

CITY COUNCIL WORKSHOP

MAYOR

Shirley Sessions

CITY COUNCIL

Barry Brown, Mayor Pro Tem

John Branigin

Jay Burke

Nancy DeVetter

Spec Hosti

Monty Parks



CITY MANAGER

Dr. Shawn Gillen

CLERK OF COUNCIL

Jan LeViner

CITY ATTORNEY

Edward M. Hughes

CITY OF TYBEE ISLAND

**CITY COUNCIL WORKSHOP
AGENDA
June 23, 2021 at 3:00 PM**

Call to Order

Items for Consideration

1. National Fish and Wildlife Foundation: Back River Project

Adjournment

Individuals with disabilities who require certain accommodations in order to allow them to observe and/or participate in this meeting, or who have questions regarding the accessibility of the meeting or the facilities are required to contact Jan LeViner at 912.472.5080 promptly to allow the City to make reasonable accommodations for those persons.

File Attachments for Item:

1. National Fish and Wildlife Foundation: Back River Project



Full Proposal Project Narrative

1. Coastal Community Context: In 2016, the City of Tybee Island (Tybee Island) became the first community in Georgia to create and adopt a municipal sea level rise plan. The plan assessed exposure to sea level rise and flooding over the next 50 years in this low-lying coastal community, examined vulnerability of existing infrastructure, and developed recommendations for immediate and long-term adaptation actions. As a result of this study, and in the wake of back-to-back 100-year storm events in Hurricanes Matthew (2016) and Irma (2017) and Hurricanes Michael and Florence (both 2018), work is already being done to improve the resilience of the City. However, it has been focused to date on the ocean beach side of the island.

Preliminary Design and Site Assessment

The priority area for this project is Preliminary Design and Site Assessment of the tidal coastal marsh shoreline of Tybee Island. This estuarine shoreline was identified in the NFWF Regional Coastal Assessment for the Savannah River Watershed as having a High priority rating in the Community Exposure Index (10 on 1-10 scale), Threat Index (10 on 1-10 scale) and Aquatic Index (5 on a 1-5 scale). The Resilience Hub index, measuring areas of open lands and protected space that are most suitable for resilience-building efforts, for the marsh side of Tybee Island is a 7 on a 1-10 scale. Tybee Island has experienced over 10 inches of sea level rise over the past 85 years and faces a dramatic acceleration of this rate, with NOAA scenarios of relative sea level rise projecting between 1.38 to 10.57 feet by 2100.

The large contiguous tract of Tybee Island's marsh front provides protection and buffering from coastal storms, sea level rise, inundation and coastal erosion. As water levels rise, however, this valuable habitat and open space is at risk of being squeezed out. This project seeks strategies that provide the dual benefits of enhancing natural features and protections to support fish and wildlife populations while mitigating impacts of flooding to community property and critical infrastructure. The suite of recommendations developed through this site assessment and preliminary design will aim to reduce risks to both the local population and the ecosystem, thereby increasing the resilience of the overall socio-environmental system.

Proven Track Record of Success

Tybee Island has a track record of success in implementing recommendations from the type of study this proposal represents. We are proposing this National Coastal Resilience Fund grant in the context of our nationally recognized framework for sea level rise planning and public engagement on coastal hazards.

The Tybee Island Sea Level Rise Adaptation Plan received the National Sea Grant Program's highest award for outreach in 2014 and University Economic Development Association Award of Excellence in 2017. The project also received regional and state recognitions, including the "Four for the Future" Award from Georgia Trend magazine and Sea Grant South Atlantic Region Outstanding Achievement Award in 2014. The Tybee Island plan is featured as a case study in the U.S. Climate Resilience Toolkit and has been presented on the U.S. Senate Floor as an example of effective climate adaptation planning.

The plan helped improve the City's rating under the Federal Emergency Management Agency's (FEMA) Community Rating System (CRS). During the planning process, Tybee Island went from a class 7 to 5 in CRS, enabling savings in flood insurance of \$3 million for property owners on the island.

