

COASTAL RESOURCE MANAGEMENT CUSTOMER TRENDS SURVEY 2010

DEVELOPED FOR THE NOAA COASTAL SERVICES CENTER

This document was created for NOAA through a contract with MRAG Americas, Inc.

MRAG Americas, Inc.
10051 5th Street North, Suite 105
St. Petersburg, Florida 33702
Jill.swasey@mragamericas.com
www.mragamericas.com

Coastal Resource Management Customer Trends Survey: Final Report

NOAA Coastal Services Center
2010

About the NOAA Coastal Services Center

The National Oceanic and Atmospheric Administration (NOAA) is a world leader in coastal and science management. NOAA's Coastal Services Center provides the up-to-date technology, information, and management strategies needed to address complex coastal issues.

The Center is housed within NOAA's National Ocean Service and has offices and staff members throughout the coastal zone. Constituents include local and state governments, coastal regulatory programs, land trusts, Sea Grant, floodplain managers, research reserves, and emergency managers.

To access the Center's products and services, visit the Center's website, or e-mail the organization at csc@csc.noaa.gov to learn more.

About the Survey

To better serve its constituents, the Center surveys coastal resource managers every few years to learn about their needs and capabilities. To see and compare surveys and results from 2010, 2006, 2002, 1999, and 1996, visit www.csc.noaa.gov/survey/.

NOAA Coastal Services Center
2234 South Hobson Avenue
Charleston, South Carolina 29405
(843) 740-1200
www.csc.noaa.gov

Table of Contents

Highlights of the 2010 Survey Results	1
Background	4
Survey Population	5
Methods and Response Rate	5
Output Analysis	5
Management Priorities and Spatial Data Use.....	7
Coastal Land Use Planning Issues.....	8
Ocean and Great Lakes Planning Issues	16
Coastal Conservation Planning Issues.....	24
Coastal Hazards Issues	32
Management Trends and Needs.....	40
Tools and Information Resources	54
Web Technology.....	54
Web-based Training	55
Frequency of Technology Use and Importance for Decision-Making.....	55
Use of Visualization Software	58
Technical Assistance and Decision-Support Tools	60
Partnerships and Collaboration	65
Engagement with Audiences.....	65
Enhancements.....	69
Demographics/Office information.....	71
Familiarity with the Coastal Services Center	72
References	75

Highlights of the 2010 Survey Results

The survey results provided here represent a snapshot of trends in priority issues and data uses and needs as captured during the time the survey was conducted. Results are intended to provide the Coastal Services Center (Center) and coastal resource management practitioners with current information on trends in management priorities, data and technologies used and needed in order to directly inform the development of useful decision-support tools and applications.

Survey Population

The survey population was identified using lists of Center partners, contacts and mailing lists, resulting in a collection of 500 individuals in resource management related fields. The survey response rate was 43.6% (n=218). Twenty-two percent of survey respondents were from the southeast region, followed by the Gulf of Mexico (17%) and the West Coast (16%) regions. Remaining survey responses came from the Mid-Atlantic (13%), the Northeast (11%), the Great Lakes (10%), the Pacific Islands region (5%), and from both Alaska and the Caribbean (3% each). Throughout this report, in order to gain insight as to the national consensus on particular questions, the summation of all responses from those surveyed was used as a general proxy.

One-quarter of survey respondents work in the education and outreach fields and twenty-three percent work in local, state or federal government. The next highest group represented by survey respondents was program or site administration/management (11%), with an additional 10% from natural resource management. Greater than 95% of respondents have had some level of interaction with the Center prior to filling out this survey; over ninety percent are aware that the Center has regional offices, and approximately seventy percent interact with the Center office in their region.

Management Priorities and Spatial Data Use and Need

Management topics in the survey related to the themes of Coastal Land Use Planning Issues, Ocean and Great Lakes Planning Issues, Coastal Conservation Planning Issues, and Coastal Hazards Planning Issues, the options for spatial data use and need mirrored these specific topic areas.

Climate change impacts are a leading priority topic identified by respondents within each of the overarching issues. Relating to Coastal Land Use Planning Issues, 77.1% of respondents identified the topic of climate change impacts as high priority; 69% within Ocean and Great Lakes Planning Issues; 76.1% within Coastal Conservation Planning Issues; and 74.4% within Coastal Hazards Issues. In most categories, spatial data use directly aligned with leading priority management topics identified. For example, coastal land use planning data use paralleled the priority topics identified within this same Center theme; greater than 60% of respondents indicated both high use for land use planning/growth management and wetland loss spatial data and high priority for the same topics with regards to management. Within all four issue categories, economics and climate change impacts data were regularly identified as leading needs.

Additional Management Trends and Needs

The highest priority demographic and economic information needs identified were for non-market values, followed by time-series data, population counts, and population attributes. The top three priority needs identified by respondents for effective coastal management were for relevant and necessary data, education and communication with the public, and coordination with local entities.

With respect to hazards management, survey respondents identified a critical need for information related to risk and vulnerability assessments and hazards mitigation. Primary needs for increasing efficiency and efficacy in hazards management include an increase in communities' ability to be resilient as well as an increase in planning capacity and resources available at local levels.

Interdisciplinary Management Approaches

While more than ninety percent of respondents agree that humans should be included as part of a coastal resource management framework, only 40.67% indicated that their office has adopted for use (and finds more useful than other approaches) a specific interdisciplinary framework or approach (e.g. Integrated Coastal Zone Management, Ecosystem-Based Management, or Adaptive Management). Respondents identified financial and technical capital and political support as the top two constraints to adopting and implementing an interdisciplinary approach to coastal and marine management.

Tools and Information Resources

The survey population has become more technologically adept since previous surveys and the development and use of decision support tools are on the rise. Over eighty-five percent (86%) of respondents use various web services (RSS, Google Maps/Earth, map service, streaming) to obtain information and nearly seventy percent (69.9%) use static sites (FTP, agency home page). Respondents identified online mapping as the most frequently used technological support tool for coastal resource management. Eighty percent of respondents have participated in web-based training in the past, though only 38.6% of respondents expressed high interest in further web-based training.

Respondents identified the tools most useful for decision-making, with respect to program management and social science, as related to applying data for decision-making, followed by data access, and using GIS for coastal management.

Program Management and Social Science Tools

The top program management and social science tools and applications being used by more than 70% of respondents include strategic planning, performance measures or indicators, meeting facilitation, surveys, stakeholder engagement processes, and project management.

Partnerships and Collaboration

Over ninety-nine percent of respondents collaborate with other groups to enhance their work. Of these engagements, the coastal management community is most commonly engaged with, followed by the scientific community, the public, education, and water quality and quantity. Just over half of the respondents do not have trouble engaging various audiences. With those respondents that are challenged when engaging audiences, they specified a diversity of groups they have difficulty engaging with efficiently (i.e. scientific community, government, private sector, fisheries, energy, etc.). Respondents indicated a critical need for information sharing with respect to lessons learned from previous partnerships to enhance engagements among offices and diverse audiences.

Supplemental Note

In light of recent tragedies and natural disasters, national and regional priorities and needs have begun to shift over the years. For example, the previous surveys (2002, 2006) had less emphasis on natural disasters than the 2010 survey. In 2005, hurricane Katrina was responsible for immeasurable loss in New Orleans, Louisiana and surrounding areas; and in 2006, a devastating tsunami struck the South Pacific, primarily Indonesia. These events have shifted the emphasis in these regions to focus priorities and information needs toward hazards management. Presently (Summer 2010), the Gulf of Mexico is undergoing a catastrophic oil spill resulting from an explosion on an offshore drilling rig, thus it can be expected that resource managers in the affected regions will shift their focal management priorities and spatial data needs accordingly, which may differ from those identified in these survey results. Collection of results for the 2010 Survey closed March 5, 2010.

Background

The National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Center (Center) is committed to serving the technology, information, and natural resource management needs of its customers in the coastal management community. To achieve this goal, the Center solicits input from the coastal resource management community using a variety of mechanisms, including the Coastal Resource Management Customer Survey. The Center conducts this national survey every three years to help the Center and NOAA better understand their customers' priority coastal management topics and issues, related technological capabilities and technical assistance needs. The information from the survey is used to plan for new projects and training programs to address these issues, and to create products that are compatible with customers' hardware, software, skills, and natural resource management needs. The coastal management community also benefits from the Center surveys as a means to identify shared issues and priority management topics and inform development of common goals and partnerships across boundaries, programs, and agencies.

The 2010¹ Coastal Resource Management Customer Survey represented the fifth triennial survey administered by the Center. The first Center survey was administered in 1996 and targeted the information management and technology segment of the coastal management community. Surveys have since evolved to target both the information technology and program/site management segments of the coastal management community. In 1999 this was accomplished using two surveys, then administered again as one instrument in 2002 in an attempt to better integrate technological information with natural resource management issues and priority topics, as well as to target a broader array of coastal management staff. The 2006 survey aimed to determine opinions on and to characterize interactions with the Center among coastal resource stakeholders. The previous survey lacked sufficient detail addressing regional priorities and survey participants found the survey instrument confusing.

The 2010 survey was preceded by a review of the Center's needs assessments, past surveys and relevant literature in an effort to reduce survey burden on respondents, characterize differences in regional needs and priorities, as well as identify potential information gaps (MRAG 2009a; 2009b). One of the goals of the survey was to focus data collection on filling gaps which were identified in previous assessments of literature and existing information (e.g. needs assessments and studies that preceded this survey), with particular focus on monitoring coastal trends. Preceding studies (a literature review and meta-analysis) revealed a significant need for data and tools, along with the need for enhanced coordination and communication among entities involved with coastal resource management. The current survey maintained the structure of the Center's priority themes but also incorporated questions to allow regional comparisons among issues and needs. Development of the survey and preceding studies were conducted by MRAG Americas, Inc., in close collaboration with a team of Center staff. Finally, a

¹ Survey administration was initiated at the end of calendar year 2009; at that time the survey tool was named the "2009 NOAA Coastal Resource Management Trends Survey". Collection of results extended into March 2010; therefore the results collected represent respondents' answers for the first quarter of 2010, and the survey will be titled with that year throughout this report.

significant difference between this and past surveys was the exclusion of product and service evaluations. Moving forward, the Center will conduct a separate and independent Product and Service Evaluation to query a selection of identified users to more accurately attain feedback from its customer base.

Survey Population

Methods and Response Rate

NOAA Center staff assisted in the identification of appropriate individuals in resource management related fields for the survey population by drawing from lists of Center partners, contacts and mailing lists. These included individuals from State Coastal Zone Management agencies, the National Estuarine Research Reserve System, Regional Ocean Governance (Gulf of Mexico Alliance, Northeast Regional Ocean Council, West Coast Governors' Agreement on Ocean Health, Mid-Atlantic Regional Council on the Ocean, and South Atlantic Alliance), Digital Coast Partners (Association of State Floodplain Managers, Coastal States Organization, National Association of Counties, National States Geographic Information Council, and The Nature Conservancy), Land Trust Alliance, SeaGrant College Programs, and Coastal and Estuarine Land Conservation Program (CELCP). Overlap in membership among individuals was noted and duplicates were removed from the survey population.

The survey was web-based, and administered via Survey Monkey (www.surveymonkey.com). To avoid confusion and lessons learned from past surveys, a proxy NOAA email account was created (CoastalManagementSurvey@csc.noaa.gov) for sending the survey invitation and allowing for feedback. The email account was directed to both MRAG Americas and the Center. The survey was initially sent to 534 people on December 10, 2009. After failed emails, opt outs and subsequent email corrections; the final survey population totaled 500. From this, 218 individuals either partially or fully completed the survey; this resulted in a 43.6% response rate. The survey remained open until March 5, 2010. During this time, reminder emails were sent on December 28, 2009 and January 28, 2010, followed by a final email sent March 3, 2010 indicating a survey close date in two days. Previous research has suggested that the targeted audience suffers from survey fatigue, and since the typical individual within this target population uses some level of technology in their job, an electronic survey seemed most suitable and the least taxing for survey participants. Mailed surveys may have added novelty which would potentially have resulted in an increased response rate, however mailed surveys are expensive, can be tedious and have an added environmental impact due to paper use.

Output Analysis

The diagrams provided throughout this report depict survey results directly from the number of respondents that provided answers; there were no mandatory questions and as a result there are different response rates for the various questions. For example, in some cases 218 people answered a question, therefore if an answer was chosen 50% of the time, this means that is 109 people chose that answer. In other instances, for example, if only 150 people answered a particular question, a 50% rate represents the response from 75 individuals.

The survey used various question types depending on the information being sought which resulted in different types of output. Multiple choice questions which allowed for only one answer (i.e. ranking) yield a 100% response. Multiple choice questions which allowed for multiple answers to be chosen, or matrix of answers would yield a total beyond 100%. In the latter case, results are charted by number of responses rather than percentages. Therefore, where possible, results are reported as percentages to indicate majority choices; except where questions allowed for multiple answers to be chosen. MRAG consulted regularly with the Center regarding result output and analysis preference. In all diagrams, unless otherwise indicated, results are given by number of responses.

Where meaningful, responses were sorted by the region indicated by survey respondent. Respondents were given the option to select 'all that apply' for regional representation, and there were different numbers of respondents from different regions (Figure 1). Nearly ¼ of survey respondents (22%) were from the southeast region, followed by the Gulf of Mexico (17%), and the West Coast (16%) regions. Along with regional choices, 'National' was an answer option, however there were very few respondents that selected 'National' as a choice. In order to gain a national perspective for survey responses, MRAG and the Center agreed that it would be appropriate to sum responses to particular questions where the total would serve as a general proxy for gaining insight as to the national consensus from survey respondents. When regional results are displayed it is meant to allow for comparisons to be interpreted within region (i.e. which topics are most important within the Northeast region), and not to quantitatively compare importance of topics or needs between or among regions (i.e. although it may appear in a particular diagram that climate change is a more significant topic for the Northeast than for the Southeast, this is NOT an appropriate interpretation).

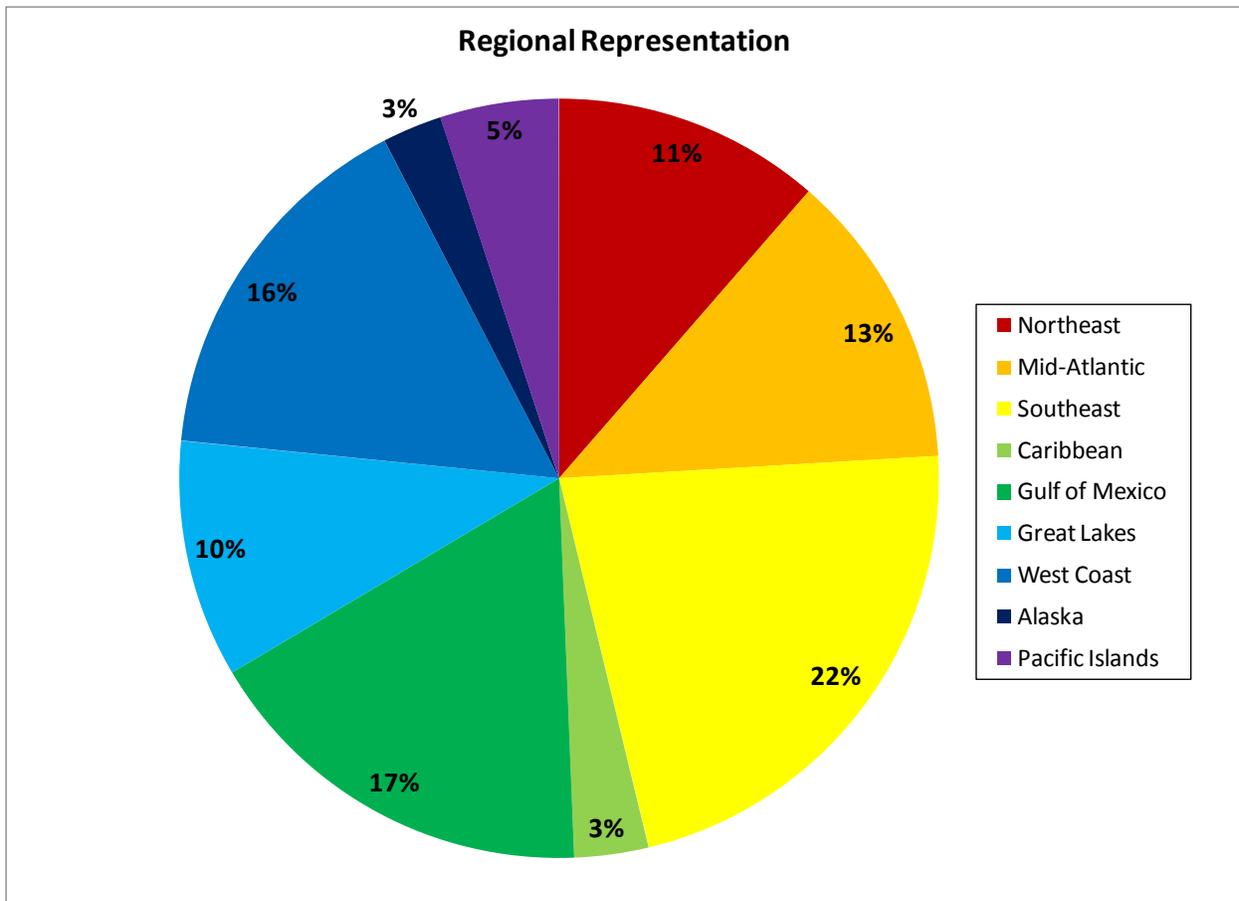


Figure 1: Regional representation of respondent population, where respondents made a selection.

