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Dredging Operations and Environmental Research Program

A Community Engagement Framework Using Mental Modeling

The Seven Mile Island Innovation Lab Community Engagement Pilot—Phase I

Sarah Thorne, Daniel C. Kovacs, Joseph Z. Gailani, and Burton C. Suedel

August 2022

Engineer Research and Development Center

Cover photo credits

Nesting laughing gulls and osprey using wetlands habitat and nature-based infrastructure near The Wetlands Institute in Stone Harbor, New Jersey. Photos by Sarah Thorne.

The Dredge Fullerton, owned and operated by Barnegat Bay Dredging Company, conducts dredging in the New Jersey Intracoastal Waterway near Stone Harbor, New Jersey, as part of a US Army Corps of Engineers project. The sediment was placed to create habitat on marshland managed by the New Jersey Division of Fish and Wildlife. Photo by Gary Paul | VIRIN: 121218-A-EO314-823.JPG. https://www.nap.usace.army.mil/Media/Images/igphoto/2002077686/.

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Sarah Thorne and Daniel C. Kovacs

Decision • Partners
563 Bouldercrest Drive
Marietta, GA 30064

Joseph Z. Gailani

Coastal and Hydraulics Laboratory
US Army Engineer Research and Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Burton C. Suedel

Environmental Laboratory
US Army Engineer Research and Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

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Abstract

The US Army Corps of Engineers (USACE) engages and collaborates with multiple stakeholders—from agency partners, to public, private, and not-for-profit organizations, to community residents—to develop its dredged-sediment long-term management strategy (LTMS) that expands beneficial-use (BU) practices. In spring 2019, USACE collaborated with Decision Partners, the USACE–Philadelphia District Operations Division, The Wetlands Institute, and the Engineering With Nature program leadership to adapt, test, and refine the proven behavioral-science-based processes, methods, and tools based on Decision Partners' Mental Modeling Insight, or MMI, approach for engaging stakeholders, including community members, as part of the Seven Mile Island Innovation Laboratory (SMIIL) initiative in coastal New Jersey. The team identified key community stakeholders and conducted research to better understand their values, interests, priorities, and preferences regarding wetlands and USACE activities in the Seven Mile Island area and those activities' effects on wetlands, including protecting the environment, wildlife habitat, aesthetic beauty, maintaining navigability, and supporting coastal resilience. Understanding stakeholder needs, values, interests, priorities, and preferences is key to designing effective engagement strategies for diverse communities for SMIIL and provides a foundation for the community engagement framework currently being developed for application across USACE.

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Preface

This technical report (TR) was funded by the US Army Engineering Research and Development Center (ERDC), Dredging Operations and Environmental Research (DOER) program, Dr. Todd Bridges, program manager. This study was conducted for the DOER program under Work Unit 19-03.

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At the time of publication, Mr. James Lindsay was chief, Environmental Risk Assessment Branch; Mr. Warren P. Lorentz was division chief, Environmental Processes and Engineering Division; Ms. Ashley E. Frey was the chief, Coastal Processes Branch; and Dr. Cary A. Talbot. was the division chief, Flood Risk Management Division. The director of ERDC-EL was Dr. Edmond J. Russo, and the director of ERDC's Coastal and Hydraulics Laboratory (ERDC-CHL) was Dr. Ty V. Wamsley. Ms. Tiffany S. Burroughs was Headquarters USACE Acting Navigation branch chief, and Mr. Charles E. Wiggins, ERDC-CHL, was the ERDC technical director for the Civil Works and Navigation, Research, Development, and Technology Transfer portfolio. The technical monitor was Dr. Todd S. Bridges, Office of the Senior Scientist Branch.

COL Christian Patterson was commander of ERDC, and Dr. David W. Pittman was the director.

1 Introduction

To expand the beneficial use (BU) of dredged sediment, the US Army Corps of Engineers (USACE) seeks to develop a long-term management strategy (LTMS) for dredged material. Engaging and collaborating with multiple stakeholders—agency partners; public, private, and nonprofit organizations; community residents—BU is critical to increasing BU while concomitantly managing costs, and stakeholder acceptance is fundamental to business success. Several dredging projects have been canceled or significantly delayed or modified because of lack of stakeholder understanding and support. These delays and modifications challenge USACE's ability to develop LTMS in the 3×3×3 planning process, which gives project managers only three years to implement new strategies that ultimately benefit the community.

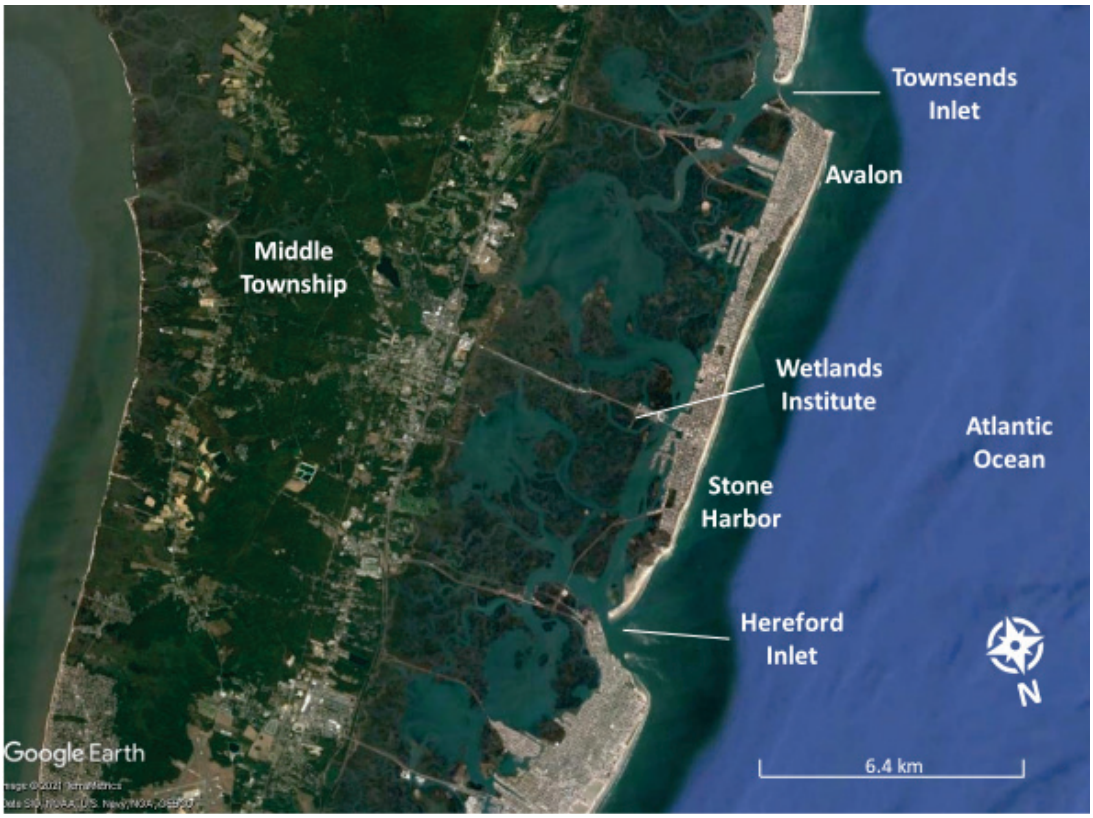
> *Understanding and addressing stakeholder—and specifically community stakeholder—needs, values, interests, priorities, and preferences is key to designing effective engagement strategies for diverse communities.*

Expanded BU can increase system resilience and improve ecosystem health. Such expanded uses may require operational changes, such as sediment placement in nearshore regions or near sensitive habitats (for example, submerged aquatic vegetation). Operational changes are often initially viewed with concern by local, state, and national stakeholder groups, and the array of concerns expressed are often complex and sometimes contradictory. Similarly, because other USACE projects that incorporate natural and nature-based features, or NNBF, and other sustainable and nature-based solutions are not well understood by stakeholders, the benefits, which often take years to obtain, are not fully recognized or factored into stakeholder perceptions and decision-making.

