Partnering to leverage scale in coastal wetland monitoring – South Atlantic Geography Approach

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ABSTRACT

Sea-level rise and its impacts to natural resources are a concern for the U.S. Fish and Wildlife Service (FWS) and National Park Service (NPS) lands within the Southeast United States. Rising sea levels threaten coastal wetlands leading to wetland loss, saltwater intrusion, habitat conversion, and inland migration of marsh and forested ecosystems. Conserving and protecting resources and habitats is part of the mission for both federal agencies, and as federal budgets continue to fluctuate, the need to find cost-effective ways to conduct long-term monitoring on local, regional, and larger scales to understand these threats is crucial. In a recent Nature Climate Change article[1], the authors identify the need to formalize coordination and create regional partnerships among federal and state government agencies, academic and research institutions, and other private and nonprofit conservation organizations to coordinate and expand coastal wetland monitoring into regional networks. The FWS Southeast Region Inventory and Monitoring (I&M) Branch and NPS Southeast Coast Inventory and Monitoring Network (SECN), along with the U.S. Geological Survey (USGS), Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR), and other partners, have been working together since 2011 to develop a regional network for coastal wetland monitoring in the South Atlantic geography of the United States. In 2012, FWS I&M and NPS SECN initiated the South Atlantic geography approach (SAGA) by establishing a network of surface elevation table (SET) benchmark sites on refuge and park lands, which include 34 sites with 101 SET benchmarks. The objective of this poster is to present information about how the SAGA works to accomplish coastal wetland monitoring on public lands and how leveraging resources, people, data, methods, and other support tools will allow local and large-scale analyses to be conducted along the U.S. Atlantic coast. There are numerous localized SET projects that provide valuable information for smaller scale conservation and management efforts. The strategy SAGA utilized has created a SET network in different priority habitat types, ranging from low salt marsh to forested wetlands, on public lands from North Carolina to Florida. This type of approach is not new; however, trying to accomplish these monitoring efforts across regions and agencies at these scales is in its infancy. A cohesive methodological protocol is being used across all SAGA sites resulting in consistent and comparable data. Currently, a process is underway to allow seamless management and sharing of network data resulting in long-term data archival, network analyses and modeling. The SAGA provides an avenue to exchange information, share equipment and resources, collaborate on methods, troubleshoot technology, and provide support to build local and regional capacity for coastal wetland monitoring. Though the SAGA adds complexity, this collaboration allows for greater opportunity to ensure continued monitoring efforts, resource allocation, data management and sharing, and a commitment for long-term success. Through these efforts, FWS and NPS will be able to make more informed, science-based decisions for conservation and management of coastal wetlands on public lands.

BACKGROUND AND MONITORING OBJECTIVES

Background

Due to the importance of coastal wetlands, salt marsh elevation was initiated as a Vital Signs Monitoring Element for SECN in 2010. In 2011, FWS I&M and refuges in the South Atlantic identified coastal wetland elevation monitoring as essential and began working closely with NPS SECN to implement. Since then, FWS I&M and NPS SECN coastal ecologists, program managers, and data managers have developed and maintained the SAGA partnership to perform coastal wetland elevation monitoring at both local and landscape scales in the South Atlantic.

NPS SECN Vital Sign and FWS I&M Objectives are to determine the:

- Magnitude, rate, and within-site variability of change in ground surface elevation in parks and refuges
- Status and trends in the surveyed elevation of benchmarks relative to the National Spatial Reference System
- Status, trends, and within-site variability of surface sediment accretion
- Status and trends of soil salinity
- Status and trends in vegetation species composition, cover, and height (structure)

FWS I&M and NPS SECN SAGA STUDY SITES

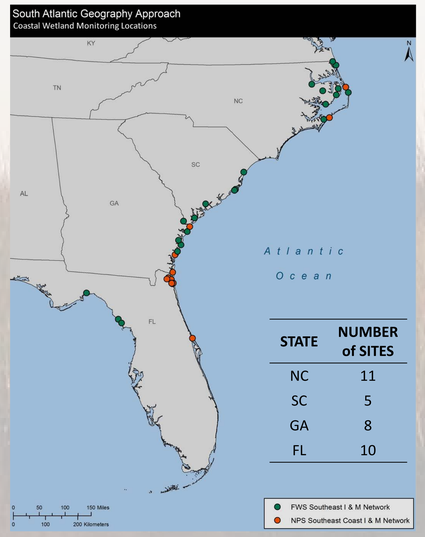


Figure 1: Map of the SAGA study site locations. Green points represent FWS I&M sites and Orange points represent NPS SECN sites.

The SAGA study area spans the Atlantic coast from North Carolina to central Florida and west into the Florida panhandle. There are 34 sites within the SAGA study area. Broad ecological habitats include: salt and brackish marsh, freshwater and oligohaline marsh, mangrove, pocosin, and forested wetland.

Table 1: List of NatureServe's Ecological Systems and the number of SAGA study sites per Ecological System[2].

NATURESERVE ECOLOGICAL SYSTEMS	NUMBER of SITES
Atlantic Coastal Plain Embayed Region Tidal Freshwater Marsh	2
Atlantic Coastal Plain Embayed Region Tidal Salt and Brackish Marsh	6
Atlantic Coastal Plain Peatland Pocosin and Canebrake	2
Florida Big Bend Salt and Brackish Tidal Marsh	2
Florida River Floodplain Marsh	1
Southern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh	4
Southern Atlantic Coastal Plain Large River Floodplain Forest	1
Southern Atlantic Coastal Plain Salt and Brackish Tidal Marsh	15
South Florida Mangrove Swamp	1

Fetch exposure varies among sites. Salt marsh sites are located in secluded marsh platforms, embayments, back-barrier, or open coast landforms. Freshwater marsh, oligohaline marsh, and forested wetland sites are located near the mouths of rivers.