Last year, Tybee Island received a \$5,000,000 grant from the State of Georgia through the Georgia Department of Community Affairs to rebuild its beach and dunes—the first phase of which is complete and is being recognized by the Georgia Department of Natural Resources as an example of successful dune restoration. The U.S. Army Corps of Engineers is scheduled to begin a \$15 million beach re-nourishment and dune-building project this winter. The Georgia Department of Transportation is currently repaving US Highway 80, raising the causeway eight inches in flood-prone areas. After Hurricane Irma, Tybee applied for a FEMA Hazard Mitigation grant to elevate 62 homes on the island. If this

FEMA grant is awarded to Tybee, these properties will be better protected against flooding, reducing flood insurance premiums for homeowners.

Prioritized in Existing Plans

These measures, however, do not address the City’s marsh shoreline, where the first and worst impacts of inundation from sea level rise are being experienced. As noted by the NOAA Sea Level Rise Viewer, flooding will disproportionately affect this side of the island (Figure 1).

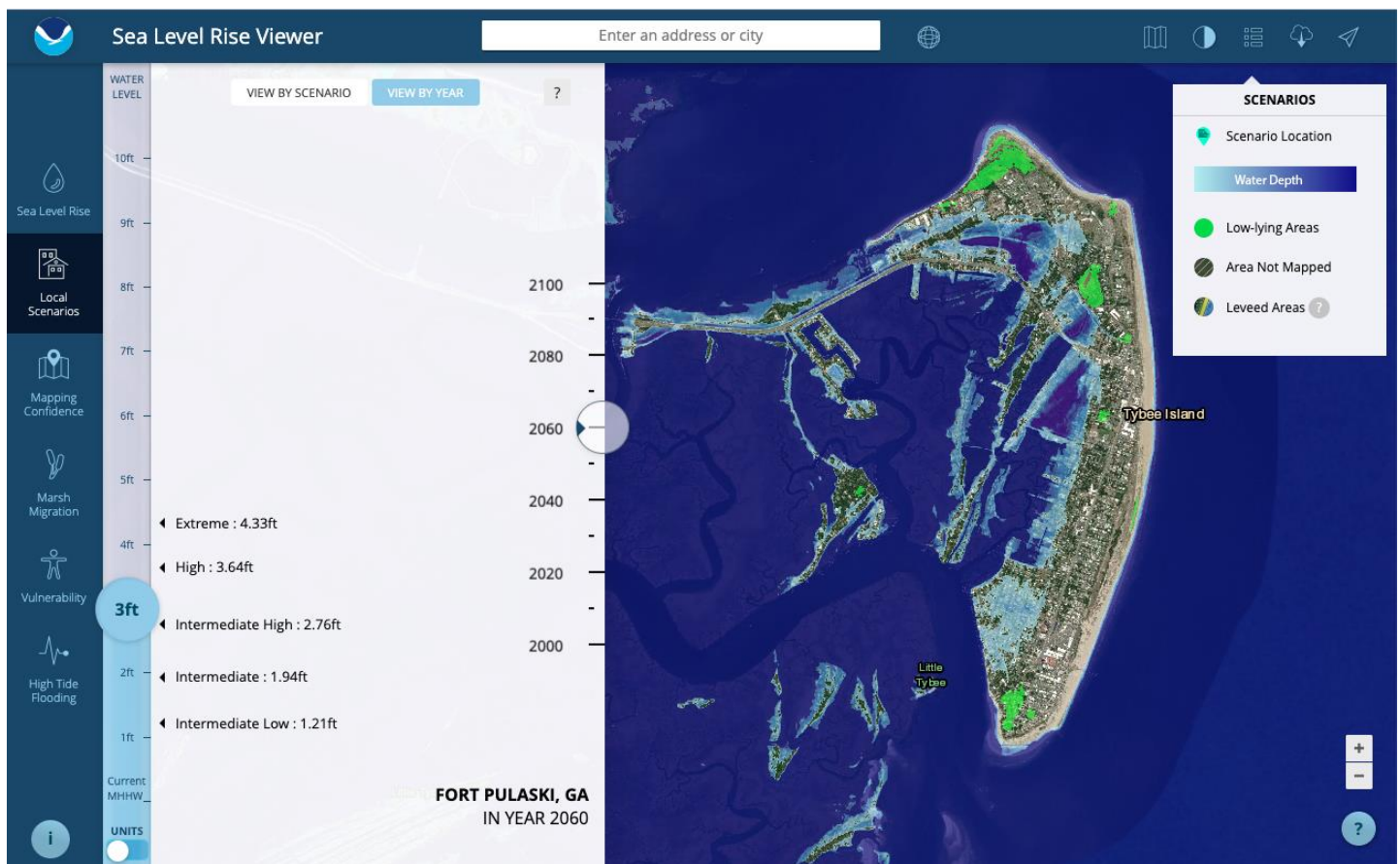


Figure 1: Tybee Island with three feet of sea level rise. (NOAA Sea Level Rise Viewer)

This study is being proposed in the context of the City’s Master Plan, Carrying Capacity Study, Beach Management Plan, and Sea Level Rise Study. It is urgent that we undertake this assessment now, while the public’s memory of the storms over the last three years is still fresh. Public sentiment currently favors the work we are doing to strengthen the City’s beach, dunes, and coastal marsh shoreline. Past experience suggests this strong public support will tend to dissipate over time.

In Partnership with Federal, State, and Local entities

By addressing the coastal marsh side of the barrier island, we address this critical gap in our current planning and continue to leverage the support and engagement of the myriad of partners already in place. These include the City of Tybee Island Council and Staff, Tybee Island Beach Task Force, Georgia Department of Natural Resources, US Army Corps of Engineers Savannah District, University of Georgia Institute for Resilient Infrastructure Systems, University of Georgia Marine Extension and Georgia Sea Grant, and the Georgia Department of Community Affairs.

2. Activities: This project will utilize an innovative design approach focused on the interface of engineering, hydrology, ecology, and social science to reconsider the totality of the city's infrastructure system, both the built and natural, in the project area. The goal is to design an integrated and community-centered green, gray, and blue infrastructure system that utilizes natural elements to provide increased resilience to flooding while protecting and promoting natural habitat. The project will provide the foundation for the assessment and prioritized identification of integrated design strategies to increase resilience to storm and flood events, including the prevention of and recovery from such events.