This technical report documents the adaptation of Decision Partners' Mental Modeling Insight™, or MMI, approach to the Seven Mile Island Innovation Laboratory (SMIIL) pilot project. This approach provides a model of community engagement practices required to build sustainable partner and public understanding, acceptance, and support for available and

emerging methods to protect and enhance coastal resilience in the Seven Mile Island area (Figure 1).

Figure 1. Map of the Seven Mile Island Innovation Laboratory (SMIIL) in coastal New Jersey, United States. The SMIIL is bordered by Townsends Inlet to the north and Hereford Inlet to the south. (Image modified from Google Earth ©2021 | TerraMetrics | Data SIO, NOAA, US Navy, NGA, GEBCO.)



The 62 km² (24 mi²) SMIIL was chosen as the pilot location for our community engagement approach because of its ongoing need for dredging, the legacy of traditional dredging activities, the vulnerability of its sensitive ecosystems and communities to coastal risks, and the successful partnership between USACE and The Wetlands Institute.*

Historically, dredged material from federal and state channels, including the New Jersey Intracoastal Waterway (NJIWW), has primarily been placed in confined disposal facilities. A working group was formed to iden-

* For a full list of the spelled-out forms of the units of measure and a full list of the unit conversions used in this document, please refer to *US Government Publishing Office Style Manual*, 31st ed. (Washington, DC: US Government Publishing Office, 2016), 248–52, 345–47, https://www.govinfo.gov/content/pkg/GPO-STYLEMANUAL-2016/pdf/GPO-STYLEMANUAL-2016.pdf.

tify and refine both short- and long-term objectives. The group also promotes goals that focus on maintaining safe navigation channels while also retaining dredged sediment in the system (in its extensive tidal marshes) to benefit natural ecosystems and coastal communities.

Coastal New Jersey, United States, marshes are at risk because of sea level rise, sediment starvation, and sediment erosion, reducing not only the marshes' habitat value but also reducing coastal resilience and increasing coastal risk. It was recently recognized that sediment is a currency that should be used to help preserve marsh integrity by restoring marsh habitat and improving coastal resilience through the BU of dredged sediment (Murray 2008). To that end, four marsh-restoration and habitat-creation projects used sediment from the NJIWW, but the question remained: how best to use dredged sediment to build on their successes. This reuse was a marked departure from the traditional practice of dredging and placing the material in confined disposal facilities cut off from the natural sediment system.

Monitoring activities are ongoing within the SMIIL and include collecting sediment and hydrodynamic data and local bird data. These data will establish baseline conditions and initial designs to develop BU placement strategies that mimic natural processes. Adaptive management strategies are also being evaluated to inform policy and to benefit long-term sustainable practices and coastal resilience in the region.

The SMIIL was launched in spring 2019 by USACE–Philadelphia District, the state of New Jersey, and The Wetlands Institute to advance and improve dredging and marsh-restoration techniques through innovative research, collaboration, knowledge sharing, and practical application consistent with regional sediment management and Engineering With Nature® principles. The SMIIL builds on four demonstration-project successes using dredged sediments beneficially by implementing additional projects using a more systematic approach and establishing a forum for stakeholders (for example, The Nature Conservancy) to share knowledge, provide input, and disseminate information. The existence of this partnership in particular made this location particularly attractive for piloting the community-engagement approach.

1.1 Background

Disruptions to regional sediment transport mechanisms (for example, removing sediment dredged from federal navigation channels from the system) have resulted in sediment deficits in rivers, bays, and estuaries as well as coasts. Sediment deficits result in decreased ecosystem diversity function and increased flood risk (Bridges et al. 2015). Because USACE recognizes sediment as a resource, it is developing more sustainable sediment management practices that maintain sediments within the regional system where they originate and strive to improve sediment distribution through natural processes. USACE dredging practice is evolving to increase BU and support regional sediment management strategies.

The bulk of navigation-dredged sediment used beneficially is sand and is used for beach, dune, and littoral-zone nourishment (Childs 2015). However, most maintenance-dredged sediment includes a substantial amount of fine-grained material (silt and clay) and is classified as "muddy" (USACE 1978; Bartos 1977). Commonly perceived as being bad for aquatic ecosystems, muddy sediment is critical to sustaining many habitats, such as marshes, fish spawning grounds (Fisken et al. 2002), and mudflats. And while the benefits of muddy sediments to USACE ecosystem-restoration and flood-risk-management objectives have been identified as a research topic requiring further investigation by the USACE Dredging Operations and Environmental Research, or DOER, program, the vital role that muddy sediments play in protecting and enhancing critical ecosystems is not always understood or valued by nearshore residents or community stakeholders.

Some stakeholders had negative perceptions about the management of these sediments near marsh habitat. Several BU projects have not been implemented because of stakeholder misunderstandings and concerns in the SMIIL and elsewhere in the United States. Effective partner and community stakeholder engagement at the local, regional, and state levels is required to support BU—particularly of muddy dredged sediments.

1.2 Objectives

The objective of the SMIIL Community Engagement Pilot Project is to adapt, test, and refine proven behavioral-science-based processes, methods, and tools (see Morgan et al. 2002; Wood et al. 2017; Atman et al.

1994; Bostrom, Fischhoff, and Morgan 1992; Fischhoff 2015; Eggers and Thorne 2017) for engaging partners and community members as part of the SMIIL initiative in coastal New Jersey.

The pilot project seeks to identify what stakeholders know, do not know, and misunderstand about the role sediments play in protecting shoreline ecosystems. USACE can then use that insight to more effectively communicate negative ecosystem impacts and increased flood risk associated with long-term removal of sediment from the system. Risks and benefits of in-water management must be clearly defined and communicated to stakeholders early in the planning process. By engaging stakeholders early and effectively, and incorporating their values and input into project planning, all parties will become invested in BU practices, and proponents can be identified who can help support such initiatives.

The comprehensive SMIIL Community Engagement Pilot Project will help protect and enhance coastal resilience in the Seven Mile Island area and identify gaps in data required to advance engineering and ecosystem restoration, navigation, and flood-risk-management guidance.

2 Methodology

2.1 The Seven Mile Island Innovation Laboratory (SMIIL) community engagement research challenge

The SMIIL pilot project used a phased approach because of US government requirements for the multistep approval processes for the collection of data from the public or businesses (see https://pra.digital.gov/). This report documents Phase I.

The key steps in Phase I of the pilot project were:

1. Form the project team.
2. Conduct a site visit.
3. Develop the SMIIL Community Engagement Opportunity Statement.
4. Integrate expert knowledge generated through a comprehensive site visit and expert interviews into an expert model used as the analytical framework for the research.
5. Develop a comprehensive stakeholder map and conduct a stakeholder hypothesis.
6. Develop the pilot research plan.
7. Conduct mental models research with community stakeholders including local community members; environmental nongovernmental organizations, or ENGOs; and nongovernmental organizations (NGOs) (Note: pretesting the research protocol with fewer than 10 nongovernment individuals is exempt from Office of Management and Budget review).
8. Participate in the SMIIL working group (stakeholder) meeting.
9. Conduct one-on-one meetings with key community leaders.
10. Report Phase I pilot results, including considerations on SMIIL community stakeholder engagement and communication.
11. Develop research materials suitable for follow-up use in a potential Phase II initiative, such as a mental models interview protocol and mental-models-based web survey.

Decision Partners' 7-Step Stakeholder Engagement Process was adapted for the SMIIL Community Engagement Pilot Project (Figure 2). The science-based process is robust, proven, and scalable to accommodate a wide range of challenges and broad, diverse, and often complex stakeholder environments. It is iterative, and so between each step is a decision: to stop

and go back to get more information, to take immediate action (if an intervention is required), or to go on to the next step. Activities completed to date on the SMIIL Community Engagement Pilot Project were part of the first four steps.

Figure 2. Stakeholder engagement process adapted for SMIIL. Activities in this pilot project were part of the *blue highlighted* steps (first four steps).

A project team was formed, led by US Army Engineer Research and Development Center (ERDC) principal investigators (PIs), and included representatives of Decision Partners; the project manager of Operations Division, USACE–Philadelphia District; the executive director of The Wetlands Institute; and the deputy national lead of Engineering With Nature.