Management Priorities and Spatial Data Use

A primary goal of the 2010 survey was to identify and evaluate priority topics² for coastal resource managers, as well as data use and needs, so that the Center can most effectively respond to their customers. As previously mentioned, preceding studies were conducted to identify coastal management community needs as they relate to Center themes (Coastal Conservation, Coastal and Ocean Planning, Hazards Resilience). Analysis of survey results found climate change topics to be the first priority among respondents; land use and habitat change continue to be priority topics, and hazards resilience appears to be gaining more attention and becoming a higher priority than in the past. An overwhelmingly clear priority need identified was for data and tools to assist in decision making, specifically with respect to the human dimensions of ecosystem function and management. Additionally, we repeatedly encountered the needs for enhanced coordination, collaboration and communication as pertaining to all

² With regard to terminology, the individual items in the survey that respondents rated the level of priority and data use and need are 'topics' (i.e. climate change impacts, demographics) that fit within the overarching issues (i.e. Coastal Land Use Planning).

Center themes, products and services. The 2010 survey was designed to consider these findings, highlighting most relevant needs and priority management topics of the community to be surveyed, while removing extraneous and potentially irrelevant information from previous surveys.

The management topics within the survey related to themes of Coastal Land Use Planning Issues, Ocean and Great Lakes Planning Issues, Coastal Conservation Planning Issues, and Coastal Hazards Planning Issues mirrored the options for spatial data use and need. Respondents were instructed to rate the level of priority for each management topics (within each planning issue) and address their use of and need for spatial data. Results provided below are organized by Center theme, reporting overall topic priorities, succeeded by regional priorities, overall data use and need, as well as data use and need by region. The management topics and data needs that fall under each Center theme were maintained from previous Center surveys and materials in order to allow for consistency and temporal comparisons to be made across years.

Priority management topics are intended to highlight where certain topics (among the options provided) have a clearly higher priority (either by consensus or within a region) when compared with others. These results are not drawing conclusions that would imply a lack of recognition or need with respect to any topic. For the diagrams that follow, results are given as percentages in consensus results (summed responses to gain a 'National' perspective) and in number of responses for regional results.

As noted above, very few respondents selected a 'national' representation, therefore that small proportion was likely not indicative of actual national priorities; instead we provide the overall sum of results as an appropriate proxy for interpreting the consensus answers from survey respondents.

Coastal Land Use Planning Issues

Coastal land use planning efforts require synthesis between the fields of conservation and management of coastal habitats and resources. Encompassing topics related to land use planning, climate change, marine spatial planning, effects of management decisions on ecological and socio-economic factors, and trade-offs between socio-economic benefits and environmental costs of development. Coastal, ocean and land use planning efforts operate on both the regional scale, with an emphasis on coordination among agencies, organizations, and various involved stakeholders, and also on the local scale, with an emphasis on addressing specific needs, capacity, and limitations which are specific to local communities (NCCOS 2007; Desotelle Consulting et al. 2006). The Center's vision relative to this theme is "that coastal communities will make land and ocean use decisions that lead to healthy coastal ecosystems and more resilient, economically-stable communities" (NOAA CSC 2007).

Management Priorities

So that the Center may provide useful information to regions, and local communities, as they proceed with land and ocean use decisions, it is important for the Center to identify which

management topics are of highest priority. The highest priority topics among respondents were climate change impacts (77.1%), land use planning/growth development (63.1%), and wetland loss (60.1%). Public access was the next highest priority (43.3%) topic. Following these, all other topics were chosen as medium priority over low priority (Figure 2). Not surprisingly, very few topics received high response rates as low priority.

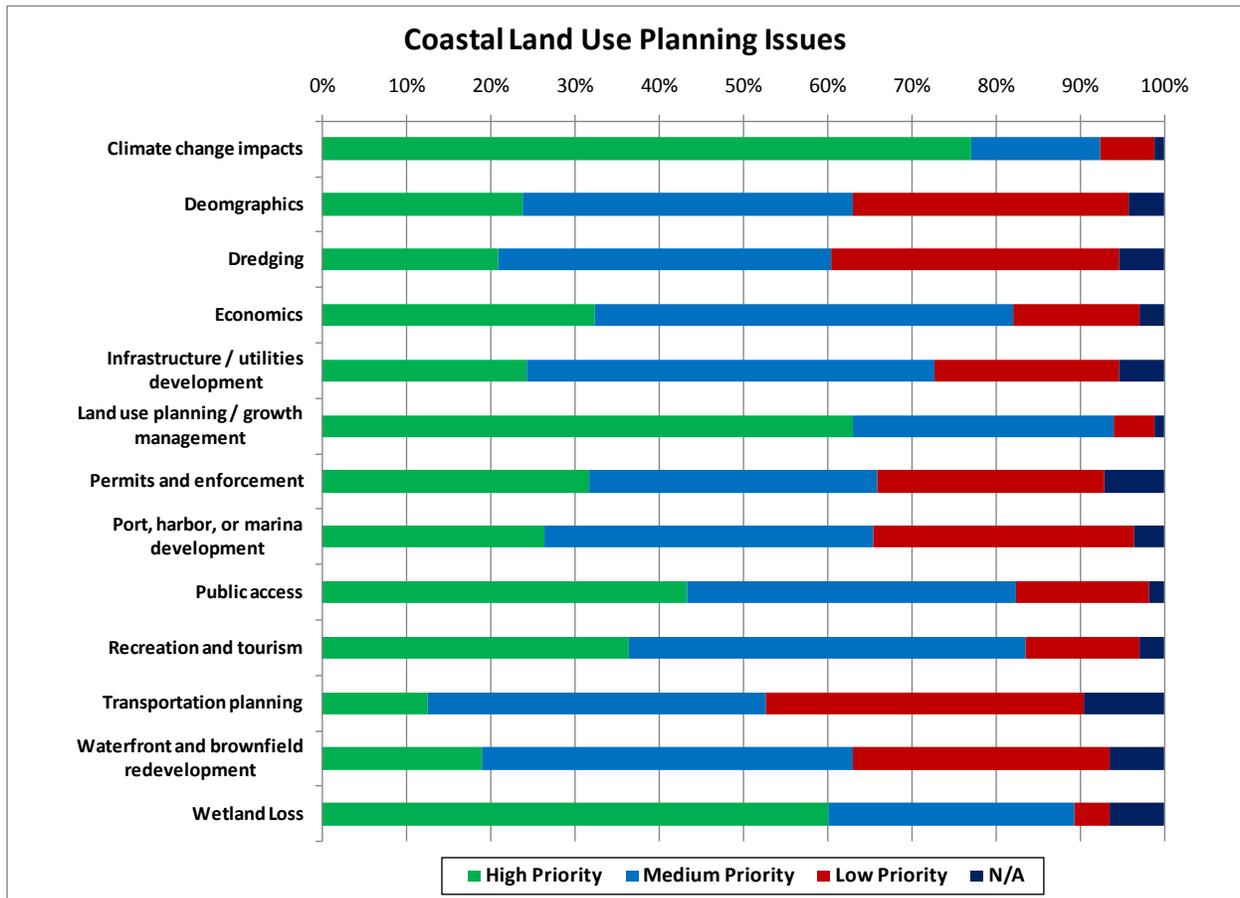


Figure 2: Priority levels of management topics within coastal land use planning issues, results reported as percentage of total response.

Figure 3 and Figure 4 illustrate regional differences in priority management topics. The charts display the different priorities of topics within given regions (e.g. land use planning/growth management are high priorities in the Southeast and Great Lakes when compared with other topics within these regions) and do not display level of importance between regions; this cannot be concluded due to the disproportionate representation of survey responses across regions. Only high priority selections are displayed.

Highest priority coastal land use planning management topics by region:

- Climate change impacts and land use planning/growth development are among the highest priorities for the Northeast, Mid-Atlantic, Southeast, West Coast, Pacific Islands, and Great Lakes;

- The two highest priority topics in the Gulf of Mexico and Caribbean are climate change impacts and wetland loss; and
- Climate change impacts and recreation and tourism are highest priorities for Alaska.

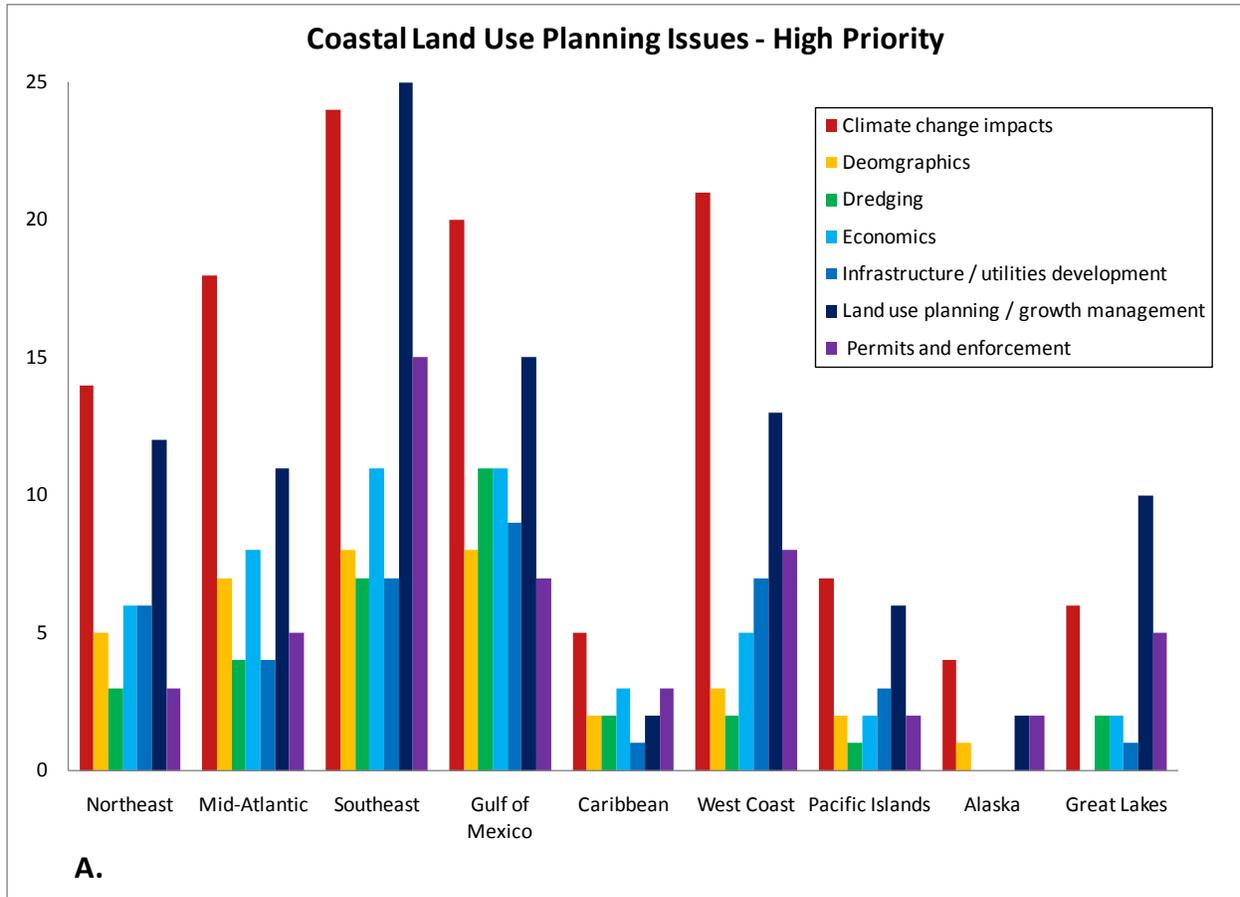


Figure 3: Highest priority management topics within coastal land use planning issues by region, chart 1 of 2. Y-axis represents number of responses.

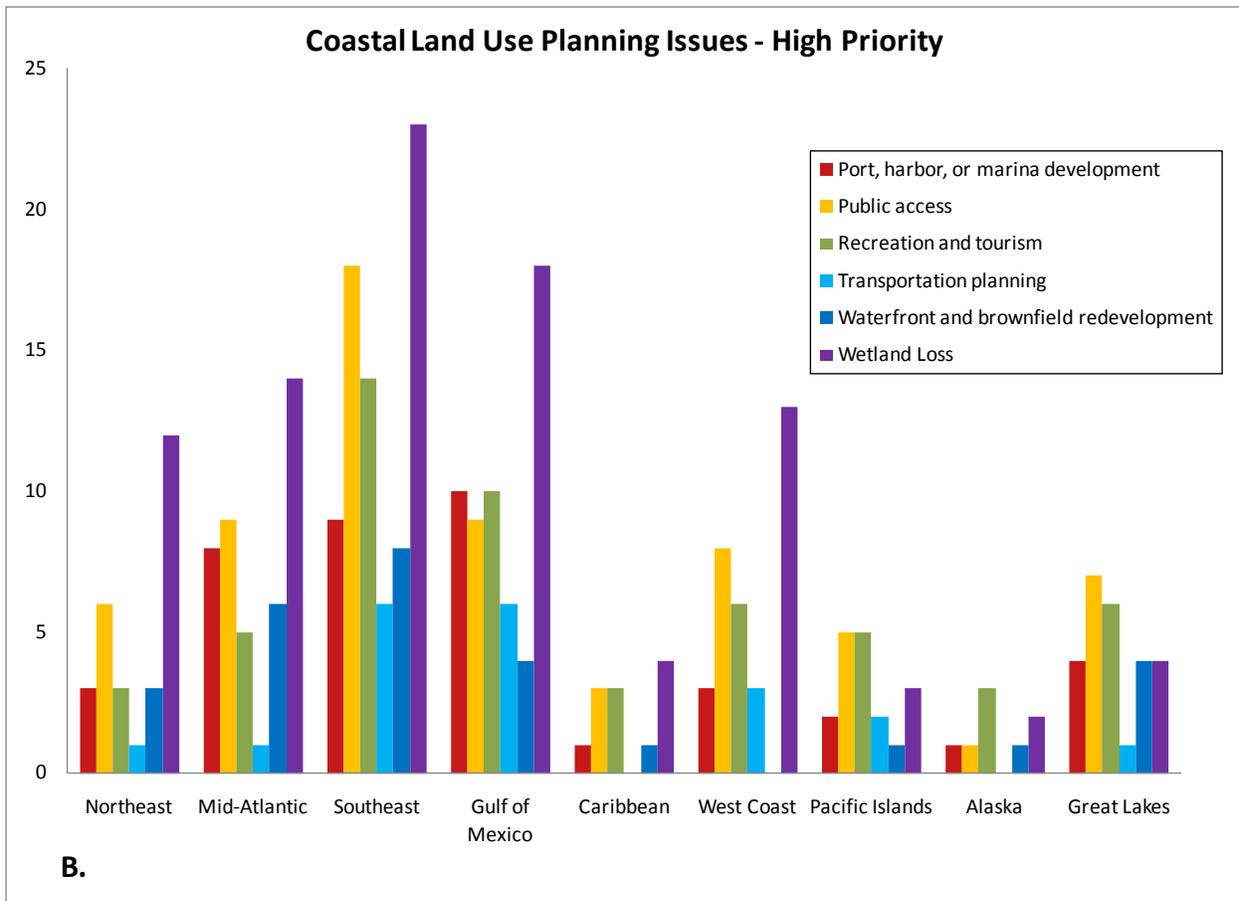


Figure 4: Highest priority management topics within coastal land use planning issues by region, chart 2 of 2. Y-axis represents number of responses.

Spatial Data Use

Although voluminous amounts of information already exists which is pertinent for making management decisions, scientific and management communities face new challenges everyday which require collection of additional information as technology advances and our understanding of the interactions among ecosystem factors improves. The survey instrument aimed to identify and evaluate spatial data use and needs relevant to the topics involved with each Center theme.

Coastal land use planning data use paralleled the priority topics identified within this same Center theme; with high use indicated for land use planning/growth management (71.4%), public access (64.6%) and wetland loss (63%). Climate change data does not appear to be as widely used, but was highlighted as the second highest data need (43.4%) after economic data (51.6%; Figure 5).