The site assessment and preliminary design process will be conducted by Tybee Island in collaboration with the University of Georgia (UGA) Institute for Resilient Infrastructure Systems (IRIS), UGA Marine Extension and Georgia Sea Grant, UGA College of Environment + Design, the Department of Agricultural and Applied Economics in the UGA College of Agricultural and Environmental Sciences, and the Skidaway Institute of Oceanography.

Stakeholder Engagement and Communication

This project will continue to advance Tybee Island's model for community engagement by (1) soliciting input from local stakeholders, (2) educating policymakers and residents on the risks of coastal hazards and benefits of building community resilience, and (3) building support for climate adaptation alternatives. Ultimately, building awareness of, and support from, the public community, including the constituencies that are contiguous to the project location but not resident of Tybee Island itself, will provide a strong foundation on which to make the often hard choices that will need to be made.

Utilizing a participatory planning model, the project will incorporate stakeholder values, knowledge, and input throughout the project period. This combination of research, design, and planning will help the project team deliver recommendations that are actionable.

A Working Group is being established to provide guidance to scientists, consultants, city staff and policy makers, meeting on a bimonthly basis. Similar to the Tybee Island Beach Task Force, the purpose of the Working Group will be to promote the health, safety, prosperity and general welfare of the City and provide recommendations to the Mayor and Council regarding issues affecting the estuarine side of the island, including but not limited to flooding and erosion.

The stakeholder engagement process will be iterative and interactive, providing multiple points of contact and opportunities for dialogue. Regular and timely updates will be provided to City Council and NFWF. Opportunities for public input will be scheduled through workshops and appropriate Council Committee meetings throughout the project. Because this project expands the work already being done by the City of Tybee Island, staff, committee members, and regulatory representatives are familiar with each other and have been working together for the past three years.

The activities are expected to engage public support, enlist appropriate local expertise, and include public comment in the design and consideration of the range of options.

