArcGIS Online, but soon I intend to convert to ArcGIS Server, hosted by our own server. We have also conducted a literature review (described above) and posted it to the web site. This work is also on-going and the web site will be updated frequently with new references as we discover them. The Monitoring Reports page includes references for the Final General Re-Evaluation Report for

Savannah Harbor Expansion Project and Final Environmental Impact Statement for Savannah Harbor Expansion Project. Otherwise, we are waiting for reports to be generated after the first year of work. The Contact page only has my name and contact info on it. The Login page is not populated at this time.

iii. We have ordered and received all of the hardware and software specified in the proposal. The final piece of equipment, the server, was received shortly before Christmas and we have installed it in our equipment rack. We will be installing and configuring the operating system in the coming week. The backup NAS server will be on-line in the next day or so and will be configured to make automatic backups of all of the project data.

iv. We have been collecting available 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. We are collecting data from the Georgia GIS Data Clearinghouse, the USGS National Map, NOAA Coastal Services Center, and Savannah SAGIS. This work is on-going.

c. **Develop Standard Operating Procedures (SOP)**
   i. These have not been established yet – we are waiting on information from the other researchers before we can set up the SOPs.

4. **Update and maintain the GIS**
   a. These efforts are on-going. To-date we have collected data as described in Section 3.b.iv above. Additional data will be incorporated into the base GIS as is becomes available.

5. **Prepare quarterly progress reports and annual reports**
   a. We submitted an interim report on December 5, 2013. This document represents the First Quarterly Report for this project.

Please feel free to contact either Marguerite Madden or Tommy Jordan if you have a questions or concerns regarding this report.

Center for Geospatial Research (CGR)

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Respectfully submitted,

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