The project was launched with a site visit to Seven Mile Island in June 2019 and included a tour of the back-bay wetlands, Seven Mile Island, and the adjacent communities. This initial site visit provided firsthand insight into the challenges and opportunities faced in maintaining coastal navigation channels in New Jersey and Delaware, which include the 117 mi NJIWW.

3 Results

3.1 Step 1: Define the opportunity

The initial team workshop began with an orientation to the challenge, the opportunity, and the stakeholder engagement process. Decision Partners had developed a draft opportunity statement as a starting point for the team to review and discuss, and over the course of the site visit, the team revisited and revised the opportunity statement. The final opportunity statement clearly defined the goals and desired outcomes of the project, including the desired behavioral outcomes resulting from the application of the community-engagement process, specifically the research component.

The opportunity statement was refined and expanded during the site visit to The Wetlands Institute, where it became clear that the highest-value opportunity was engaging partner and community stakeholders in protecting and preserving the SMIIL wetlands, which serve an increasingly critical role in coastal resilience. Sediment BU remains an important technical component of this initiative. But the team learned that understanding partners' and community stakeholders' values, interests, priorities, and preferences for the wetlands—along with assessing their understanding of the critical role the wetlands play in supporting coastal and community resilience—is essential to the future well-being of the community and the wetlands ecosystem.

The opportunity statement that resulted from this process read as follows:

> The opportunity now is to protect and preserve the value of the SMIIL wetlands by systematically building sustainable partner and community understanding, acceptance, and support for the application of available and emerging methods to protect and enhance coastal resilience in the Seven Mile Island area.
>
> We will do this by applying a values-based, behavioral-science approach to conduct foundational pilot research. We will systematically document the process and use key learnings to develop a Community Engagement Framework that can be scaled, tested, and

> applied to a range of challenges where USACE and its partners are collaborating to simultaneously support Navigation, Flood Risk Management and Ecosystem missions.
>
> The initial phase of the pilot research will be completed by the end of 2019. We will complete the rest of the pilot research once OMB approval has been received.

In addition to the opportunity statement, the following research objectives were developed in collaboration with the ERDC PIs to further define the opportunity and intent of the project. Building on work to date, ERDC and its contractors will continue to adapt and apply a proven, values-based, behavioral-science approach to

- Identify SMIIL partners and community stakeholders.
- Discover community stakeholders' values, interests, priorities, and preferences along with their communications needs regarding SMIIL, its role in ecosystem and flood protection, and the role of BU projects, technologies, and options being considered to support those needs.
- Identify shared values, gaps, and perspectives.
- Address gaps and build shared understanding of the critical need to use sediments to restore ecosystems, support flood-risk management, and enable shoreline resilience, while simultaneously maintaining social and commercial uses.
- Incorporate partner and community interests into BU projects and a LTMS for sediments in the area.
- Document the process, outcomes, and lessons learned to incorporate into a community-engagement framework that can be scaled and applied broadly to other regions where USACE operates.

3.2 Step 2: Characterize the situation

The next step in the process was to characterize the situation. In this step Decision Partners collaborated with the ERDC PIs and project collaborators to develop the initial expert model depicting influences on effective stakeholder engagement, identify stakeholders, develop a stakeholder map and have a detailed discussion of the stakeholder hypothesis, define the re-

search plan, and develop the sample frame and research sample. An interview protocol was then developed to guide the mental models research interviews conducted in the next step.

The resulting expert models, shown in Figures 3 and 4, were developed using conversations with the project team members as well as insights gained from a review of materials provided by the project team. Figure 3 depicts the range of factors, and the relationships among these factors, that may influence stakeholders' judgments and decision-making about opportunities and options for coastal resilience and ecosystem health at SMIIL. Figure 4, the impacts model, is a submodel of the base expert model that depicts the influence of various forms of impacts resulting from implementation of dredging projects undertaken to protect wetlands and improve coastal resilience in detail.

Following several iterations and refinements of the models with the project team, the models were completed. They were then used as the analytical framework for the design, implementation, and structured analyses of in-depth, semistructured mental models interviews conducted as part of Step 3 and then to assess and characterize the results of the interviews in Step 4.

3.2.1 SMIIL stakeholder map

The stakeholder map (Figure 5) was developed working with the project team, drawing specifically on the expertise of the local members. The map shows individual stakeholders—individuals, groups, and organizations, including decision makers—identified by the project team who may affect, be affected by, or perceive themselves to be affected by activities in SMIIL wetlands.

For this SMIIL project, stakeholders are organized in the map by sector for clarity. A draft map was developed using a review of background materials, which enabled the identification of broad categories of stakeholders. The map was then populated with specific stakeholders through discussions with the project team. The map was updated as additional stakeholders were identified, including through engagement with other stakeholders.

Plaintext versions of the following figures (Figures 3–5) are provided in the appendix.

Figure 3. Base expert model of influences on effective partner and community stakeholder engagement on wetland protection and resilience at SMIIL. (Reused with permission from Decision • Partners.)

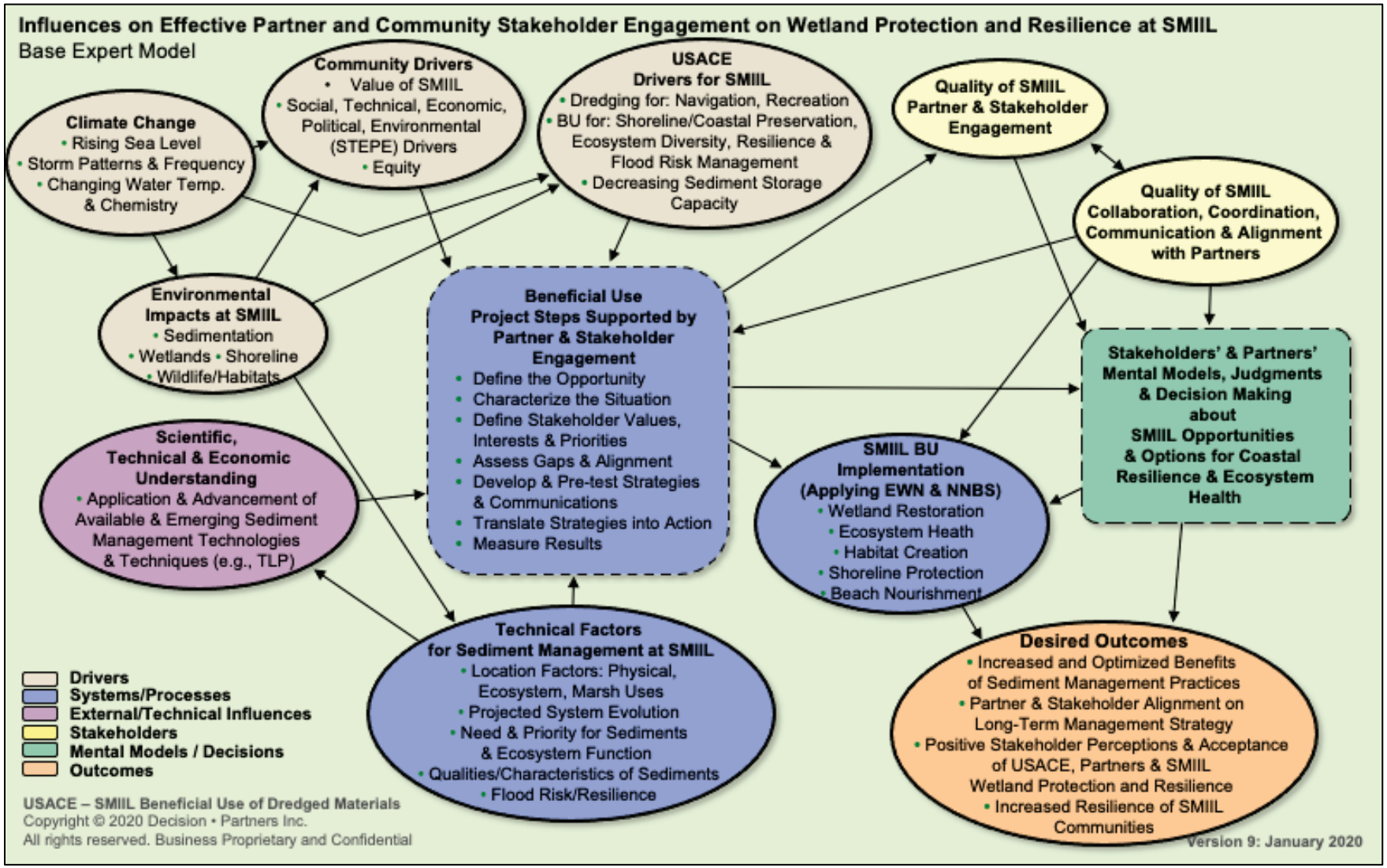


Figure 4. Impacts submodel showing the various influences that could affect the implementation of projects in the SMIIL. (Reused with permission from Decision • Partners.)