- **Charrettes:** Two design charrettes for elected officials, members of the Tybee Island Planning Commission and Beach Task Force, City staff from Public Works, Planning and Zoning, Tybee residents and others as identified to define their vision for the marsh side of Tybee Island. The charrettes will: (1) begin the process of identifying and prioritizing potential nature-based solutions and engineered alternatives to address flooding, erosion and other sea level rise-related challenges, and (2) educate community members and decision makers on how green infrastructure and natural systems can protect against coastal hazards and natural disasters and provide dual benefits in building socio-ecological resilience.

- **Focus Groups:** Gather more detailed feedback on receptivity to specific adaptation strategies, barriers to implementation and behavioral attitudes through two focus groups hosted in collaboration with the National Academies of Sciences, Engineering and Medicine and the National Center for Atmospheric Research (NCAR).
- **Town Hall Meeting:** At the halfway point of the project, the project team will present a progress report to Tybee stakeholders, inviting charrette attendees, focus group participants, City Council, the Working Group, members of local committees and environmental groups, media and others.
- **City Council Meetings:** Project team members will present to City Council at the beginning and end of the project, as well as give presentations to the Tybee Island Planning Commission and Beach Task Force.
- **News Media:** Tybee Island will issue a press release upon being awarded the funding from NFWF and will invite reporters to attend all public events. The project team will seek opportunities to showcase the project during newsworthy tidal or weather events, such as a large King Tide or tropical storms.
- **Student Engagement:** In the fall 2020 semester, UGA College of Environment + Design will offer a landscape architecture studio course based on the project. Students will utilize results from the charrettes and focus groups, as well as spatial analysis and assessments of the cost, performance, environmental impact and maintenance burden of conventional and natural infrastructure options to develop site-specific renderings of adaptation strategies. Students will present their designs to the Working Group and their renderings will be included in the final project report.
- **Regional and National Conferences:** Project team members will share updates and findings of the project with fellow practitioners, resource managers, scientists and local government staff at conferences, such as NOAA's Social Coast Forum and the National Adaptation Forum.

Strong Technical Merit

Tybee and IRIS will integrate several existing data sets, outputs from hydrodynamic and salt marsh migration models, high resolution LiDAR-derived topography, and existing land use / shoreline protection features in a GIS-based spatial analysis. The spatial analysis will be used to help prioritize locations for natural and nature-based features based on their potential to simultaneously provide flood resilience and protect fish and wildlife habitat. Outputs of existing flood inundation models will be adjusted for sea level rise (SLR) and combined with 4.5m LiDAR digital elevation data to identify complex overland flow pathways and potential natural flood retention areas and other features that protect this side of the island. Salt marsh migration models will be used to identify areas suitable for facilitated marsh migration. These outputs will be combined into a spatial Multi-Criteria Decision Analysis (MCDA) approach that will provide a flexible, rational, and transparent means to rank and select a comprehensive set of nature-based infrastructure responses to SLR based on flood mitigation and habitat performance criteria developed collaboratively by Tybee, IRIS, residents and other stakeholders. Alternatives are expected to include marsh restoration and migration zones, natural storm water detention areas, thin layer placement, and living shorelines, among others. The study will examine how they can work in harmony with conventional infrastructure.

The MCDA approach is more structured, transparent, and defensible than 'best professional judgment', yet more interpretable and less data intensive than complex computer optimization schemes. By combining data and metrics representing erosive power, storm surge attenuation potential, land loss, potential dredge material placement, habitat enhancement, marsh evolution, critical infrastructure threats, costs, practicality, and other considerations, the MCDA will be used to identify areas of vulnerability and opportunity. Ecological, technical, practical, socioeconomic and strategic considerations will also be included in the criteria used to assess and rank candidate projects.

The MCDA approach allows managers and planners to individually weight each criterion, accounting for the specific goals and circumstances presented by the current situation and to use a common system of evaluation for analyzing the available data. This weighting and evaluation will be a heuristic and iterative process that allows users to adjust the weighting values in response to changing goals and values as decision-making progresses. It will be streamlined enough to allow it to be run multiple times for a single meeting or design charrette. In addition to an evaluation of habitat and flood mitigation benefits, the MCDA will incorporate preliminary cost analysis and consider the broad suite of co-benefits such as recreation, since Tybee Island is a resort community attracting tens of thousands of visitors to the Island each season.