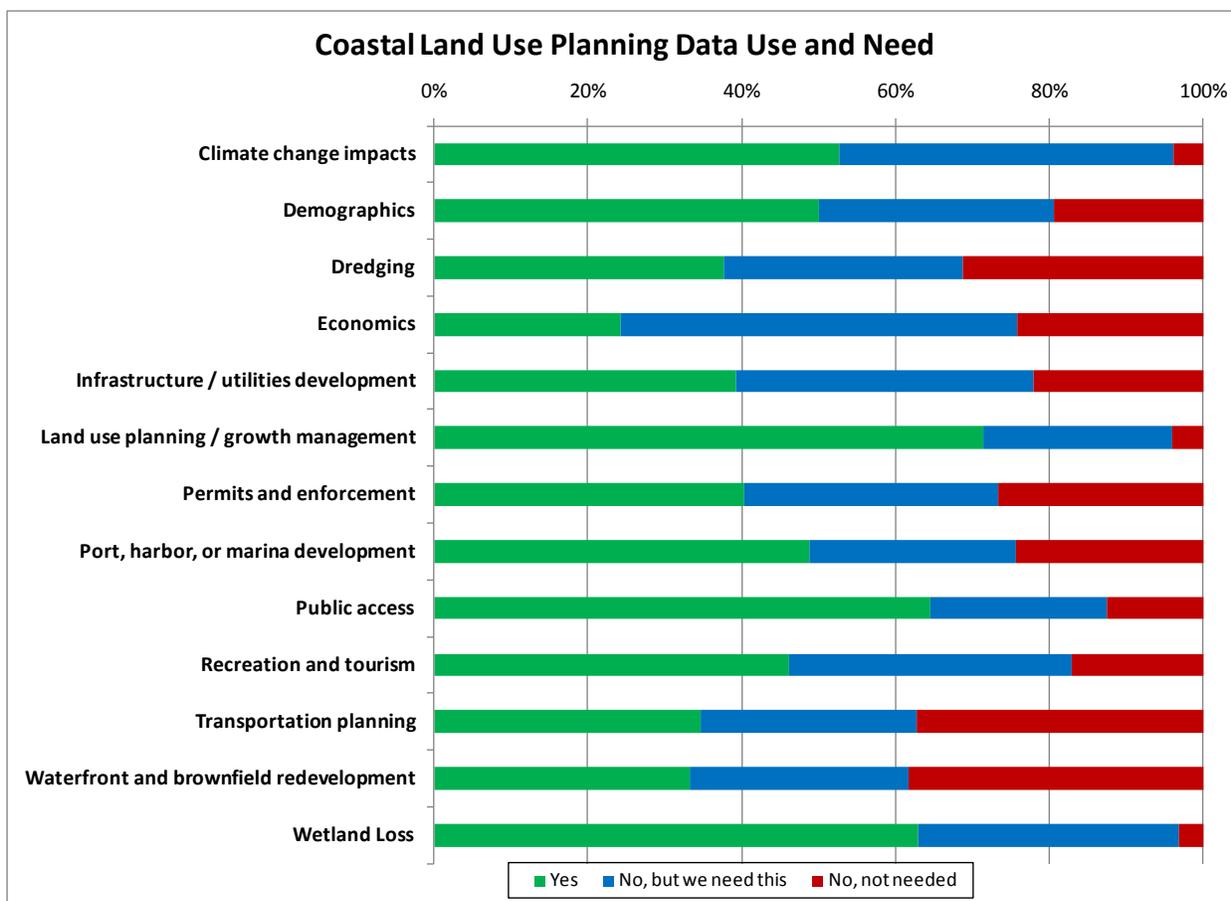


Figure 5: Spatial data use and need for coastal land use planning among respondents, results reported as percentage of total response.

Top coastal land use planning spatial data *uses* by region (Figure 6 and Figure 7):

- Spatial data to address climate change impacts and wetland loss are the primary data used in the Northeast;
- The Mid-Atlantic respondents indicated primarily using spatial data for demographics, land use planning/growth development and wetland loss;
- Spatial data for management of land use planning/growth development are primarily used in the Southeast, Caribbean and Great Lakes;
- The Gulf of Mexico relies primarily on data related to wetland loss;
- Land use planning/growth development and public access are the primary spatial data being used in the West Coast;
- Public access and recreation and tourism are the primary data used in both the Pacific Islands and Alaska, with the addition of port, harbor, or marina development in Alaska.

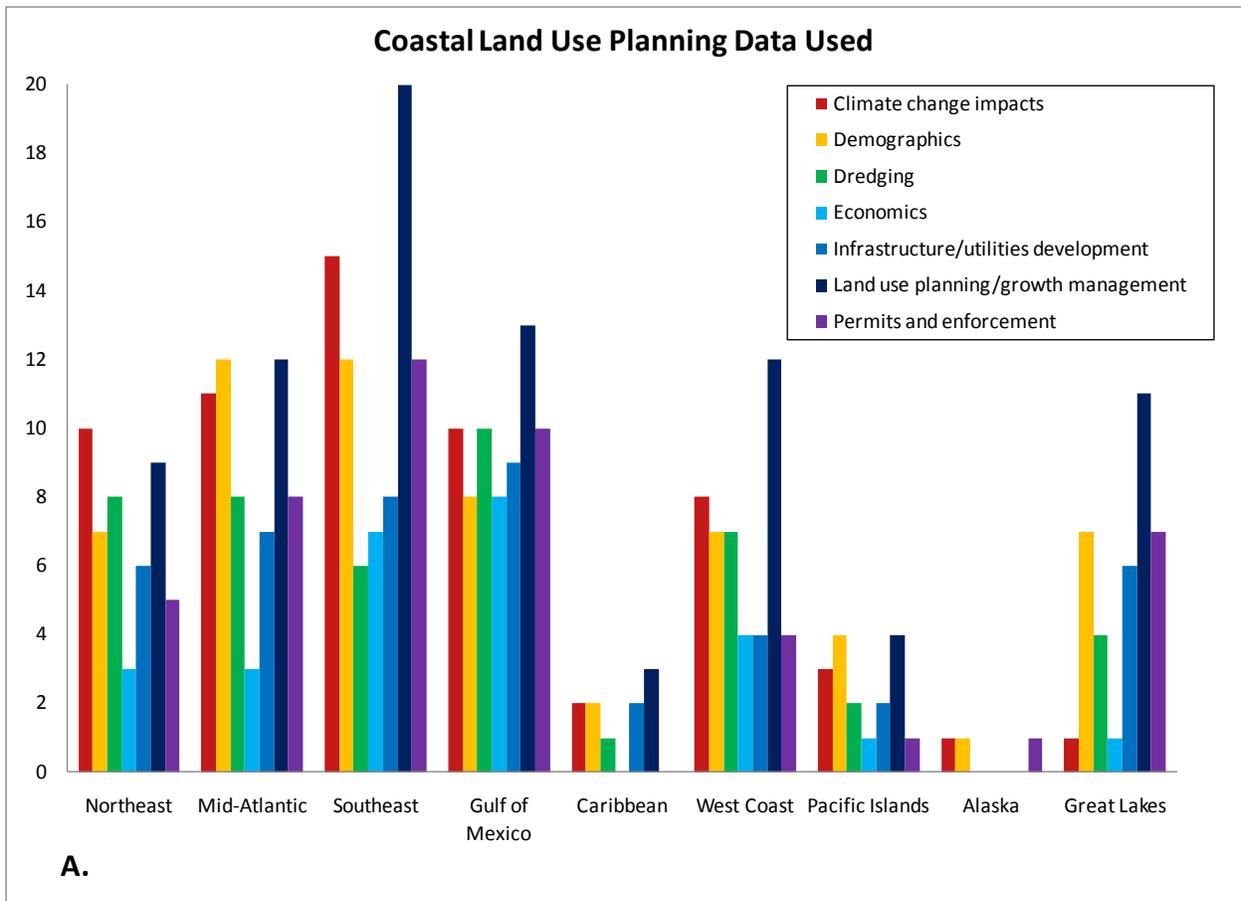


Figure 6: Spatial data used, as indicated by “yes” response, for coastal land use planning by region, chart 1 of 2. Y-axis represents number of responses.

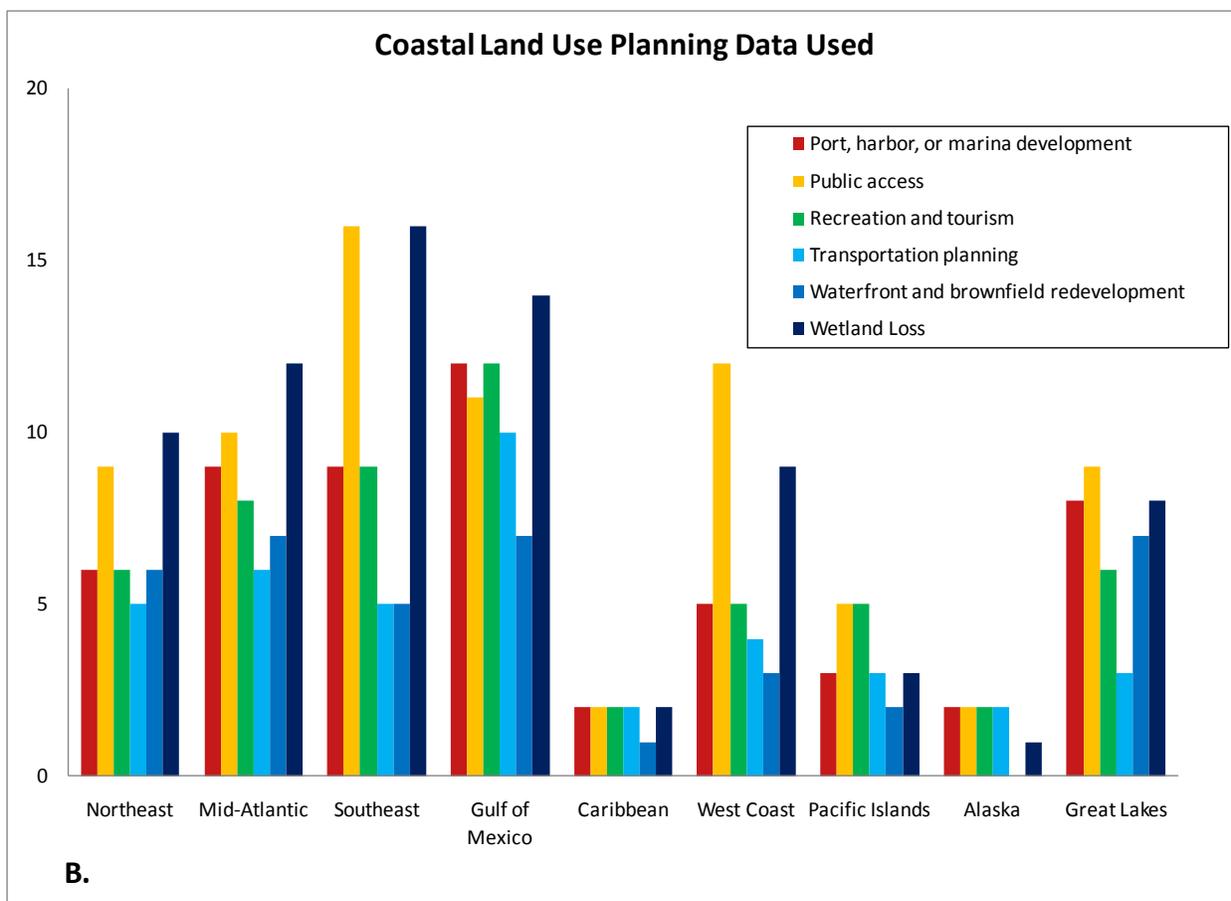


Figure 7: Spatial data used, as indicated by “yes” response, for coastal land use planning by region, chart 2 of 2. Y-axis represents number of responses.

Top coastal land use planning spatial data *needs* by region (Figure 8 and Figure 9):

- Economics data were the primary data need indicated by the Northeast, Mid-Atlantic and Southeast regions;
- Economics and infrastructure/utilities development spatial data are indicated as needed in the Gulf of Mexico and Pacific Islands, the latter of which also indicated data needs with respect to climate change impacts, permits and enforcement, and wetland loss data;
- The Caribbean region needs spatial data related to permits and enforcement;
- Climate change impacts spatial data are primary needs for the West Coast and Great Lakes; and
- Alaska indicated data needs for infrastructure/utilities development and land use planning/growth development management data.

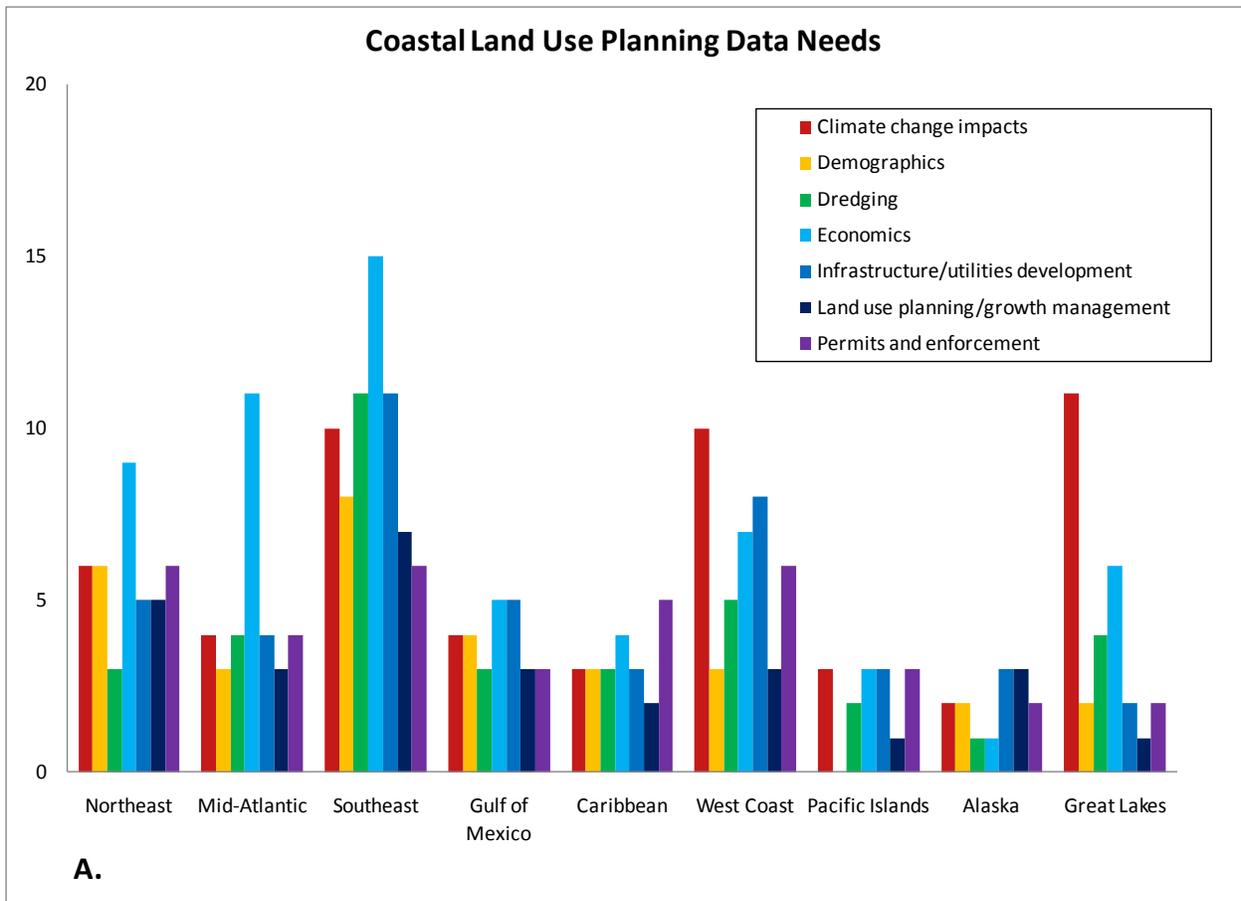


Figure 8: Spatial data needs, as indicated by “no [not used], but we need this” response, for coastal land use planning by region, chart 1 of 2. Y-axis represents number of responses.