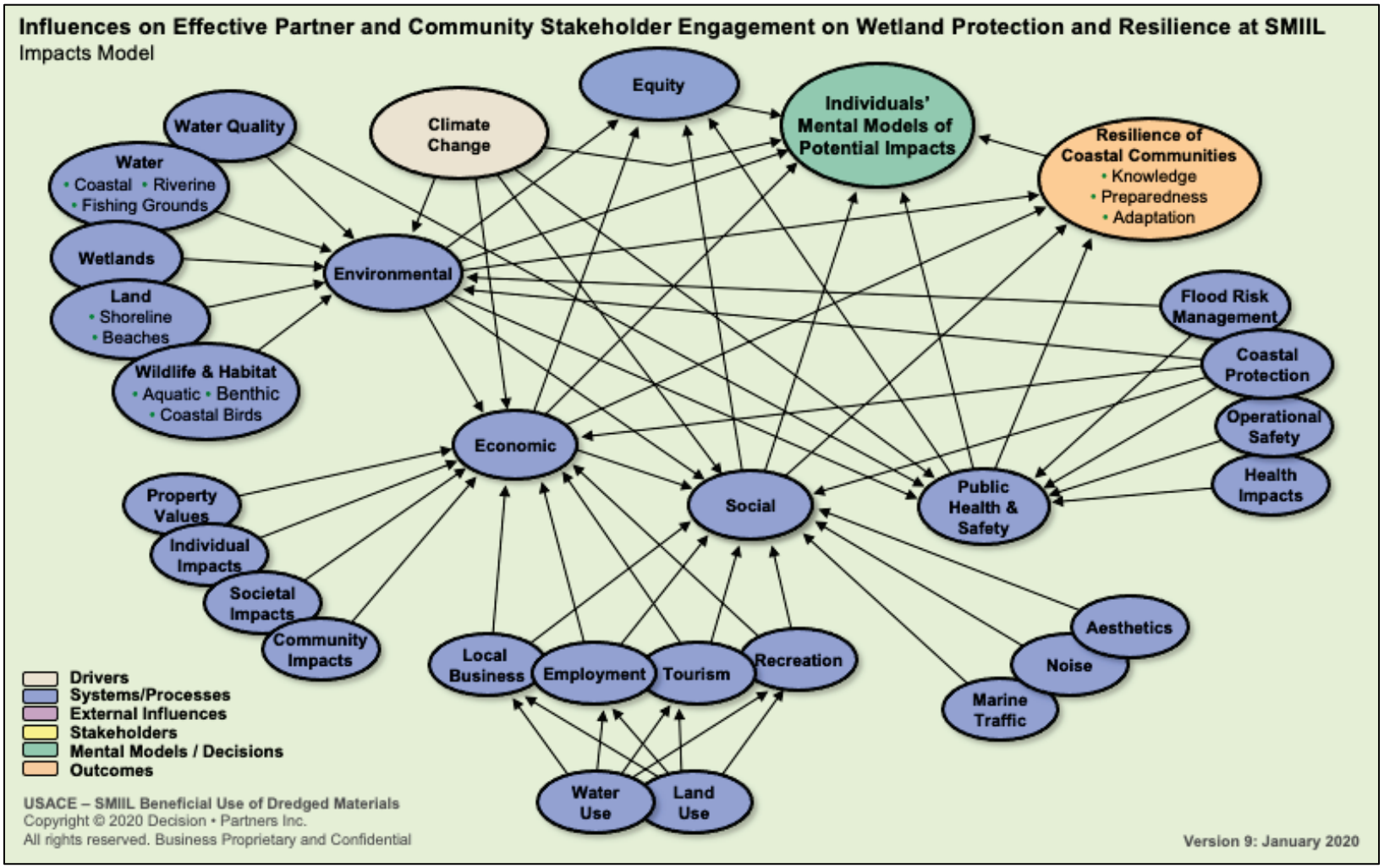
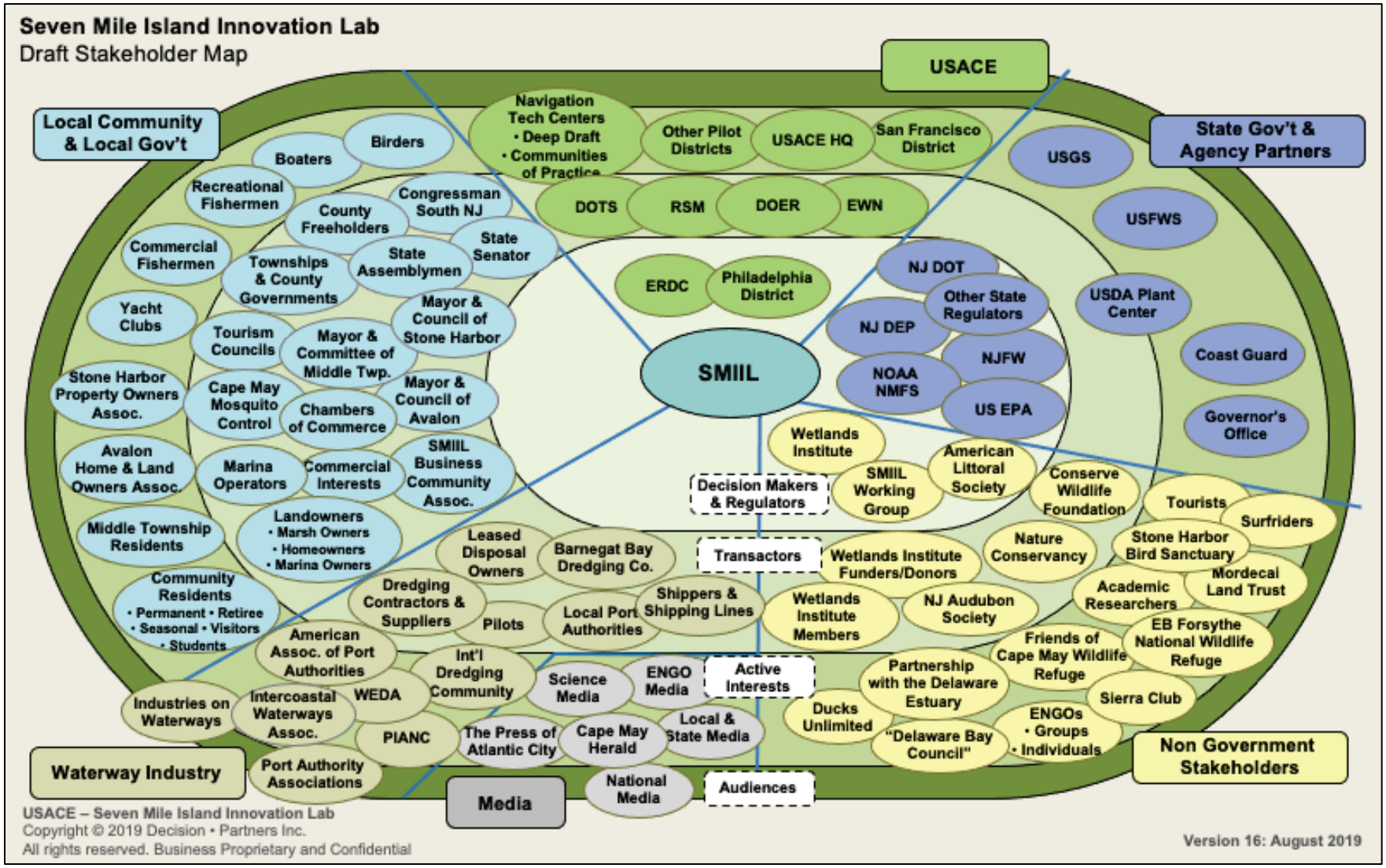


Figure 5. SMIIL stakeholder map showing the various stakeholders affected by US Army Corps of Engineers (USACE) dredging activities. Similar stakeholders are grouped and colored into segments in the map indicated by the *rectangular segment labels*. The *concentric bands* around the central SMIIL node indicate the nature of the stakeholder as a decision maker, transactor, active interest, or audience. (Reused with permission from Decision • Partners.)