An Innovative Approach

Models of the future extent and evolution of the marsh will be used to better understand where the marsh is getting squeezed and where there are opportunities for restoration and facilitated migration to maintain or expand the current level of protection under SLR. These models will be corroborated with recent storm experience to calibrate the models' expected outputs. To evaluate the need for, and sustainability of, potential salt marsh projects, we will use an existing Georgia-specific and up-to-date Sea Level Affecting Marshes Model (SLAMM) developed by UGA (dynamic accretion, vegetation-corrected 4.5-m Light Detection and Ranging (LiDAR), and <10-year time steps) to identify zones of likely future marsh losses and coastal squeeze due to SLR and shoreline armoring, as well as priority areas for facilitated marsh migration, strategic placement of sediments, living shorelines, and other natural infrastructure interventions. In addition to future scenarios of marsh migration and extent, understanding the compounding effects of storm surge and SLR is an essential component of nature-based strategies for coastal flood resilience. Current flood hazard maps used by local governments, including Tybee Island, for planning purposes do not account for the effects of SLR on storm surge. Fortunately, research on incorporating SLR into peak storm surge estimates has investigated the use of parsimonious methods including linear addition approaches with promising results. These approaches typically add the magnitude of SLR to peak storm surge estimates from hydrodynamic models.

UGA will employ the ADCIRC outputs used for the production of Federal Emergency Management Agency (FEMA) digital flood insurance rate maps based on ADCIRC models in conjunction with the SLR post-processing methods to generate multiple scenarios of water surface elevations and currents for Tybee Island. Output scenarios will include projected changes in SLR effects, marsh extent and coastal squeeze estimated from SLAMM, LiDAR based overland flow routing, and potential natural and hybrid infrastructure project combinations that reorient, store and attenuate flood waters. Projected flood hazards due to interactions between storm surge and SLR will be incorporated as a criterion for prioritizing natural infrastructure interventions, as well as conventional flood proofing and structural infrastructure approaches.

3. **Outcome(s):** Utilizing the results of this robust and innovative modeling and spatial analysis, City of Tybee Island staff, IRIS, and Marine Extension and Georgia Sea Grant consultants will partner with the Working Group to develop a plan for Tybee's estuarine shoreline to complement the Tybee Island Beach Management Plan.

50% -60% Design Criteria

The plan will include an array of prioritized design options, available independently and in combination, for consideration by Tybee Island's City Council. These alternatives will include preliminary conceptual design, estimated monetary costs, risks of implementing and risks of not implementing, impact on fish and benthic natural habitats, protection of vital infrastructure, and relative time and ease of implementation. They will meet the 50-60% design criteria required by the conditions of the Grant and provide the basis for a "Go/No Go" decision by City Council.

The outcomes of the stakeholder engagement process will be increased knowledge of coastal hazards, increased understanding of the tradeoffs and benefits of natural and gray infrastructure, and increased support of flooding and sea level rise adaptation strategies. The project team will conduct pre- and post-evaluations at the charrettes, focus groups and town hall meeting to gauge knowledge gained, past and future decision making in relation to personal flood safety and mitigation and changes in support of conventional and natural infrastructure and policy-based adaptation strategies.

Project team members and representatives of Tybee Island will improve their understanding of the existing barriers and perceptions that impede coastal adaptation planning and limit efforts to build the island's resilience to coastal hazards. This information will be incorporated into outreach and education conducted by Tybee Island, IRIS, UGA Marine Extension and Georgia Sea Grant and other project partners.

Long-term Sustainability

The deliverable for this phase of the project: site assessment and preliminary design, is the array of design options presented to City Council for their consideration. We expect this phase to conclude about 12 months from the start of the project.