PARTNERING IS NECESSARY

FWS I&M and NPS SECN are working with many partners to implement a regional network of SET benchmark sites on refuge and park lands in the South Atlantic geography. Partners have been engaged since the beginning of the SAGA and have continued to provide guidance in planning, sample design, site selection, field techniques, equipment, logistics, data management and analysis, and reporting. The SAGA relies on collaborating closely with refuges and parks where the study sites are located, other FWS regions and NPS networks, and external partners. The GTMNERR and USGS are two principal collaborators and detailed efforts are listed:

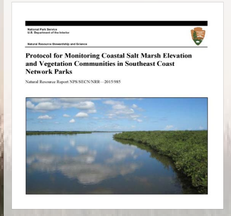
GTMNERR

- 6 sites located in the Saint Augustine, FL area
- Sampled twice per year by GTMNERR staff
- Utilize same methodology as SAGA
- Shared resources, support, and expertise
- Data will be input into the DOI online, centralized database by NPS SECN staff

USGS

- Guidance in planning and sample design phase
- Trained FWS staff and contractors to install SETs
- Trained FWS staff to perform SET readings, take accretion cores, and collect porewater salinity
- Shared knowledge and documented methods
- 11 sites located on refuge lands in SAGA area

LEVERAGING SCALE



Protocol and Standard Operating Procedures (SOPs)

NPS SECN was charged with writing the protocol and related SOPs for the Salt Marsh Elevation Vital Sign Monitoring Element. This protocol relies on widely-used data collection methods and SOPs developed by the NPS[3], USGS[3], and the Louisiana Coastal Protection and Restoration Authority[4]. Since FWS I&M, NPS SECN, and GTMNERR utilized the same methods, staff worked together to publish the protocol in 2015. Surface elevation, accretion, and salinity are collected using the protocol at all SAGA sites. Vegetation community data is collected using the Carolina Vegetation Survey[5] at FWS I&M sites and NPS[6] procedures at NPS SECN sites.

Sample Design and Site Selection

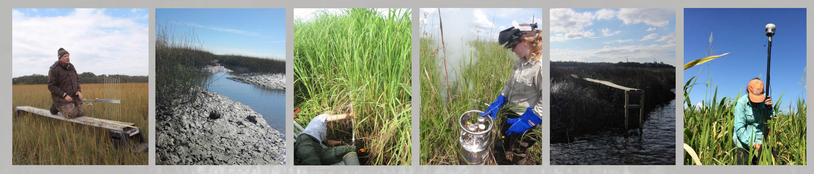
Since over 64,836 acres of NPS SECN parks are salt marsh communities, low salt marsh was identified as the priority habitat for monitoring. Other partner sites are also located within low, regularly-flooded salt marshes along the South Atlantic. Due to site gaps, FWS I&M sites focused on high salt marsh, oligohaline marsh, and pocosin wetlands. During site selection, some refuges were limited in the acres of priority habitat. Alternative habitats were then identified that were representative of the wetlands on the refuges. A spatially-balanced random sample approach was used to determine sample locations.

Wolf Island NWR, GA

Sharing Resources and Building Capacity

Coastal wetland monitoring is one of many priorities for FWS I&M and NPS SECN. The SAGA has been beneficial in leveraging resources and capacity in order to more efficiently and effectively use funding.

Sharing Equipment	Troubleshooting	Training	Exchanging Information
Corers, LN Dewars, GNSS GPS Receivers	Methods, Site Issues and Logistics, Technology	Cryogenic Coring, GNSS GPS Surveying	Annual Workshops, Monthly Calls



Student assistantships are a resource both agencies utilize to accomplish and expand monitoring efforts. Through the SAGA, students have been used to perform field work, enter and analyze data, write SOPs, and solve technical problems. The FWS Directorate Fellowship Program and NPS SECN contracts with the University of Georgia have provided opportunities to move forward different monitoring aspects, most recently benchmark elevation surveying, from which both FWS I&M and NPS SECN benefit.

Data Management

The FWS and NPS Natural Resource Program Center divisions are developing an online, centralized database to house data collected from coastal wetland monitoring efforts using surface elevation tables. Multiple FWS regions, NPS networks, and Department of the Interior researchers are involved in the creation of this collaborative database, which will create one application to meet both FWS and NPS data management needs. Currently, the database is in production with anticipated completion within the coming year. FWS I&M and NPS SECN staff will be among the users testing and utilizing this database.

NEXT STEPS

Data Analysis and Reporting

Individually, FWS I&M and NPS SECN will perform site-specific analyses of monitoring data to provide localized information to the individual refuge/park. This will be done per agency reporting schedules. Together, FWS I&M and NPS SECN will collaborate with other partners including the South Atlantic Landscape Conservation Cooperative to complete a landscape-scale synthesis report.

Collaborative Agreement

Currently, the SAGA is an informal partnership. Formalizing this partnership through a FWS I&M and NPS SECN collaborative agreement will ensure continued monitoring efforts into the long-term.