3.2.2 SMIIL interview protocol

Using the research objectives and the expert model as a base, an interview protocol was developed to elicit discussion on key topics depicted in the expert model to better understand stakeholder perceptions of the Seven Mile Island area, the role of wetlands as wildlife habitat and as an element of coastal resilience, and of USACE activities associated with dredging in the area and BU of dredged material. The protocol was designed to allow for and encourage other relevant topics important to the stakeholder to emerge through free expression, whether these topics had been anticipated.

The interview protocol followed this basic outline:

1. Introduction to SMIIL and the research purpose and objectives
2. Stakeholder perceptions of the wetlands, the ways they use them, and what they value
3. Their perceptions of the role of the wetlands in coastal resilience and wildlife habitat
4. Their reactions to objective descriptions of the role of wetlands in coastal resilience and wildlife habitat (to assess perceptions of gaps and to ensure that stakeholders are operating from a common frame of understanding moving forward in the interview)
5. Their thoughts on various forms of wetlands protections, such as access and use limitations and controls (for example, boat speed limits) and BU applications (for example, thin-layer placement)
6. Their willingness to accept and make personal trade-offs among forms of wetland protection
7. Their preferences for future engagement and communications about SMIIL wetland protections
8. Their recommendations for other individuals and organizations that should be included in future engagement activities
9. Demographics (including characteristics such as full-time resident, retiree, and seasonal presence in the area)

The interview protocol was first pretested with a community stakeholder to make sure it worked as intended before additional interviews were conducted.

3.2.3 SMIIL sample development

3.2.3.1 SMIIL sample frame

A sample frame for the SMIIL project—the types and number of stakeholders the team intended to include in the research—was developed using discussions with the project team with the stakeholder map as a reference. Discussions around the stakeholder map and sample frame helped the team formulate its stakeholder hypothesis regarding who the key stakeholders are in the community and why and what their interests and priorities related to the wetlands and USACE operations might be and why. This hypothesis was used to define the sample frame and focus the design of the interview protocol.

The sample frame for the SMIIL pilot research comprised three cohorts:

1. ~9 local community and nongovernment stakeholders (residents, those involved in local organizations, businesses)
2. ~9 local government stakeholder (mayors, council members, representatives)
3. 6–10 state government and partner agency stakeholders

To conduct the full research complement of 24–28 interviews, a formal review of the project by the Office of Management and Budget would have been required. Given the time available, the PIs agreed to focus on conducting pilot research with the 9 individuals from the local community and nongovernment stakeholders cohort. The possibility of completing additional interviews at a later time, following OMB approval, was left open.

3.2.3.2 SMIIL research sampling

Decision Partners worked with The Wetlands Institute, the local partner on the project, to develop a list of approximately 45 stakeholders that could be contacted for interviews.

3.3 Step 3: Determine community values, interests, priorities, and preferences

In this step, one-on-one, confidential, in-depth, mental models interviews were conducted with 9 individuals in the local community and nongovernment stakeholders cohort. Potential interviewees from the sample list were

prioritized by the project team according to their demographics and affiliations to get as broad a set of perspectives as possible. Individuals were then recruited to participate in an interview following a script included in the protocol. Interviews were set up at the convenience of the interviewees and included evenings and weekends.

Key topics depicted in the expert model were discussed while encouraging interviewees to raise other topics they felt were important. Interviews averaged 49 minutes, with a minimum of 38 minutes and a maximum of 68 minutes, totaling 7 hours and 19 minutes of stakeholder interviews.

3.4 Step 4: Assess gaps and alignments

In this step, structured qualitative analysis of the interview results against the expert model was conducted to identify key areas of alignment and critical gaps in the thinking between the "experts"—the project team—and the community stakeholders. The results of the SMIIL pilot research are limited because of the small number of interviews that could be conducted under OMB requirements but provide valuable foundational insight into community stakeholders' values, interests, priorities, and preferences.

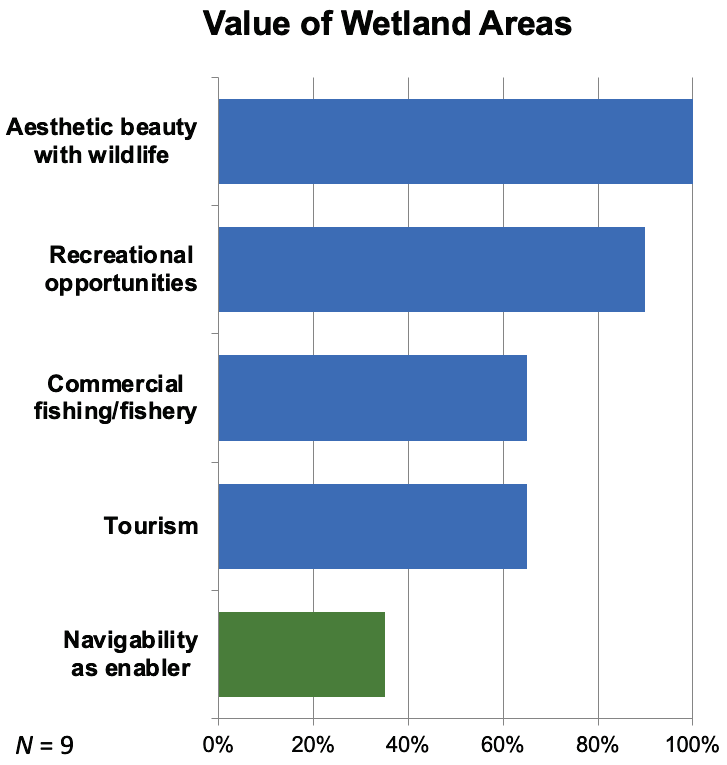
Given the small sample size, the results should not be interpreted as definitively representative of the larger community. Specific findings are ordered according to their frequency of mention (percentage of interviewees mentioning a topic). To further highlight the qualitative nature of the results, the frequency of mention is rounded to the nearest 5%, and the following qualitative descriptive terms are used to characterize the frequency:

- *All* indicates a response by all 9 (100%) interviewees
- *Nearly all* indicates a response by 7 or 8 of 9 (80% or 90%)
- *Most* indicates a response by 6 of 9 (65%)
- *Many* indicates a response by 4 or 5 of 9 (45% or 55%)
- *Some* indicates a response by 3 of 9 (35%)
- The more precise terms of *one* and *a couple* indicates a response by 1 and 2 of 9 interviewees, respectively.

3.4.1 Value of wetlands

Interviewees identified multiple values of the SMIIL wetlands areas (Figure 6). Aesthetic beauty with wildlife and recreational opportunities were the top benefits identified.

Figure 6. Value of wetland areas as identified by Interviewees. *Green bar* highlights result closely related to the USACE dredging and navigation mission.



3.4.2 Changing wetlands and wetland protection

Interviewees were asked about the changes they saw taking place in the wetlands and how these same wetlands could be protected. Most interviewees (65%) noted changes to wildlife habitat, such as reduced diversity of nesting bird species, that many (55%) attributed to rising sea levels, higher tides, and stronger storm systems. Many (45%) also noted the buildup of silt in the back bay and the resultant negative impact on navigability.