After City Council has chosen among the alternatives, the project will move to the next phase: Final Design and Permitting, which we expect to begin end of 2020 or early 2021 and fund from a variety of sources, including City

General Fund and Chatham County Special Local Option Sales Tax (SPLOST), as well as applying for a grant from a variety of agencies including the GA DNR Coastal Sea Grant, the GA Department of Community Affairs, and the National Fish and Wildlife Foundation.

We expect to prepare more specific conceptual designs, engineering plans, and detailed cost estimates of the choices made. It is expected that the Working Group will be reconfigured and expanded to include appropriate technical, engineering, and regulatory expertise needed to meet the requirements of the next phase of the project.

The Working Group will continue to coordinate with the US Army Corps of Engineers (USACE), Georgia Department of Natural Resources (DNR) Regulatory Division and Coastal Resources Division, the State Legislature, Chatham County officials, and other appropriate Federal agencies to secure adequate funding for implementation. All regulatory permitting will be identified and the two governing regulators for the City: GA DNR and USACE will have had significant input as part of the Working Group.

Transferability

In proceeding on the basis outlined in the Activities above and contemplating the Outcomes expected, Tybee Island will be intentional in designing a best practice model to identify, assess, prioritize, design, and cost alternative approaches to improve resiliency that can be used by other coastal communities facing similar challenges.

Annual Milestones

This phase of the project is expected to be completed within 12 months. The key milestones against which we will measure progress are:

- Two design charrettes
- Two focus groups
- Town Hall meeting
- UGA Landscape Architecture Studio
- Two presentations to City Council
- Corroborate model outputs with recent flood experience
- Complete marsh migration, storm surge with SLR, and overland flow routing models
- Formulate alternative scenarios for enhancing flood protection and improved habitat function
- Incorporate model outputs and alternative designs into a spatial multi-criteria decision analysis
- Tybee Island Marsh Shoreline Management Plan
- Prioritize alternatives based on performance criteria and cost-benefit analysis
- City Council considers plan for implementation

4. **Tracking Metrics:** The project will monitor and assess progress based on the metrics selected, primarily the percentage of critical infrastructure and personal and commercial property with enhanced protection, the number of participants, and a proxy for enhanced habitat.

Project Accomplishments Related to Community Benefits and Capacity Building

This project will increase (1) the percentage (not the number, as originally defined in the RFP) of Critical Facilities and Infrastructure and (2) the percentage (not the number) of Personal and Commercial Properties that have enhanced protection from and more resilience to natural hazards. Based on our flood experience of the past three years, none of the critical neither infrastructure nor the homes in the project area are currently protected. Because this is an assessment and preliminary design phase, an important criterion for selection of appropriate options to move forward will be the improvement in these metrics. The final values will be determined by the choices made. To be conservative in our proposal, we have estimated a lower bound of potential risk reduction and increase in resiliency.

To assure that the project develops appropriate and sustainable public awareness and political support, we will include (1) Volunteer Participation and (2) Government Agency Participation and Engagement as appropriate measures. We have

established a baseline in all cases with a value of zero, as we are collectively just starting the process of developing strategies to address marsh shoreline erosion and flooding from coastal storms and sea level rise.

Project Accomplishments Related to Enhanced Habitat

As a proxy for enhanced habitat for fish and wildlife population that reside in and around the marsh, we will attempt to project the net change in acres of salt marsh over a longer-term planning horizon, (20 years) under SLR with and without the project scenarios, to get an indication of each design scenario's contribution to marsh growth. We will also measure the expected percentage of estuarine shoreline protected by natural and nature-based features with project implementation versus a "do nothing" scenario.