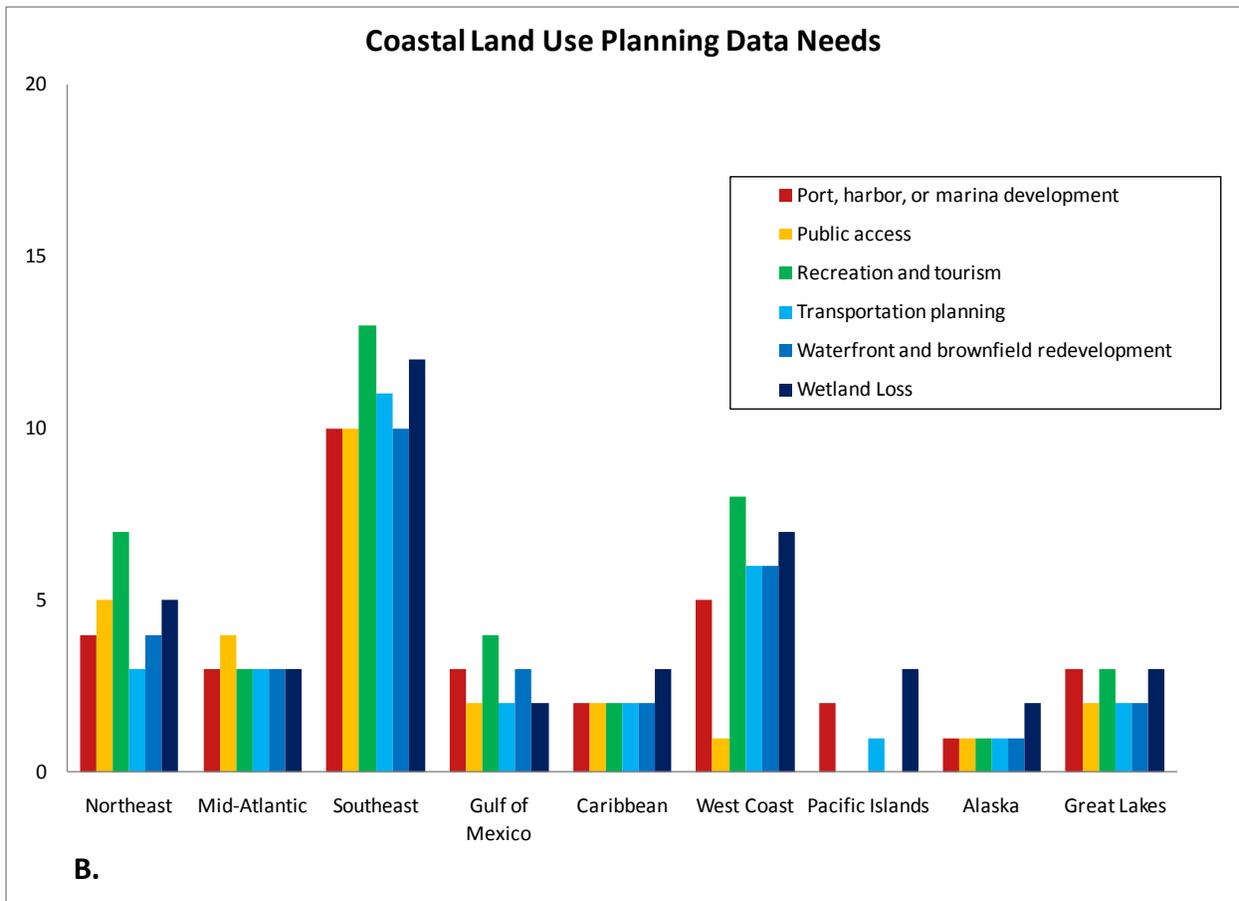


Figure 9: Spatial data needs, as indicated by “no [not used], but we need this” response, for coastal land use planning by region, chart 2 of 2. Y-axis represents number of responses.

Ocean and Great Lakes Planning Issues

As with coastal land use planning, ocean and Great Lakes planning operates on both the regional and the local scale; encompassing aspects of conservation and management related to planning for multiple uses, climate change impacts, effects of management decisions on ecological and socio-economic factors, and trade-offs between benefits, environmental costs of development, and others. The Center’s work in this area is designed to make land and ocean use decisions that lead to healthy coastal ecosystems and more resilient, economically-stable communities.

Management Priorities

Top management priorities related to ocean and Great Lakes planning issues identified by respondents included shoreline change management (70.89%) and climate change impacts (65.64%). Other topics that were indicated as high priority by greater than 50% of respondents include nearshore and offshore habitat mapping (57.86%) and energy development (54.38%). Protected area management (49.68%), and submerged lands management (48.08%) were just under 50% (Figure 10).

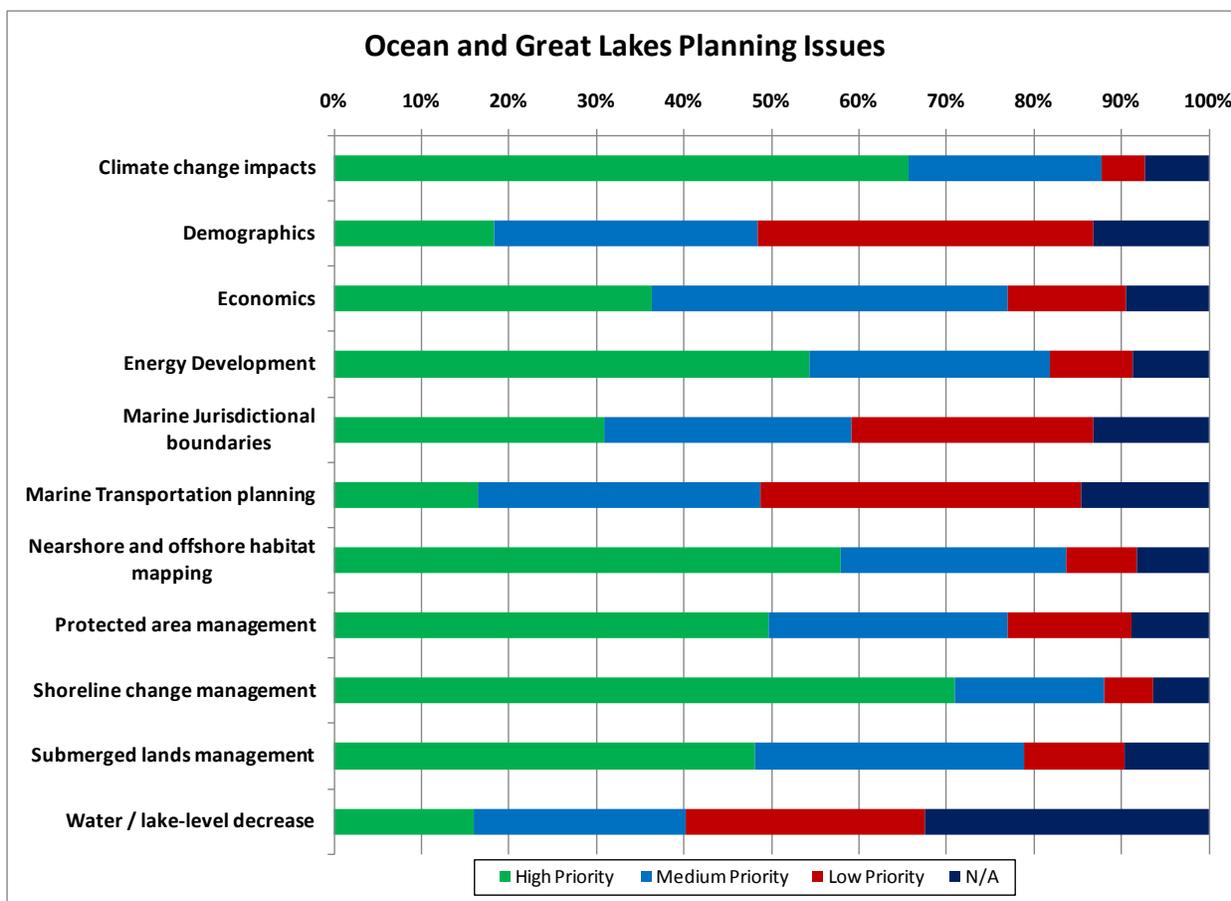


Figure 10: Priority levels of management topics within ocean and Great Lake planning issues, results reported as percentage of total response.

Highest priority topics related to ocean and Great Lakes planning and management by region (Figure 11 and Figure 12):

- Shoreline change management was indicated as a high priority topic in the Northeast, Gulf of Mexico and Great Lakes;
- The Mid-Atlantic and West Coast identified climate change impacts as their highest priority;
- The Southeast region identified nearshore and offshore habitat mapping and shoreline change management as their highest priorities;
- The Pacific Islands indicated climate change impacts, protected areas management, and shoreline change management as their highest priority topics with respect to planning and management; and
- The Caribbean and Alaska both identified climate change and energy development as high priorities. Respondents from the Caribbean region also selected shoreline change management and submerged lands management, whereas Alaska identified nearshore and offshore habitat mapping as high priorities.

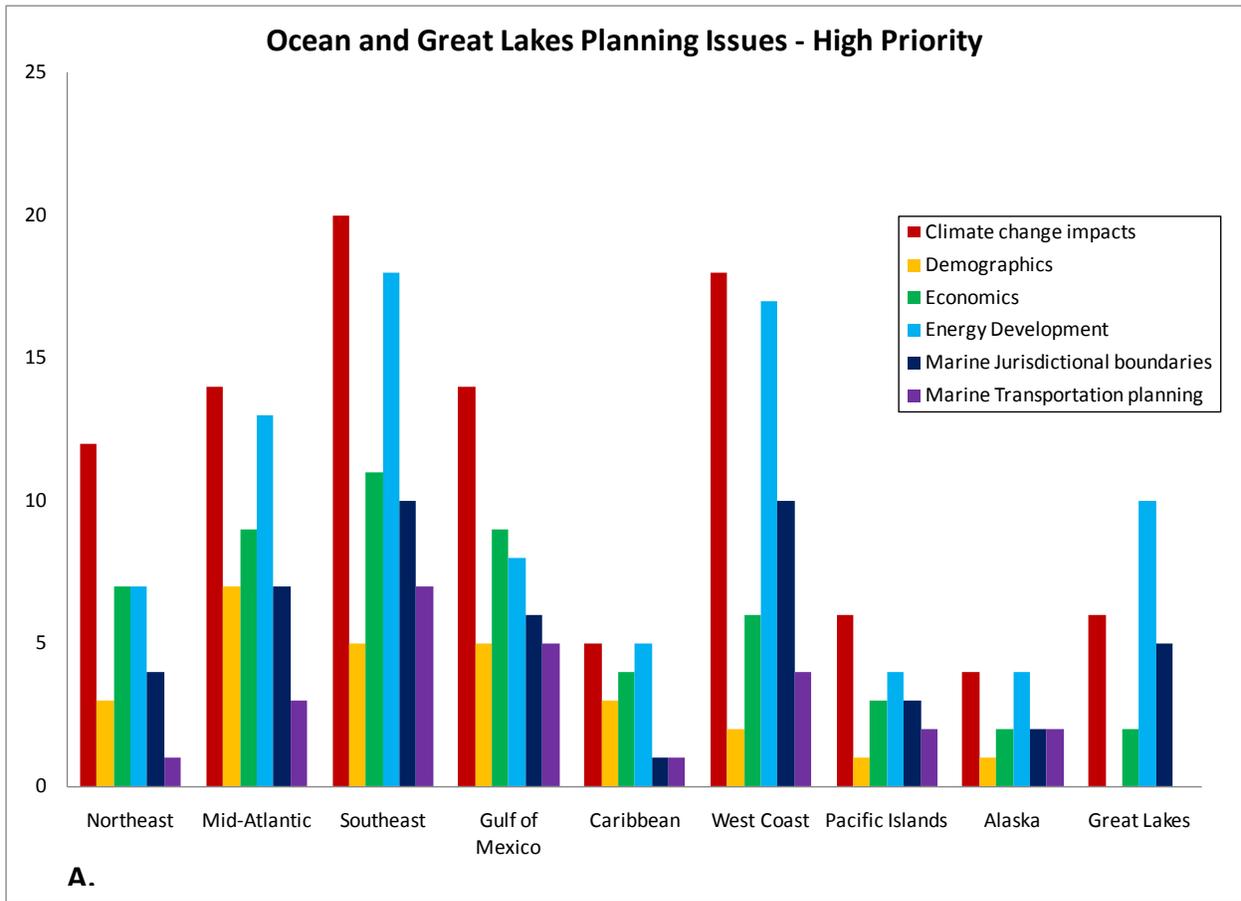


Figure 11: Highest priority management topics within ocean and Great Lakes planning issues by region, chart 1 of 2. Y-axis represents number of responses.

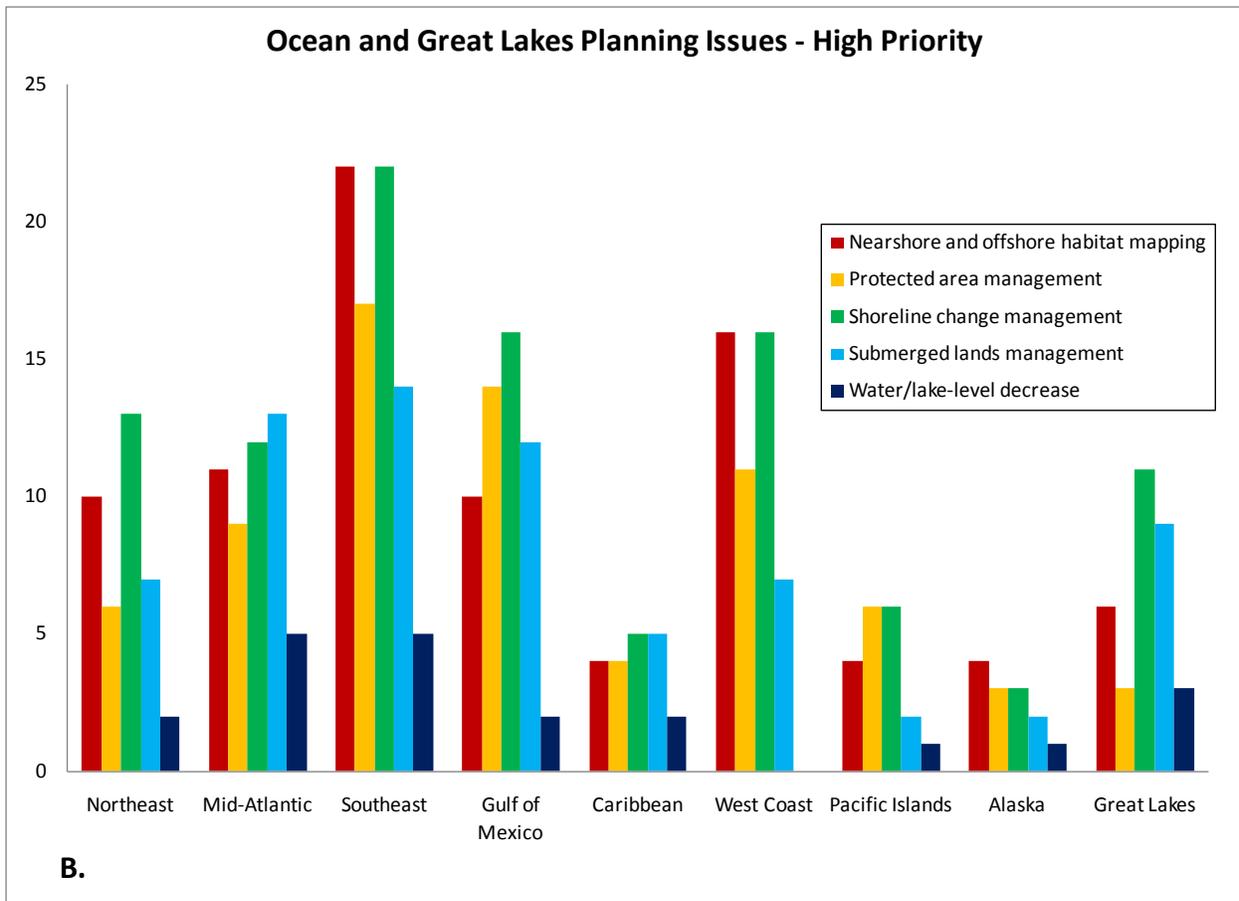


Figure 12: Highest priority management topics within ocean and Great Lakes planning issues by region, chart 2 of 2. Y-axis represents number of responses.

Spatial Data Use

Ocean and Great Lakes spatial data that was indicated as being used by greater than 50% of respondents include nearshore and offshore habitat mapping (62.7%), protected area management (60.2%), shoreline change management (56.5%), and marine jurisdictional boundaries (54%). Among these, shoreline management, nearshore and offshore habitat mapping, and protected area management were also indicated as priority topics. Primary spatial data needs include climate change impacts (55.46%), economics data (55.36%), and energy development (50%).