Interviewees were generally aware of activities being taken to ensure the health of the back-bay wetlands, including USACE's thin-layer-placement

projects (55%) and other efforts, such as collaborations with The Wetlands Institute, to raise awareness around protecting the wetlands. Again, because of the small number of interviews, it is not known whether this level of awareness is representative of the larger population. When asked what more can be done to protect the wetlands, some interviewees suggested continuing and expanding dredging and BU of sediments (35%) as well as increased protection from pollution runoff (35%), and one suggested protecting the back-bay area with flood gates.

3.4.3 Responsibilities and vision for the future

Interviewees were also asked about responsibility for protecting the wetlands. There was no definitive understanding about who has primary responsibility for protecting the wetlands, but most interviewees (65%) suggested that it is likely a shared responsibility among the various levels of local, state, and federal government.

When asked about their vision and priorities for the future of the SMIIL area, interviewees' comments reflected their values presented above: protecting the environment, including habitat (55%) and aesthetic beauty of the wetlands (20%); maintaining navigability (55%); and supporting coastal resilience (20%). Some (35%) asked about how dredging and BU projects could be supported and funded in the future.

3.4.4 US Army Corps of Engineers (USACE) dredging activities

Interviewees were given the following short description of USACE activities and asked to provide their thoughts:

> Back bay channels and basins behind Seven Mile Beach have been getting shallower for some time. The Army Corps has undertaken dredging projects at both Avalon and Stone Harbor to remove critical shoaling in the federal channel in the New Jersey Intercoastal Waterway, where they are responsible for maintaining navigation to ensure public safety and enable commercial and recreational use.
>
> A key challenge of all dredging projects is what to do with the dredge sediment? The standard method has

> historically been to pump dredge material or sediments into Confined Disposal Facilities or CDFs and allow it to dry out. You are likely familiar with the trapezoid-shaped "mountains" that are visible on Nummy Island just south of Stone Harbor and on Graven's Island along the Avalon Causeway. More recently, clean sediments dredged on behalf of the Army Corps have been used to build elevated nesting habitat on Ring Island for several species of nesting birds struggling with habitat loss. It has also been used to restore degraded marshes through a technique called thin-layer placement. Putting clean sediments on the marsh in a layer thin enough to allow marsh grasses to regrow, enables marsh habitat to grow, while slowly raising the marsh elevation to offset elevation losses due to rising sea level.

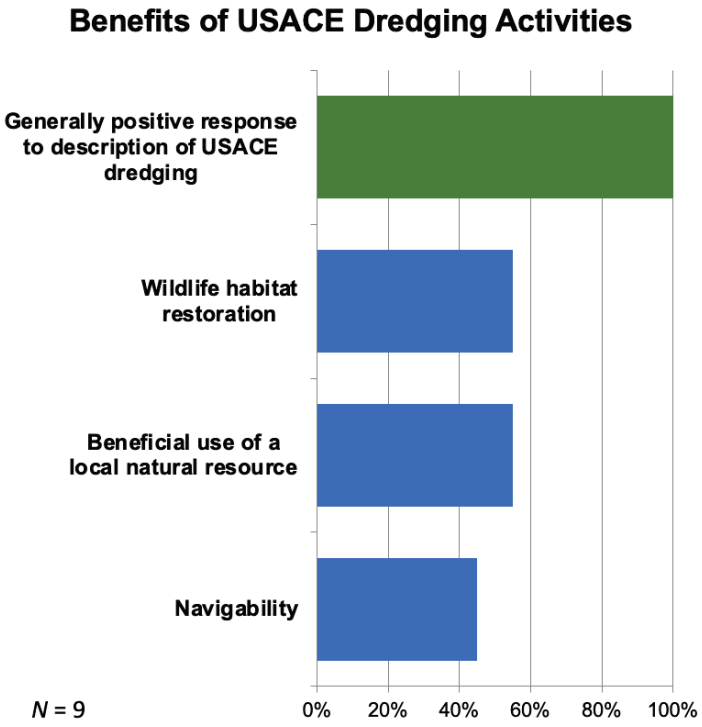
Nearly all interviewees (90%) were somewhat aware of USACE's dredging activities, and some (35%) were aware of thin-layer placement as a means of beneficially using sediment dredged from the NJIWW (Figure 7).

All interviewees (100%) commented positively about the dredging projects after hearing them described. Interviewees noted many benefits on navigability and on the ecosystem, including supporting wildlife habitat and restoration, BU of a local resource (dredged sediments), and improved navigability.

Some commented that the BU of dredged sediments is the only active, ongoing effort to support habitat that they know of in the area.

When asked at the end of the interview to rate their level of support for using dredged sediment to support wetlands and habitat restoration (scale: *very supportive*, *somewhat supportive*, *not very supportive*, *opposed*, *too early to say*), nearly all (90%) were very supportive (one interviewee would not rate, and another wondered why the projects cannot be done more quickly or expanded).

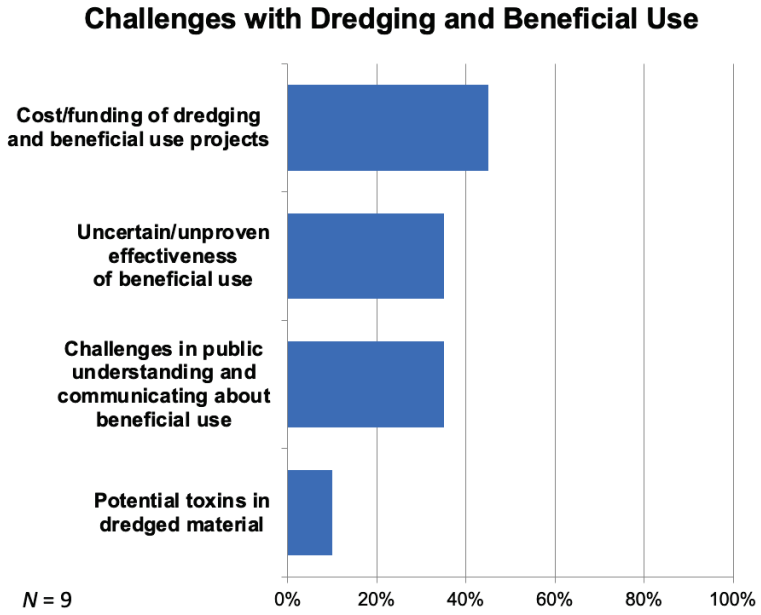
Figure 7. Benefits of USACE dredging activities as identified by interviewees. *Green bar* highlights result closely related to the USACE dredging and navigation mission.



3.4.5 Challenges with dredging and beneficial use (BU)

Interviewees did not raise significant concerns about dredging or thin-layer placement but did have questions about costs and priorities, unknowns about the level of benefit, lack of public awareness and understanding around these activities, and the potential for toxic materials to be present in dredged materials (Figure 8). Many spontaneously mentioned the desire that more dredging be done to improve navigability of waterways in the area.