5. Project Team:

- Dr. Brian Bledsoe, Georgia Athletic Association Distinguished Professor and Director of the Institute for Resilient Infrastructure Systems, is in the College of Engineering at the University of Georgia. His research and teaching are focused on natural and hybrid "green-gray" infrastructure, hydraulic engineering, storm water and flood management, water quality, and riverine and wetland ecosystems.
- Jill Gambill, Coastal Resilience Specialist and Public Service Faculty for the University of Georgia Marine Extension and Georgia Sea Grant, is an author of the 2016 Tybee Island Sea Level Rise Adaptation Plan. Following Hurricanes Matthew and Irma, she conducted extensive social science research on Tybee, including two NSF-funded projects; She is co-chair of the Georgia Coastal Hazards Community of Practice and serves on the coordinating team of the Georgia Climate Project.
- Dr. Craig Landry, Professor of Natural Resource Economics at the University of Georgia, is a natural resource economist with expertise in non-market valuation, coastal resources management, and experimental economics. His research includes risk management, insurance, and mitigation for natural hazards; dynamic optimization models for studying coupled human-natural coastal systems; modeling of recreation demand, including beach going and recreational angling. He has worked on hazard economics in coastal GA and specifically Tybee Island since he published his MS Thesis about Tybee in 1998.
- Dr. Clark Alexander, Director of the UGA Skidaway Institute of Oceanography, is also a professor in the Department of Marine Sciences at the University of Georgia. Alexander is a coastal and marine geologist with areas of emphasis encompassing continental-margin and coastal sedimentary systems, long-term and recent shoreline change, and coastal hazards. As a researcher, Alexander has participated in 63 field programs from New Zealand to Siberia and has been the chief scientist on 29 oceanographic cruises with a total of more than two years at sea. He has published 91 papers in scientific journals and in the past decade has received more than \$5 million in direct research funding.
- Alan Robertson, Principal, AWR Strategic Consulting, is the Project Manager for the Tybee Island dune restoration and beach re-nourishment projects. He is a resident of Tybee Island and serves in various capacities, including the Tybee Island Planning Commission, Chair of the Master Plan Committee, and former member of the Beach Task Force. Alan authored the current assessment and plan for Tybee's dune restoration and coastal marsh projects, as well as the funding proposal for the \$5 million Georgia Department of Community Affairs grant.

6. Other: Tybee Island is the northernmost barrier island on the Georgia coast. Located in Chatham County about 15 miles due east of Savannah, the incorporated City of Tybee Island covers an area of about 2.7 square miles and is home to about 3,000 residents. It is the most densely populated of Georgia's barrier islands and is a popular beach resort that regularly attracts more than 30,000 visitors on a summer weekend as "Savannah's Beach", with over a million visitors annually. These visitors to Tybee Island provide the majority of the City's revenues and contribute significantly to the revenue of the larger Chatham County.

With an average upland elevation of only 7.5 feet above mean sea level, the City is experiencing “blue sky” flooding more regularly every year, even without a storm or significant rainfall. Not only is it critical to our full-time residents that we begin to address the issues presented by sea level rise on our estuarine shoreline using a sustainable mix of natural and hybrid infrastructure approaches that provide a wide range of social and environmental benefits through this grant, it is vital to maintaining this economic engine of growth for the county.

While the ocean is clearly an attraction for visitors, Tybee Island’s marsh, typical of Georgia’s tidal salt marshes in general, is one of the most biologically productive natural systems on Earth. According to the Georgia DNR, they produce more than twenty tons of biomass per acre. This enormous productivity helps make the salt marsh a nursery area for blue crab, oysters, and shrimp. The marsh is also home to the Diamondback Terrapin raccoons, marsh rabbits, and otter. A variety of bird species, including the marsh hen, seaside sparrow, and long-billed marsh wren count the marsh as home. Great blue herons, common and snowy egrets, and other wading birds commonly forage in the marsh at low tide. The salt marsh is of immense value for storm protection, pollution filtering, and a nursery area for Georgia’s economically important crustaceans and fish.

We are working to reduce our risk and increase our resiliency to flooding events while enhancing the natural habitat that is so vital to the environmental and economic health of the area. We also appreciate the need to build a model of analysis and decision-making that is transferable, applicable to a wide variety of issues, and that can be used by other coastal cities faced with similar issues. By being intentional about our process, documenting our steps and reviewing each stage with a critical eye towards improvement, we hope to assure that it is methodical, inclusive, and informed by both experts and the wide range of public constituencies affected by the decisions to be made. Along with the appropriate publicity to assure awareness by others who would benefit from such an approach, our goal is to develop a replicable model and assist other communities to implement it.

7. **Representative Project Photos:** See uploads
8. **Designs, Site Maps and Letters of Support:** See uploads