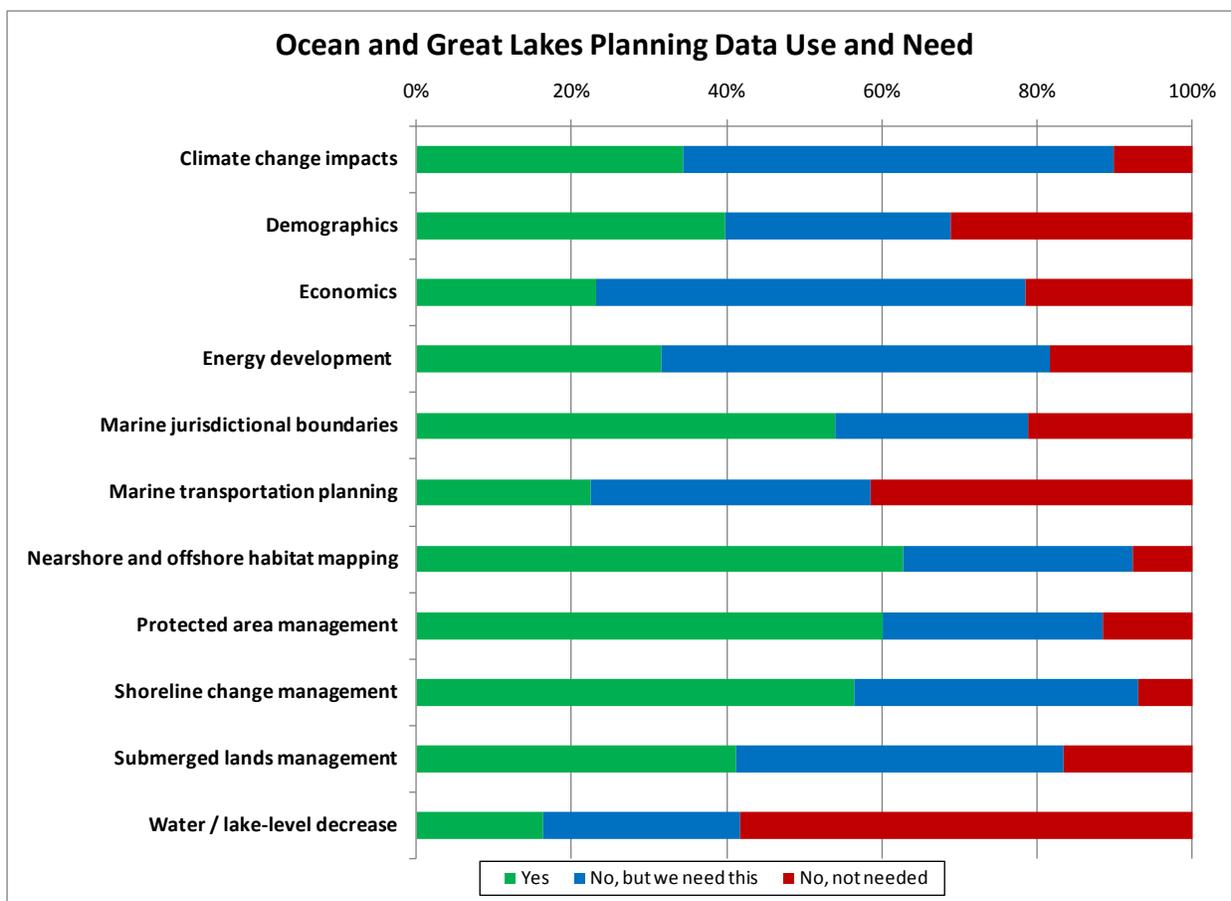


Figure 13: Spatial data use and need for ocean and Great Lakes planning among respondents. Results reported as percentage of total response.

Spatial data *use* by region is illustrated in Figure 14 and Figure 15.

- Nearshore and offshore habitat mapping spatial data are the primary data used in the Northeast, Southeast, Gulf of Mexico, and Caribbean;
- The Mid-Atlantic primarily uses marine jurisdictional boundaries and shoreline change management spatial data;
- Nearshore and offshore habitat mapping and protected areas management data are primarily used by both the Pacific Islands and Alaska;
- West Coast respondents indicated using marine jurisdictional boundaries and protected areas management data; and
- Great Lakes respondents mainly use shoreline change management data.

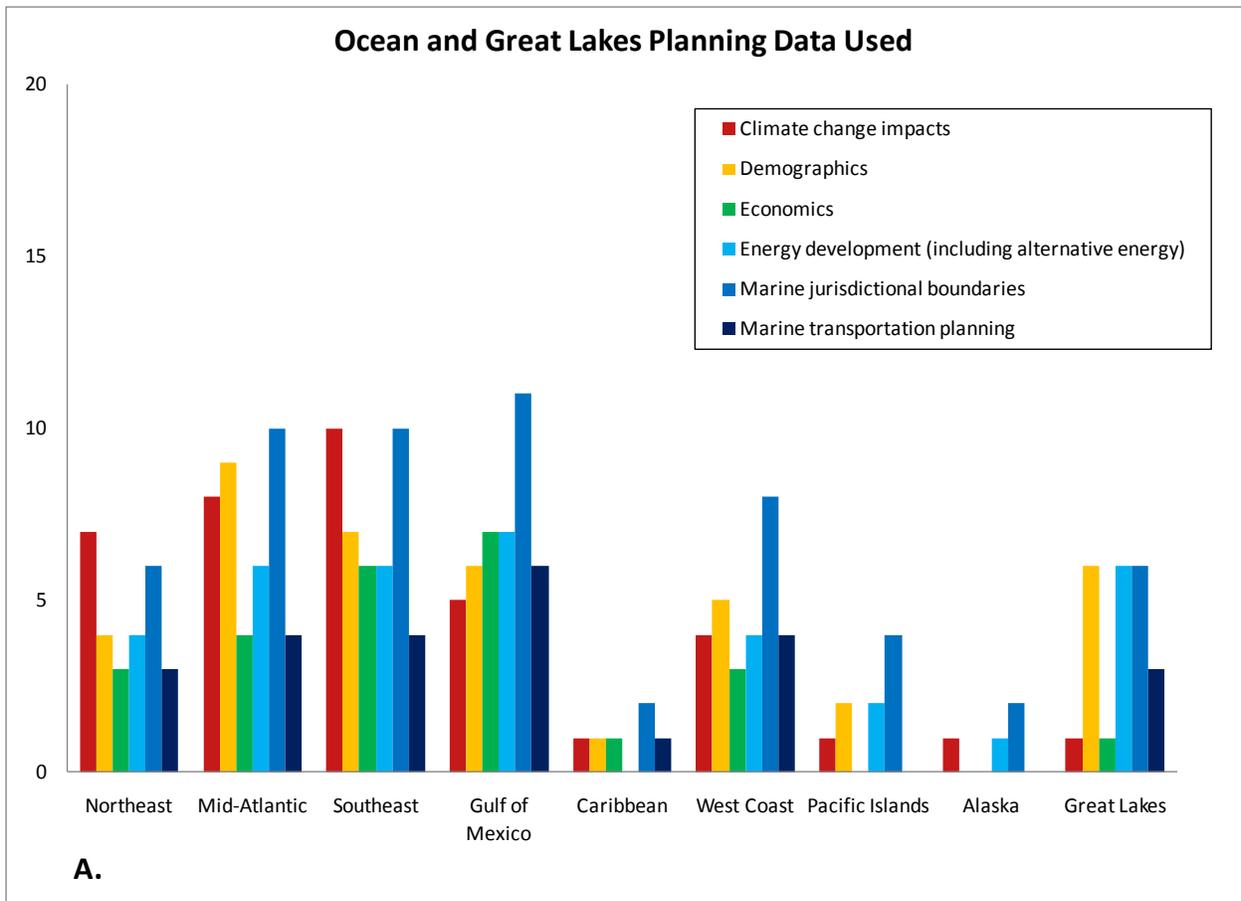


Figure 14: Spatial data used, as indicated by “yes” response, for ocean and Great Lakes planning by region, chart 1 of 2. Y-axis represents number of responses.

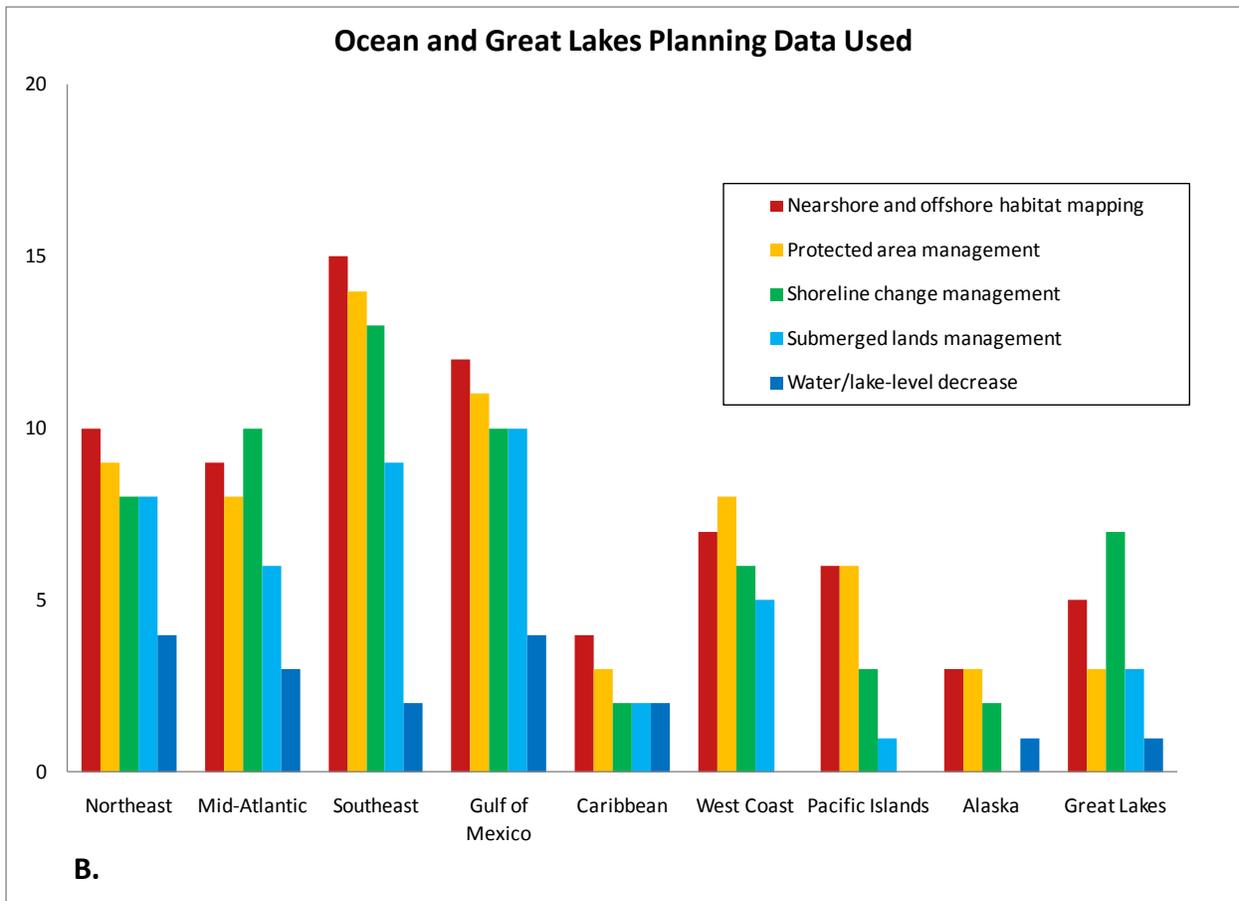


Figure 15: Spatial data used, as indicated by “yes” response, for ocean and Great Lakes planning by region, chart 2 of 2. Y-axis represents number of responses.

Regional spatial data *needs* related to ocean and Great Lakes planning issues are displayed in Figure 16 and Figure 17.

- Northeast respondents primarily need economics and energy development data, the former is also a primary need for the Mid-Atlantic and Pacific Islands and the latter is a primary need for the Southeast and Caribbean regions;
- Gulf of Mexico, West Coast, and Great Lakes respondents need spatial data for addressing and understanding climate change impacts above other data needs; and
- Alaska indicated a data need for marine transportation planning and submerged lands management.

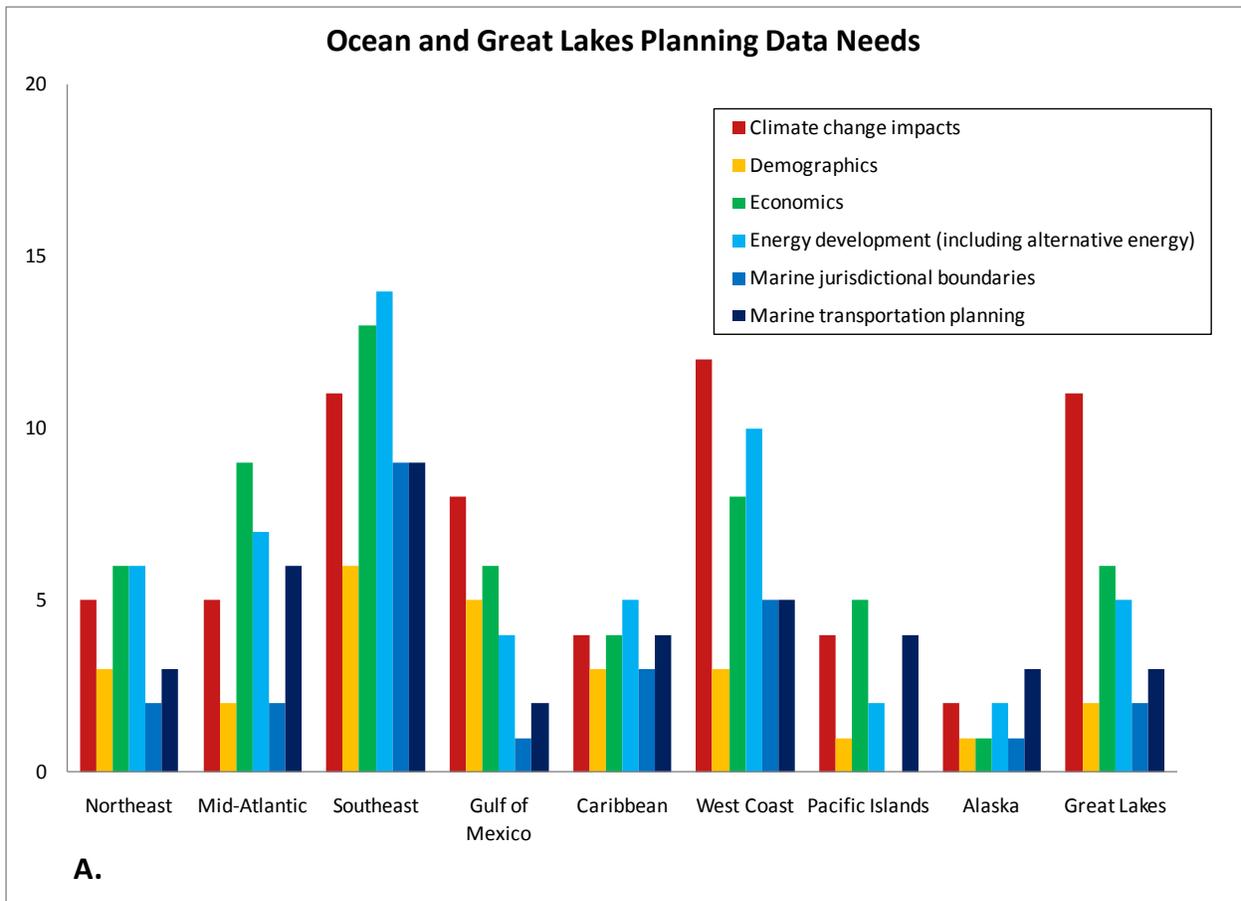


Figure 16: Spatial data needs, as indicated by “no [not used], but we need this” response, for ocean and Great Lakes planning by region chart 1 of 2. Y-axis represents number of responses.