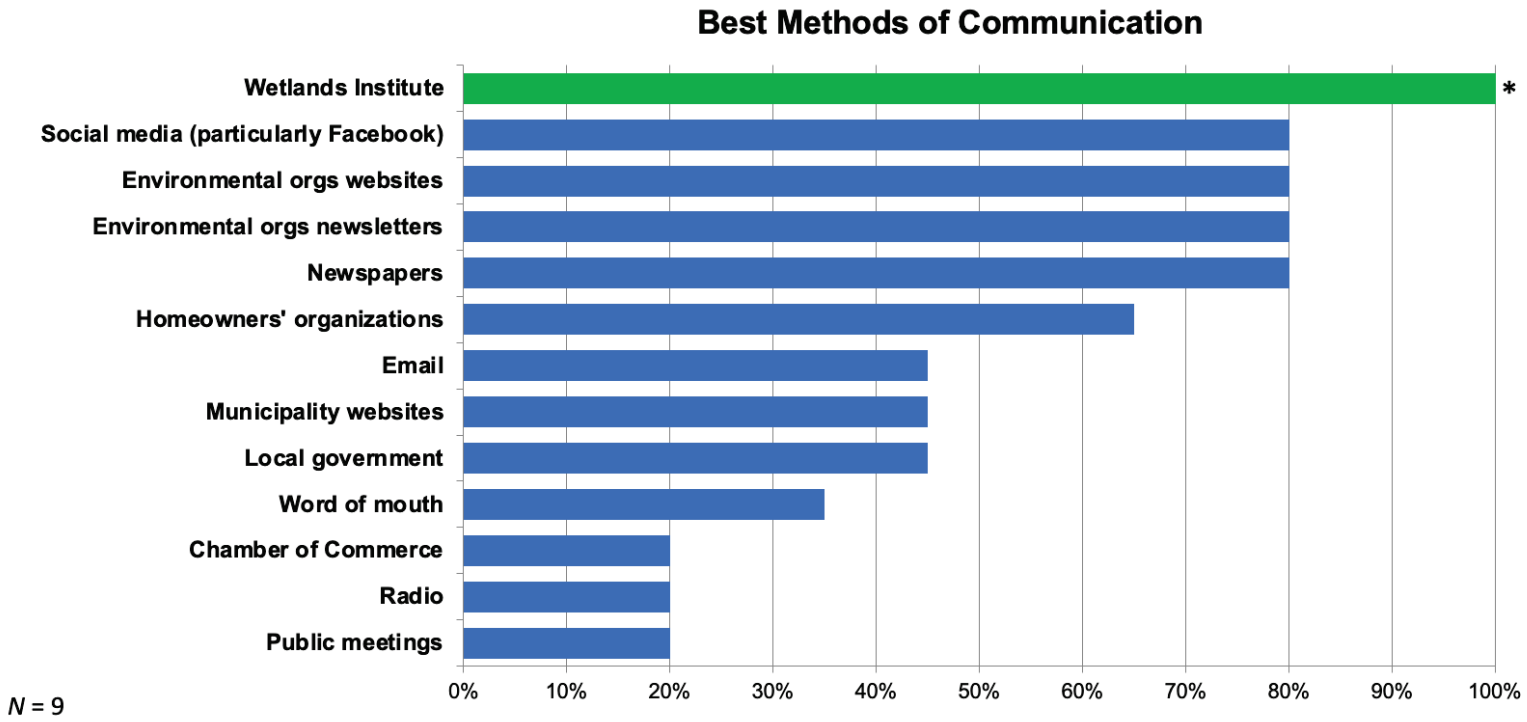
Figure 8. Challenges with dredging and beneficial use (BU) as identified by interviewees.



3.4.6 Communications

When presented with a number of methods that could be used as channels of communication, all interviewees suggested that information through The Wetlands Institute would be effective in reaching them, with social media (Facebook), environmental organizations' websites, and environmental organization newsletters and newspapers also being effective for 80% of respondents. Homeowners' associations were also rated highly as a communications source (Figure 9).

Figure 9. Best methods of communication as identified by interviewees. *Green bar* highlights result related to The Wetlands Institute.*



* The prevalence of The Wetlands Institute as the top source for communications was expected given the sample was developed in collaboration with The Wetlands Institute. Future work with a broader sample may produce different results.

3.4.7 Top-level summary of informal meetings with area leaders

To gain insight into the values and priorities of some of the key community leaders in the SMIIL area, some team members met in unstructured, small-group meetings with people identified by the project team as influential, including association representatives of local business and homeowners' associations as well as politicians and community administrators.

The community leaders were very forthcoming about the issues and challenges they face in their respective roles. They were knowledgeable about the value of the wetlands, but a couple only had a very superficial understanding of the work of USACE in the area, or USACE's work underway through SMIIL, despite their long residency in the area.

They all offered useful advice to USACE, including several communications channels and follow-up opportunities. A key piece of information learned was that the communities of Stone Harbor and Avalon, New Jersey, experience significant turnover because many of the homes are second properties. It was noted that there is a new crowd every 10 years or so, because of the turnover of second homes, and community leaders emphasized the need for constant reinforcement and re-education on the wetlands and their importance.

The insight generated by the SMIIL pilot research is being used to support targeted outreach and communications strategies about the initiative and to define the scope of subsequent research.

Subsequent research could comprise all or some of the following:

- Additional mental models research with community and NGOs (and the other stakeholder cohorts identified herein), expanding the initial (experimental) pilot sample of 9
- A web-based survey to engage a larger population of the broader community around SMIIL
- Deliberative dialogue sessions with key stakeholders, including agency and government stakeholders and others determined to be of critical influence according to results to date

4 Summary

The SMIIL Community Engagement Pilot Project provided insight into the values and priorities regarding the Seven Mile Island wetland areas and awareness of the activities of USACE from a small sample of local stakeholders and key community leaders in the SMIIL area. The results of this pilot research are limited because of the small number of interviews that could be conducted under Office of Management and Budget requirements.

Generally, interviewees' top priorities were protecting the environment, habitat, and aesthetic beauty of the wetlands and maintaining navigability. Some noted the value of supporting coastal resilience and using the dredged sediment as a local resource in these efforts.

Most interviewees were somewhat aware of USACE's dredging activities, and many were aware of the thin-layer-placement method of beneficially using dredged sediments but had only a superficial understanding of the benefits being generated by implementing this sustainable practice to restore wetlands and improve coastal resilience. After USACE's BU of dredged sediments was explained to them, all interviewees were generally supportive.

Interviewees' preferences regarding communications channels have proven particularly insightful. As found here, unique local sources—for example, The Wetlands Institute and local homeowners' associations—were preferred by those interviewed. Such findings suggest the potential for partnerships and using organizations' website, newsletters, and meetings for communication.

The insight generated from this research will inform targeted outreach, communications, and strategies around the SMIIL initiative and USACE activities as well as provide foundational guidance for planning and conducting subsequent research. As noted above, it is recommended that the research findings be validated through additional stakeholder engagement activities, such as additional interviews or a broader community stakeholder survey, or both.

Such insight should be used to reinforce positive messages that align with the values and priorities of community stakeholders and USACE and its

partners. Where the values and priorities do not align, additional engagement and communication should be conducted along with refinements to USACE's planning and outreach activities, so USACE's activities better align with community values and priorities. Listening to, learning from, and finding common ground with community stakeholders is critical in gaining and sustaining community support for USACE dredging project activities.

Because many of the residences in the area are second properties, with a high turnover of owners, the pilot project findings suggest that communication about BU and wetland preservation needs to be a continuous activity with constant reinforcement and re-education on the importance of wetlands from economic, social, and environmental perspectives.

The project also illustrated the value of including informal dialogue in addition to the formal research interviews as part of defining community values, interests, priorities, and preferences in Step 3 of the community engagement process. Dialogue with even small numbers of individuals—as was done with the informal meetings with community leaders in this project—can yield important insight and, importantly, is an effective form of community engagement that improves relationships with the community and aids future activities, including research. This unstructured engagement is not subject to the same data-collection review and limitations as the structured research.

In addition to providing directly applicable guidance for the SMIIL project team, this pilot project demonstrates how this approach could be employed at other sites. Adopting the community engagement process, USACE project delivery team members should conduct similar foundations research to gain insight into the values, interests, priorities, and preferences of their community stakeholders, then seek opportunities to engage community stakeholders in dialogue about USACE dredging activities in their area generally and the project specifically. Specific community engagement activities must be tailored to the interests and preferences of the project community—there is no one solution. These outreach and engagement efforts are key to gaining and sustaining community support for USACE projects. Skilled and trained USACE team members with strong communications skills and knowledge of navigation and dredging would be particularly well suited for leading such community engagement activities.

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Appendix: Stakeholder Map Outline

Figures 3–5 from the main body of the report are provided in plain text as multilevel lists below.

Figure 3. Base expert model of influences on effective partner and community stakeholder engagement on wetland protection and resilience at SMIIL.