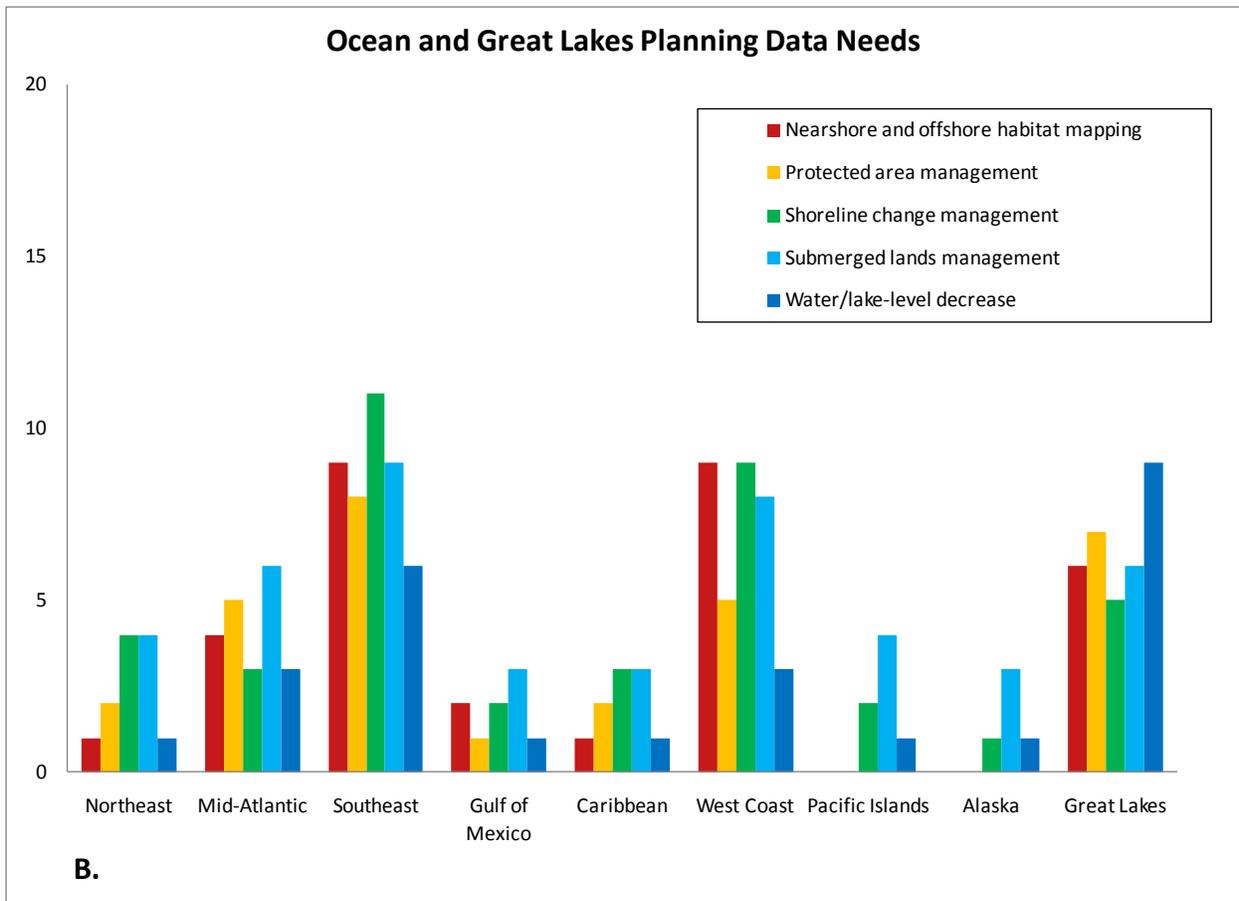


Figure 17: Spatial data needs for ocean and Great Lakes planning by region, chart 2 of 2. Y-axis represents number of responses.

Coastal Conservation Planning Issues

The need for improved protection and sustainable use of coastal and marine resources is well established. Coastal and marine habitats are being fragmented, degraded, and lost due to coastal development and other human land use changes, resource extraction, point and non-point source pollution, intrusion of invasive species, and climate changes. Planning for coastal conservation involves identification and characterization of coastal and marine habitats as well as understanding the ecosystem services they provide. The Center aims to provide resource managers with their informational and technological needs to assist them as they work to sustain habitats and ecosystem services through efficient and effective strategic planning.

Research preceding this survey identified resource management needs related to coastal conservation within an ecosystem based management (EBM) context in every Center product and service category. Primary needs are for data and tools that pertain to the biophysical/natural and institutional/governance elements (within the EBM context) involved with conservation planning, specifically tools to enhance partnership building with regard to institutional and governance challenges. Within the coastal conservation theme, the most cited

needs specifically relate to habitat restoration, protection, and monitoring; public outreach and education for enhanced stakeholder involvement and sense of stewardship; and lastly integrated management through increased communication, coordination, and cooperation within and between agencies, NGOs, and other organizations as well as across jurisdictions.

Management Priorities

The overwhelmingly highest priority management topics under the coastal conservation theme was climate change impacts (76.1%), followed by habitat restoration and monitoring (68.9%), erosion and beach nourishment (68.5%), and nonpoint source pollution (52.8%; Figure 18). Invasive species management (48.8%) and water quality monitoring (47.8%) were indicated as high priorities to just under half of the response population (Figure 18).

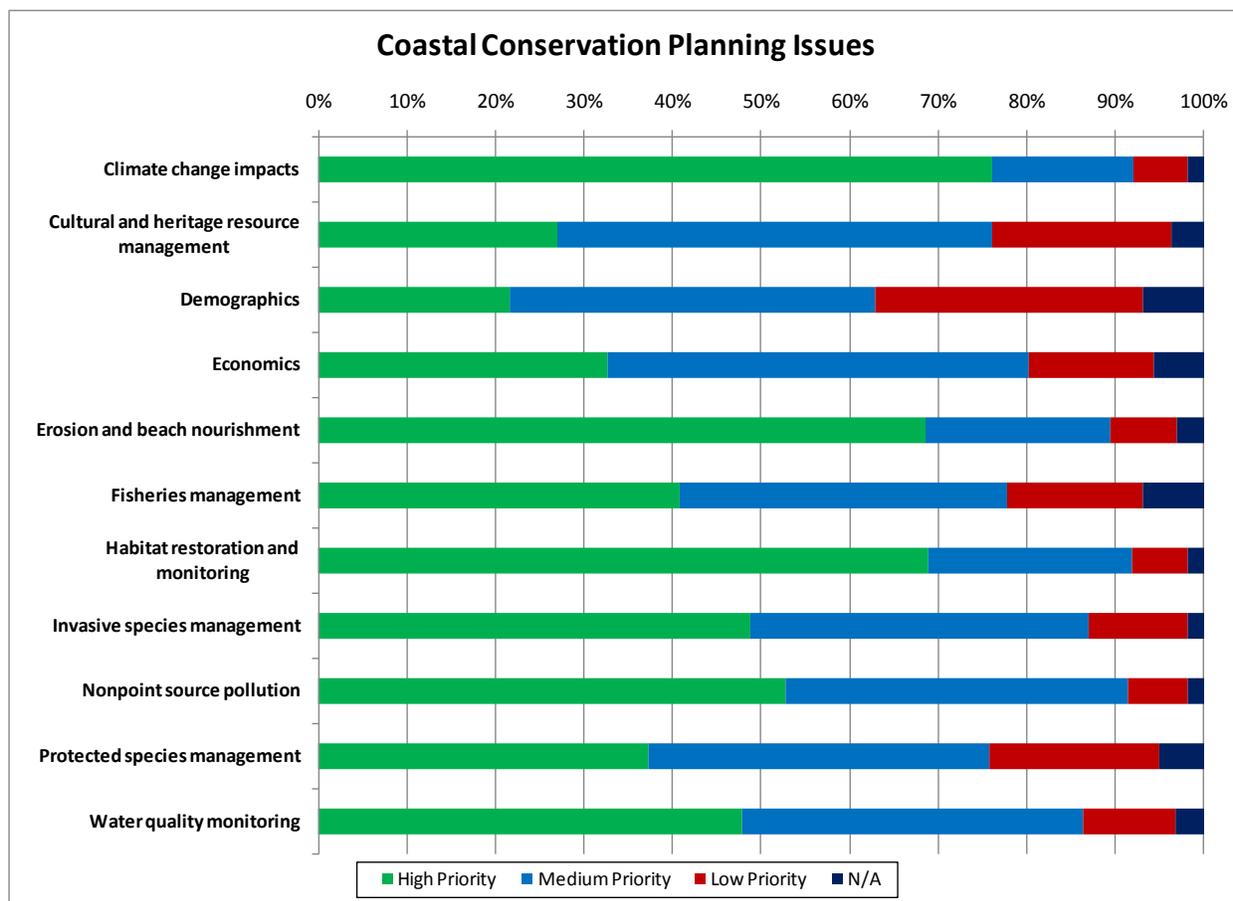


Figure 18: Priority levels of management topics within coastal conservation planning issues, results reported as percentage of total response.

Topics related to climate change impacts and erosion and/or beach nourishment are the highest priority in nearly all regions. The differences between regional topic priorities are shown in Figure 19 and Figure 20.

- Climate change impacts were identified as the highest priority topic for the Northeast, Mid-Atlantic, Southeast, and Alaska;

- The Caribbean indicated climate change impacts and erosion and beach nourishment as high priority topics;
- The Pacific Islands also indicated climate change impacts as high priority topics along with habitat restoration and monitoring;
- Gulf and Mexico and West Coast also identified habitat restoration and monitoring as their highest priority; and the Great Lakes' highest priority topic is erosion and beach nourishment.

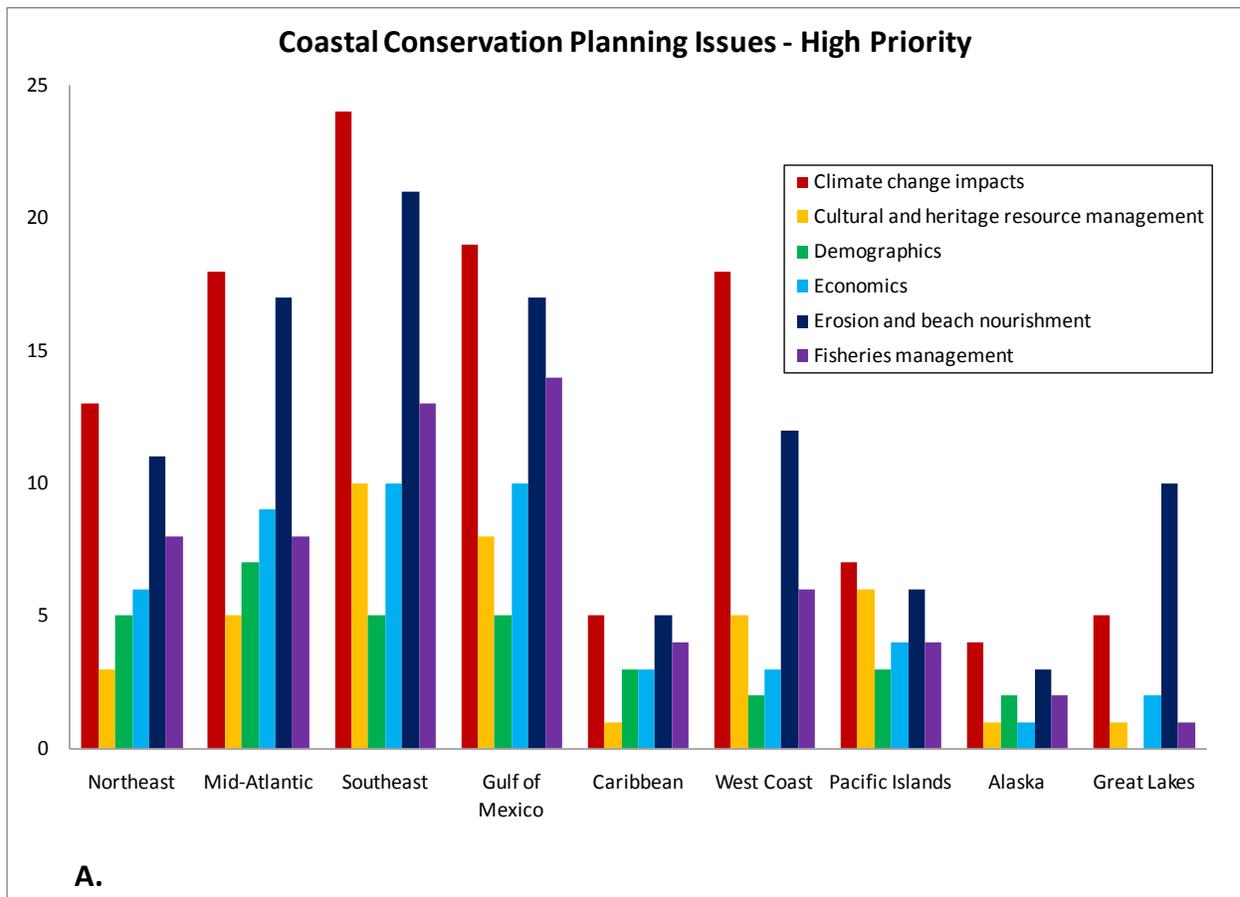


Figure 19: Highest priority management topics within coastal conservation planning issues by region, chart 1 of 2. Y-axis represents number of responses.

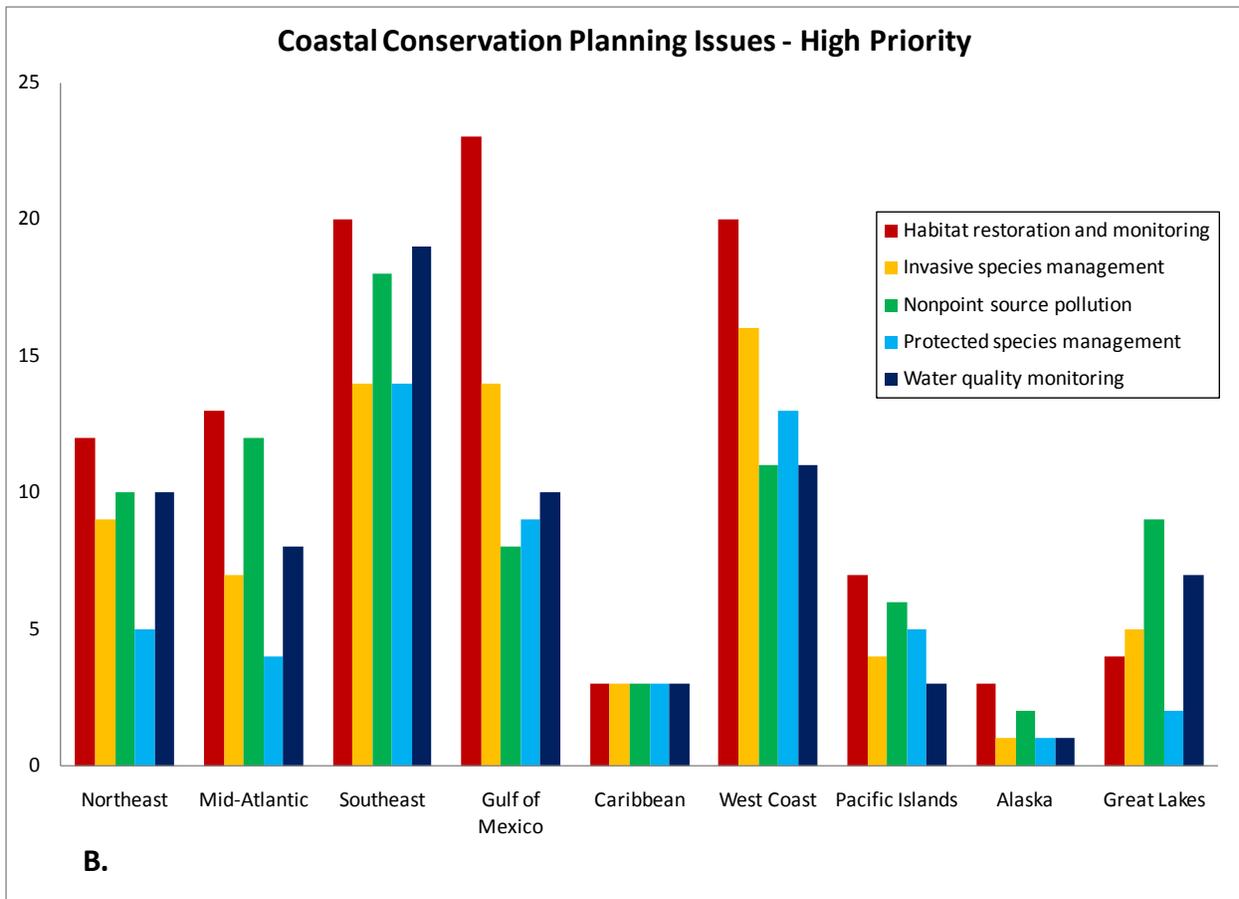


Figure 20: Highest priority management topics within coastal conservation planning issues by region, chart 2 of 2. Y-axis represents number of responses.

Spatial Data Use

Coastal conservation spatial data being used by greater than 50% of respondents includes water quality monitoring (55.1%), erosion and beach nourishment (55%), habitat restoration and monitoring (54.2%), and climate change impacts (50.4%; Figure 21). In this theme there was no overwhelming data type used far more than other types. All four of these data types were also selected as high priority management topics under coastal conservation. Data needs selected most often by respondents include economics data (46.22%), climate change impacts (44.72%), and nonpoint source pollution (43.8%).

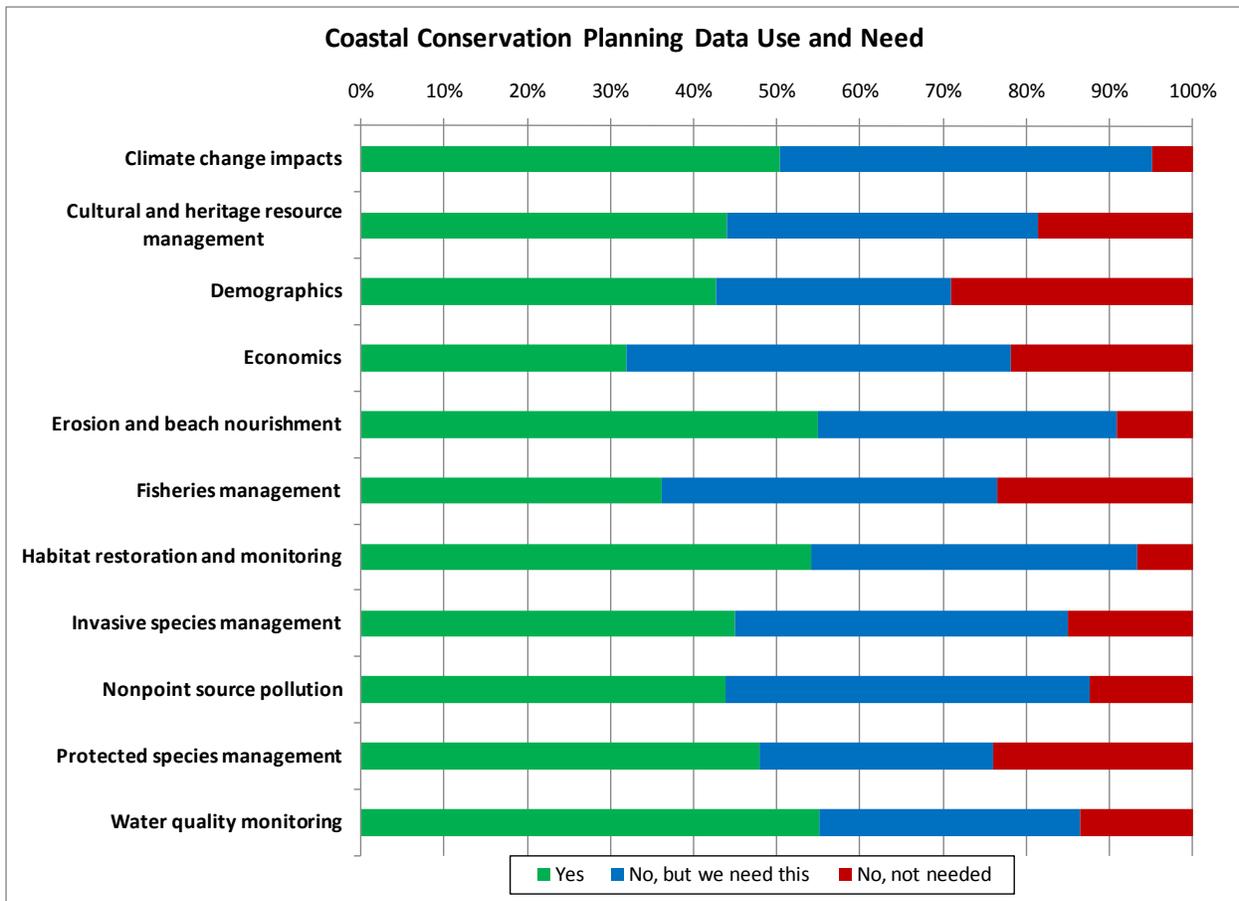


Figure 21: Spatial data use and need for coastal conservation planning among respondents. Results reported as percentage of total response.

Regional differences in primary spatial data *use* for coastal conservation planning are shown in Figure 22 and Figure 23.

- The Northeast and Southeast regions primarily use water quality monitoring data;
- Climate change impacts data are the primary data used by the Mid-Atlantic and Caribbean regions, the latter of which also identified using demographic and economic data;
- The Gulf of Mexico and West Coast both use habitat restoration and monitoring spatial data;
- Primary data used by the Pacific Islands region include cultural and heritage resource management, demographics, erosion and beach nourishment, and protected species management;
- Alaska also uses cultural and heritage resource management; and
- The Great Lakes uses spatial data related to erosion and beach nourishment.

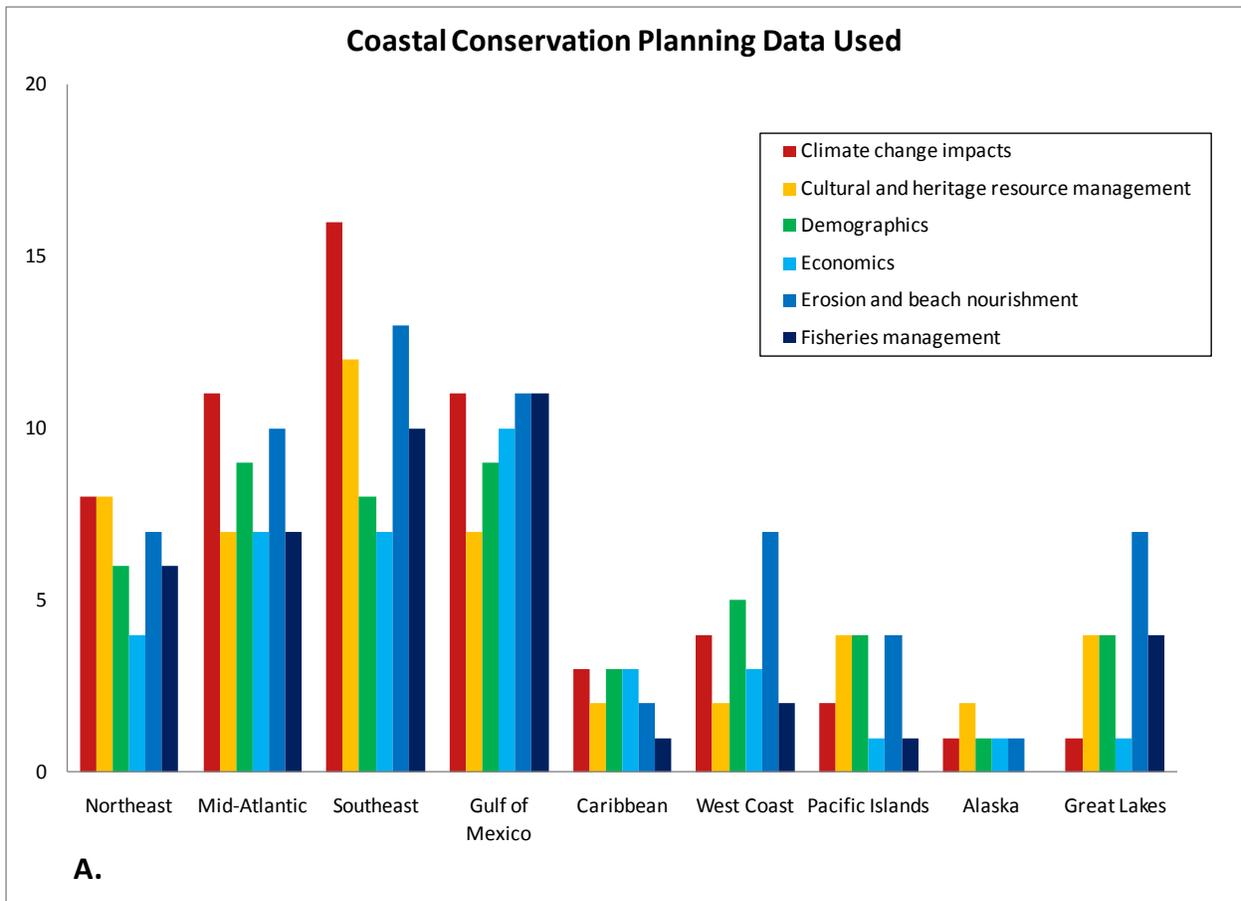


Figure 22: Spatial data used, as indicated by “yes” response, for coastal conservation planning by region, chart 1 of 2. Y-axis represents number of responses.

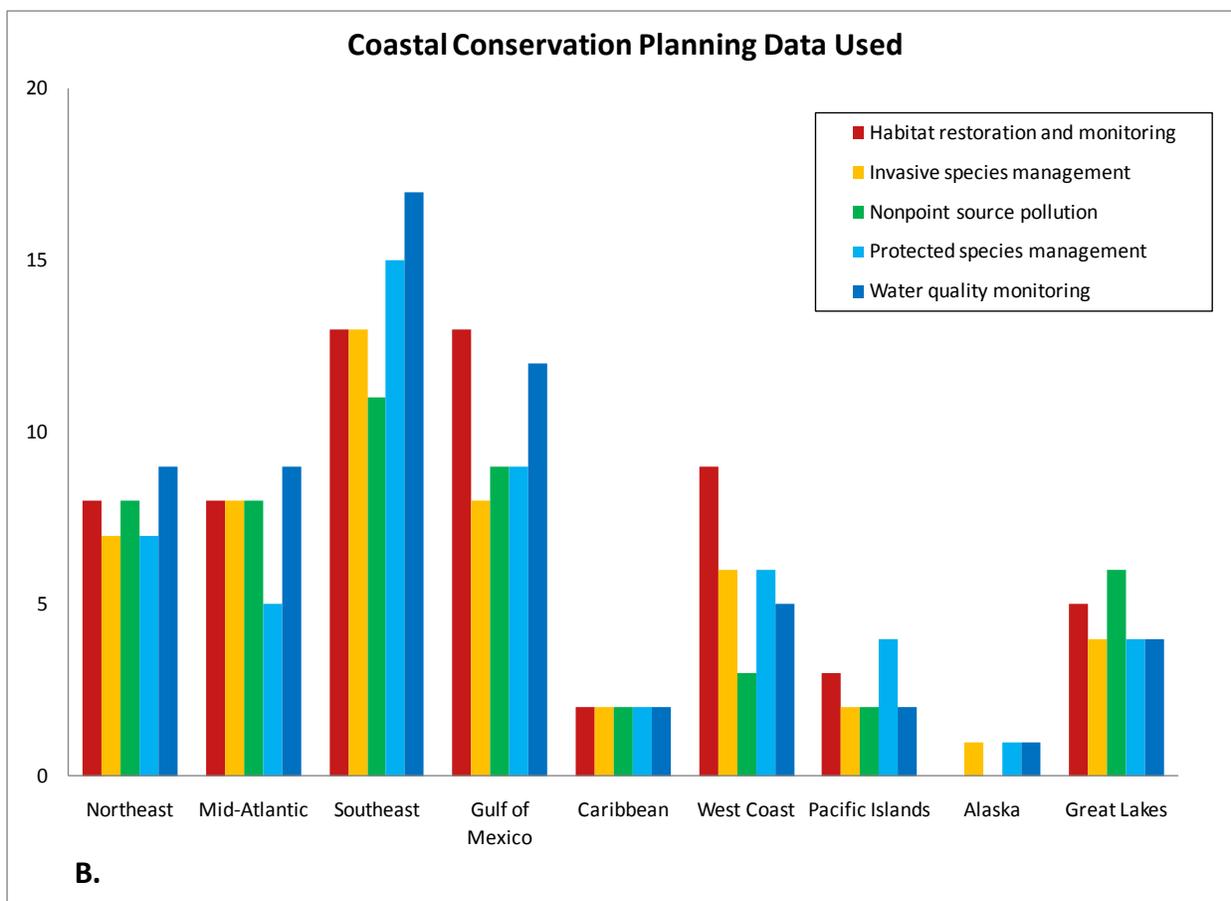


Figure 23: Spatial data used, as indicated by “yes” response, for coastal conservation planning by region, chart 2 of 2. Y-axis represents number of responses.

Regional spatial data *needs* for coastal conservation planning are charted in Figure 24 and Figure 25.

- The Northeast, Southeast and Mid-Atlantic all indicated the need for economics data, the Mid-Atlantic region also identified data needs related to habitat restoration and monitoring data, invasive species management, and nonpoint source pollution;
- The Gulf of Mexico primarily needs spatial data relating to cultural and heritage resource management;
- The Caribbean region indicated primary needs for all data categories, except climate change impacts, demographics and economics;
- West Coast and Great Lakes regions primarily need climate change impacts data; and
- Pacific Islands and Alaska regions need spatial data on fisheries management, and the latter identified the same level of need for habitat restoration and monitoring and nonpoint source pollution.

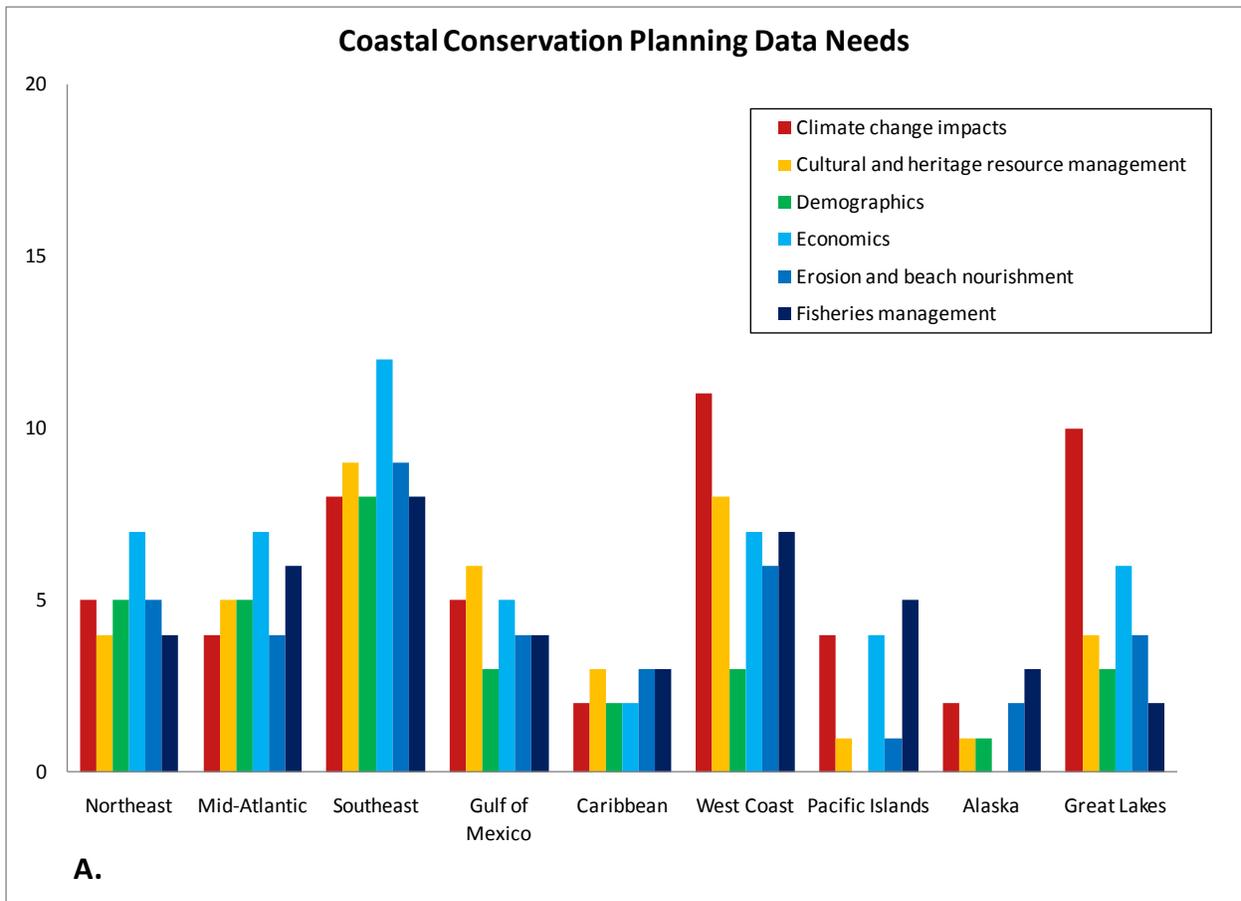


Figure 24: Spatial data needs, as indicated by “no [not used], but we need this” response, for coastal conservation planning by region, chart 1 of 2. Y-axis represents number of responses.