Title: Influences on Effective Partner and Community Stakeholder Engagement on Wetland Protection and Resilience at SMIIL

Subtitle: Base Expert Model

- Drivers
  - Climate Change
    - Rising Sea Level
    - Storm Patterns & Frequency
    - Changing Water Temp. & Chemistry
  - Community Drivers
    - Value of SMIIL
    - Social, Technical, Economic, Political, Environmental (STEPE) Drivers
    - Equity
  - Environmental Impacts at SMIIL
    - Sedimentation
    - Wetlands
    - Shoreline
    - Wildlife/Habitats
  - USACE Drivers for SMIIL
    - Dredging for: Navigation, Recreation
    - BU for: Shoreline/Coastal Preservation, Ecosystem Diversity, Resilience & Flood Risk Management
    - Decreasing Sediment Storage Capacity
- Systems/Processes
  - Beneficial Use Project Steps Supported by Partner & Stakeholder Engagement
    - Define the Opportunity
    - Characterize the Situation
    - Define Stakeholder Values, Interests & Priorities
    - Assess Gaps & Alignment
    - Develop & Pre-test Strategies & Communications
    - Translate Strategies into Action

        - Measure Results
    - Technical Factors for Sediment Management at SMIIL
        - Location Factors: Physical, Ecosystem, Marsh Uses
        - Projected System Evolution
        - Need & Priority for Sediments & Ecosystem Function
        - Qualities/Characteristics of Sediments
        - Flood Risk/Resilience
    - SMIIL BU Implementation (Applying EWN & NNBS)
        - Wetland Restoration
        - Ecosystem Heath
        - Habitat Creation
        - Shoreline Protection
        - Beach Nourishment
- External/Technical Influences
    - Scientific, Technical & Economic Understanding
        - Application & Advancement of Available & Emerging Sediment Management Technologies & Techniques (e.g., TLP)
- Stakeholders
    - Quality of SMIIL Partner & Stakeholder Engagement
    - Quality of SMIIL Collaboration, Coordination, Communication & Alignment with Partners
- Mental Models / Decisions
    - Stakeholders' & Partners' Mental Models, Judgments & Decision Making about SMIIL Opportunities & Options for Coastal Resilience & Ecosystem Health
- Outcomes
    - Desired Outcomes
        - Increased and Optimized Benefits of Sediment Management Practices
        - Partner & Stakeholder Alignment on Long-Term Management Strategy
        - Positive Stakeholder Perceptions & Acceptance of USACE, Partners & SMIIL Wetland Protection and Resilience
        - Increased Resilience of SMIIL Communities

Figure 4. Impacts submodel showing the various influences that could affect the implementation of projects in the SMIIL.

Title: Influences on Effective Partner and Community Stakeholder Engagement on Wetland Protection and Resilience at SMIIL

Subtitle: Base Impacts Model

- Drivers

- Climate Change
- Systems/Processes
  - Equity
  - Environmental
    - Water Quality
    - Water: Coastal, Riverine, Fishing Grounds
    - Wetlands
    - Land: Shoreline, Beaches
    - Wildlife & Habitat: Aquatic, Benthic, Coastal Birds
  - Economic
    - Property Values
    - Individual Impacts
    - Societal Impacts
    - Community Impacts
    - Local Business
  - Social
    - Employment
    - Tourism
    - Recreation
    - Water Use
    - Land Use
    - Marine Traffic
    - Noise
    - Aesthetics
  - Public Health and Safety
    - Flood Risk Management
    - Coastal Protection
    - Operational Safety
    - Health Impacts
- Mental Models / Decisions
  - Individuals' Mental Models of Potential Impacts
- Outcomes
  - Resilience of Coastal Communities
    - Knowledge
    - Preparedness
    - Adaptation

Figure 5. SMIIL stakeholder map showing the various stakeholders affected by US Army Corps of Engineers (USACE) dredging activities. Similar stakeholders are grouped and colored into segments in the map indicated by the *rectangular segment labels*. The *concentric bands* around the central SMIIL node indicate the nature of the stakeholder as a decision maker, transactor, active interest, or audience.

Title: Seven Mile Island Innovation Lab

Subtitle: Draft Stakeholder Map

- USACE
  - Decision Makers
    - ERDC
    - Philadelphia District
  - Transactors
    - DOTS
    - RSM
    - DOER
    - EWN
  - Active Interests
    - Navigation Tech Centers: Deep Draft, Communities of Practice
    - Other Pilot Districts
    - USACE HQ
    - San Francisco District
- Local Community & Local Government
  - Transactors
    - State Senator
    - Mayor & Council of Stone Harbor
    - Mayor & Council of Avalon
    - SMIIL Business Community Association
    - Congressman, South NJ
    - State Assemblymen
    - Mayor & Committee of Middle Twp.
    - Chamber of Commerce
    - Commercial Interests
    - County Freeholders
    - Township & County Governments
    - Tourism Councils
    - Cape May Mosquito Control
    - Marina Operators
    - Landowners: Marsh Owners; Homeowners; Marina Owners
  - Active Interests
    - Birders
    - Boaters
    - Recreational Fishermen
    - Commercial Fishermen
    - Yacht Clubs
    - Stone Harbor Property Owners Association
    - Middle Township Residents
    - Community Residents: Permanent; Retirees; Seasonal; Visitors; Students

- State Government & Agency Partners
  - Decision Makers
    - NJ DEP
    - NOAA NMFS
    - NJ DOT
    - Other State Regulators
    - NJFW
    - US EPA
  - Transactors
    - USDA Plant Center
  - Active Interests
    - USGS
    - USFWS
    - Coast Guard
    - Governor's Office
- Waterway Industry
  - Transactors
    - Barnegat Bay Dredging Co.
    - Leased Disposal Owners
    - Shippers & Shipping Lines
    - Local Port Authorities
    - Dredging Contractors & Suppliers
    - Pilots
  - Active Interests
    - American Assoc. of Port Authorities
    - International Dredging Community
    - WEDA
    - Intercoastal Waterways Assoc.
    - PIANC
  - Audiences
    - Industries on Waterways
    - Port Authority Associations
- Non Government Stakeholders
  - Decision Makers
    - Wetlands Institute
    - SMIIL Working Group
    - American Littoral Society
  - Transactors
    - Conserve Wildlife Foundation
    - Nature Conservancy
    - Wetlands Institute Funders/Donors
    - NJ Audubon Society
    - Wetlands Institute Members
  - Active Interests

        - Tourists
        - Surfriders
        - Stone Harbor Bird Sanctuary
        - Mordecai Land Trust
        - Academic Researchers
        - EB Forsythe National Wildlife Refuge
        - Friends of Cape May Wildlife Refuge
        - Sierra Club
        - ENGOs: Groups; Individuals
        - Partnership with the Delaware Estuary
        - Ducks Unlimited
        - “Delaware Bay Council”
- Media
    - Active Interests
        - Science Media
        - ENGO Media
        - The Press of Atlantic City
        - Cape May Herald
        - Local & State Media
    - Audiences
        - National Media

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14. ABSTRACT

The US Army Corps of Engineers (USACE) engages and collaborates with multiple stakeholders—from agency partners, to public, private, and not-for-profit organizations, to community residents—to develop its dredged-sediment long-term management strategy (LTMS) that expands beneficial-use (BU) practices. In spring 2019, USACE collaborated with Decision Partners, the USACE–Philadelphia District Operations Division, The Wetlands Institute, and the Engineering With Nature program leadership to adapt, test, and refine the proven behavioral-science-based processes, methods, and tools based on Decision Partners' Mental Modeling Insight, or MMI, approach for engaging stakeholders, including community members, as part of the Seven Mile Island Innovation Laboratory (SMIIL) initiative in coastal New Jersey. The team identified key community stakeholders and conducted research to better understand their values, interests, priorities, and preferences regarding wetlands and USACE activities in the Seven Mile Island area and those activities' effects on wetlands, including protecting the environment, wildlife habitat, aesthetic beauty, maintaining navigability, and supporting coastal resilience. Understanding stakeholder needs, values, interests, priorities, and preferences is key to designing effective engagement strategies for diverse communities for SMIIL and provides a foundation for the community engagement framework currently being developed for application across USACE.

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