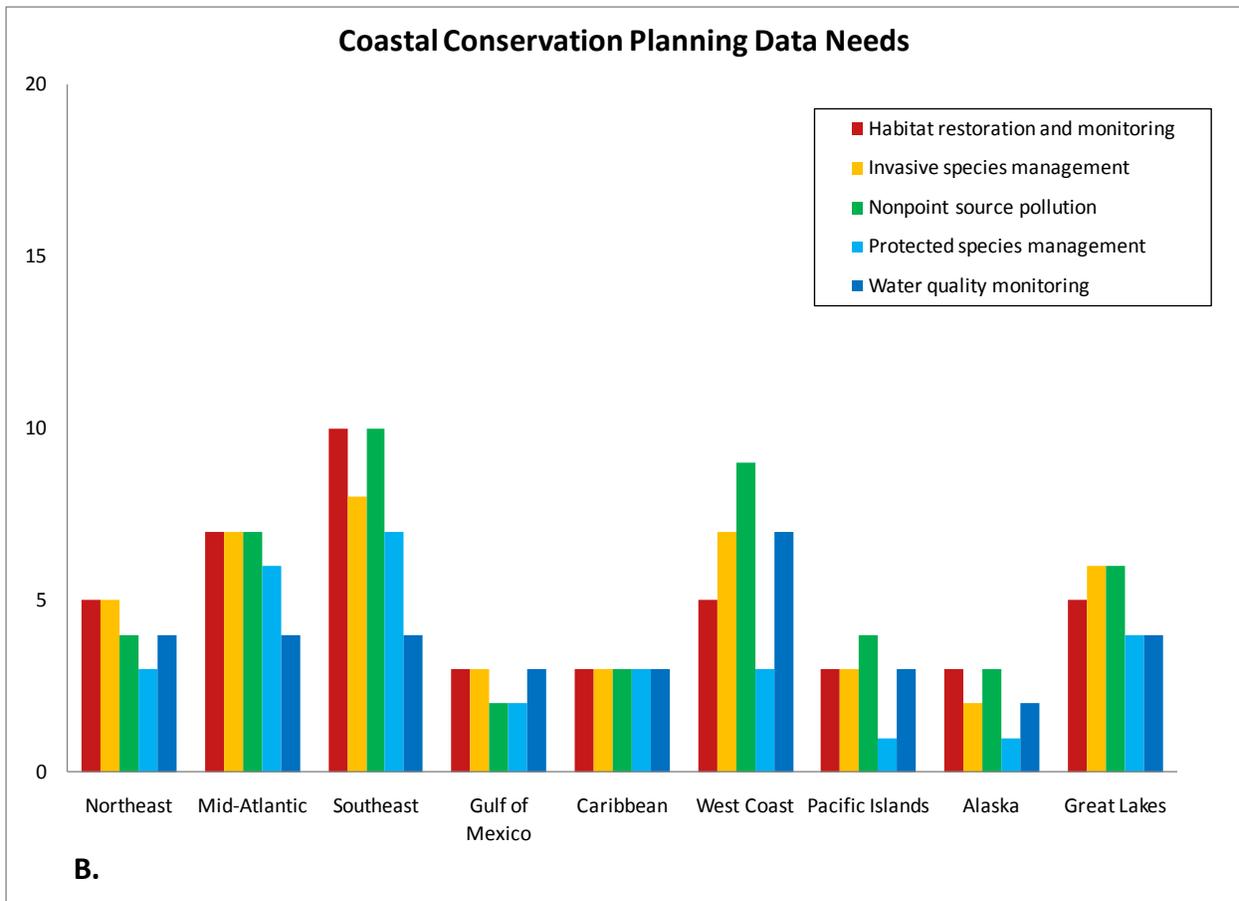


Figure 25: Spatial data needs, as indicated by “no [not used], but we need this” response, for coastal conservation planning by region, chart 2 of 2. Y-axis represents number of responses.

Coastal Hazards Issues

The resiliency of a community, or system, is its capacity to adapt to potential hazards in order to maintain structure and achieve and sustain an effective level of functioning (NOAA CSC 2006; LA Sea Grant 2009). Coastal communities are subject to hazards such as sea level rise, increased number and severity of coastal storms, risk of oil spills in certain regions, and other natural and human hazards that have major implications on human safety along with the economic and environmental health of coastal areas. Results from preliminary research indicated that resource managers need products and services for dealing with hazards resilience in every Center category, illustrating the significance of this issue in the coastal resource management community.

Management Priorities

As with the previous three themes, climate change impacts are a high priority management topic to nearly three-quarter of respondents (74.4%). The other highest ranking priority coastal hazards management topics included flooding, inundation, and storm surge (65.9%), sea level rise (68.5%), and erosion (62.1%). All other topics were selected as high priority by less than 50% of respondents (Figure 26).

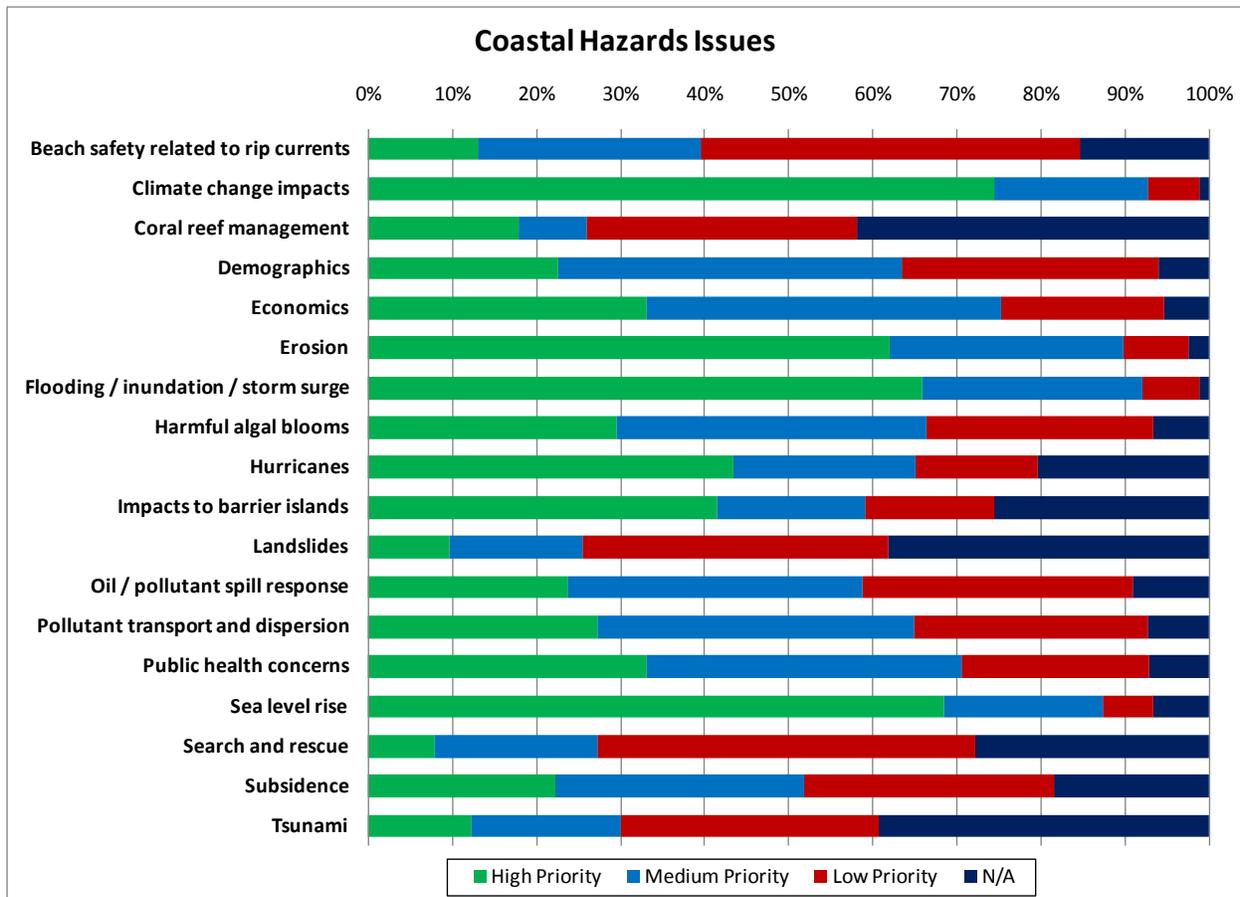


Figure 26: Priority levels of management topics within coastal hazards issues. Results reported as percentage of total response.

Regional differences in high priority coastal hazards topics are shown in Figure 27 and Figure 28.

- Flooding, inundation, and storm surge are the highest priority topic for Northeast and Southeast respondents;
- Climate change impacts are the highest priority topic for the Mid-Atlantic, Southeast, Caribbean, West Coast, Pacific Islands and Alaska;
- The Mid-Atlantic, Southeast and Alaska also identified sea level rise as a high priority topic;
- Impacts to barrier islands are the highest priority topic for the Gulf of Mexico;
- The Caribbean region also identified coral reef management and erosion as high priority topics;
- Coral reef management and hurricanes are among the highest priority topics for the Pacific Islands; and
- Both Alaska and the Great Lakes identified erosion as a major management priority, and the former also indicated sea level rise.

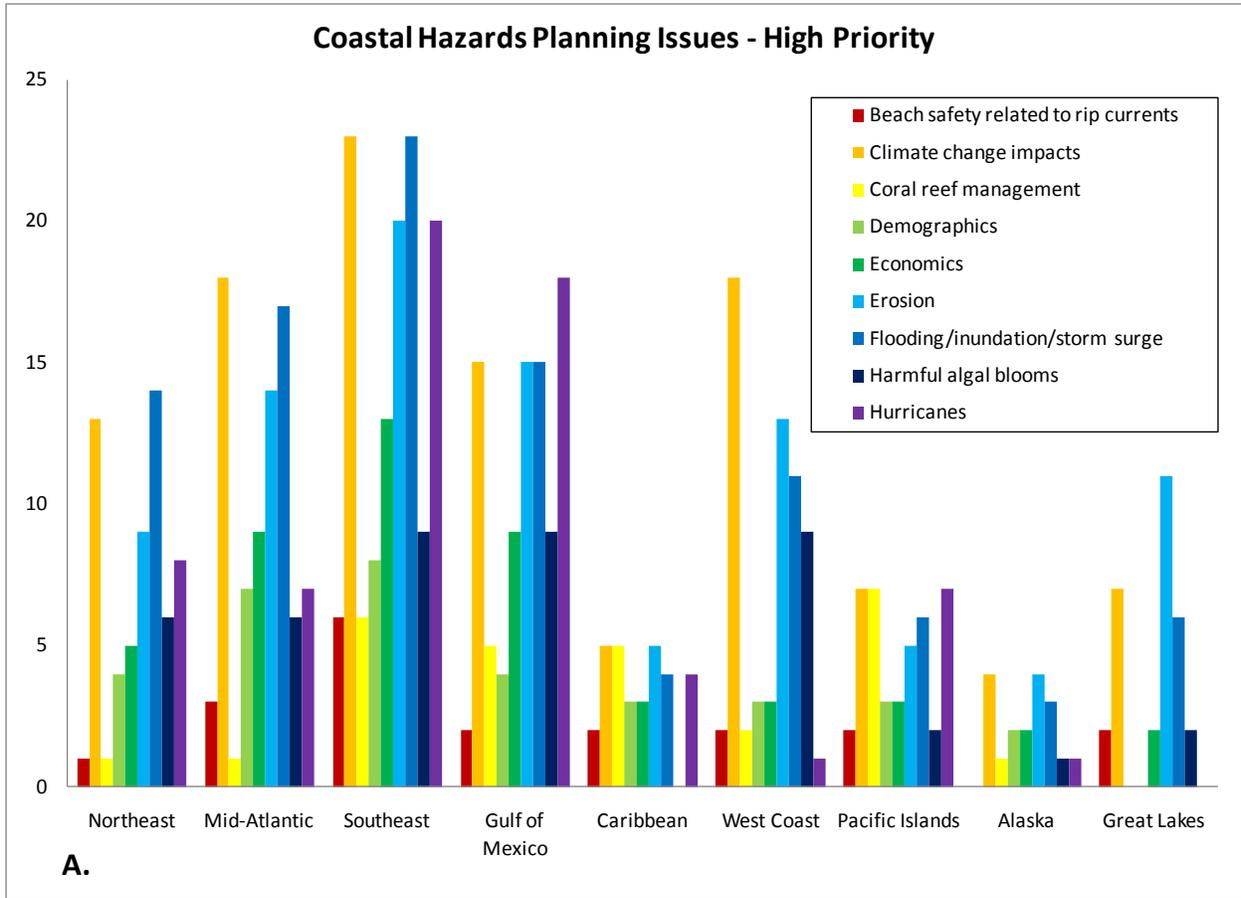


Figure 27: Highest priority management topics within coastal hazards issues by region, chart 1 of 2. Y-axis represents number of responses.

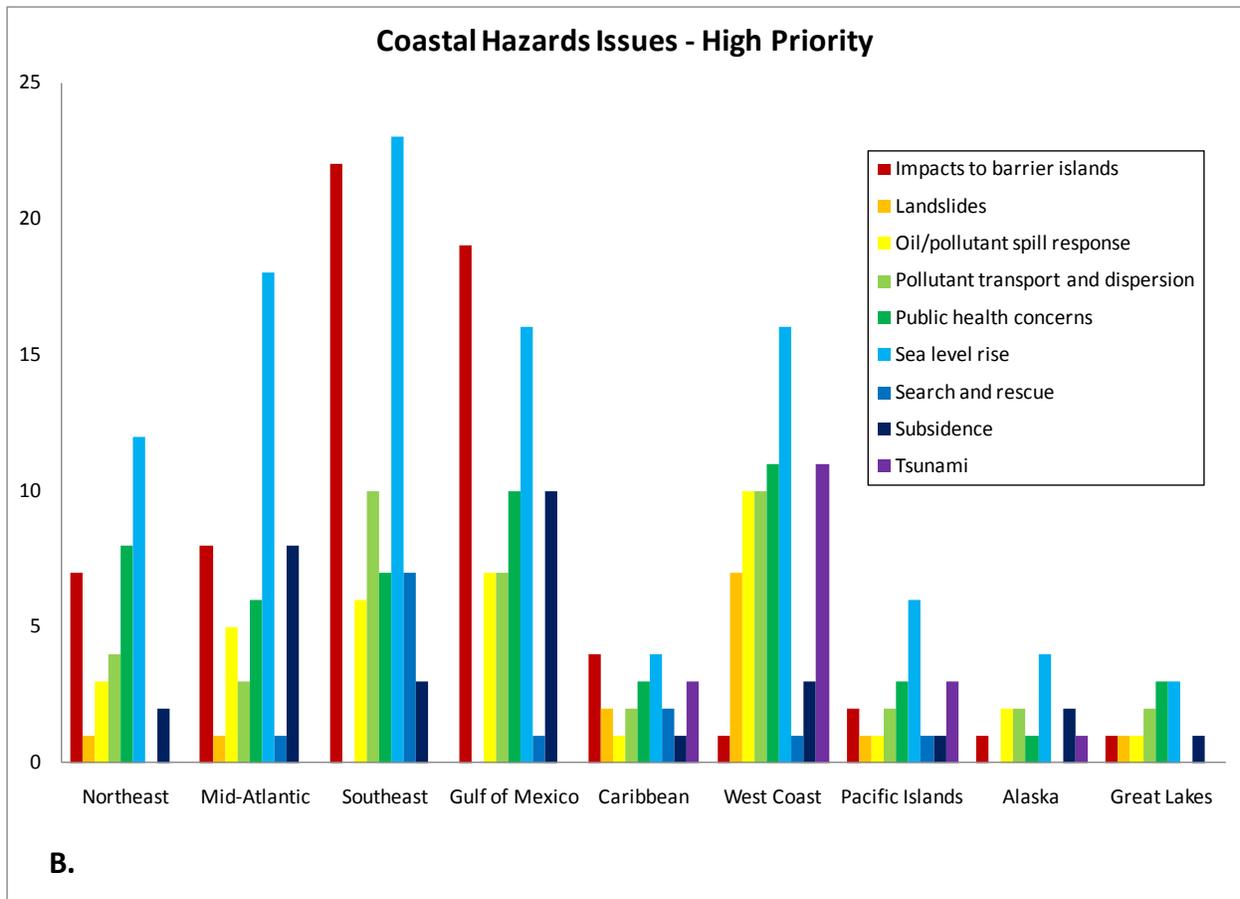


Figure 28: Highest priority management topics within coastal hazards issues by region, chart 2 of 2. Y-axis represents number of responses.

Spatial Data Use

Respondents indicated spatial data use primarily in the areas of flooding, inundation, and storm surge (57.7%), sea level rise (50.8%), and erosion (50%; Figure 29). These data uses correspond directly to three of the four high priority management topics identified, the fourth being climate change impacts. Climate change impacts data were indicated as being used by 45.3% of the respondent population. Leading spatial data needs identified were for economics data (57.85%), pollutant transport and dispersion data (52.07%), and climate change impacts data (50%).

Preceding studies (MRAG 2009b) indicated that the need for data and tools within coastal hazards related to biophysical and natural topics were more common, when compared to social/economic and institutional/governance Center products. Specifically, the majority of data and tool needs were for information relating to storm surge and sea level rise. Results from this survey confirmed these particular needs as evidenced by the primary data used by survey respondents.

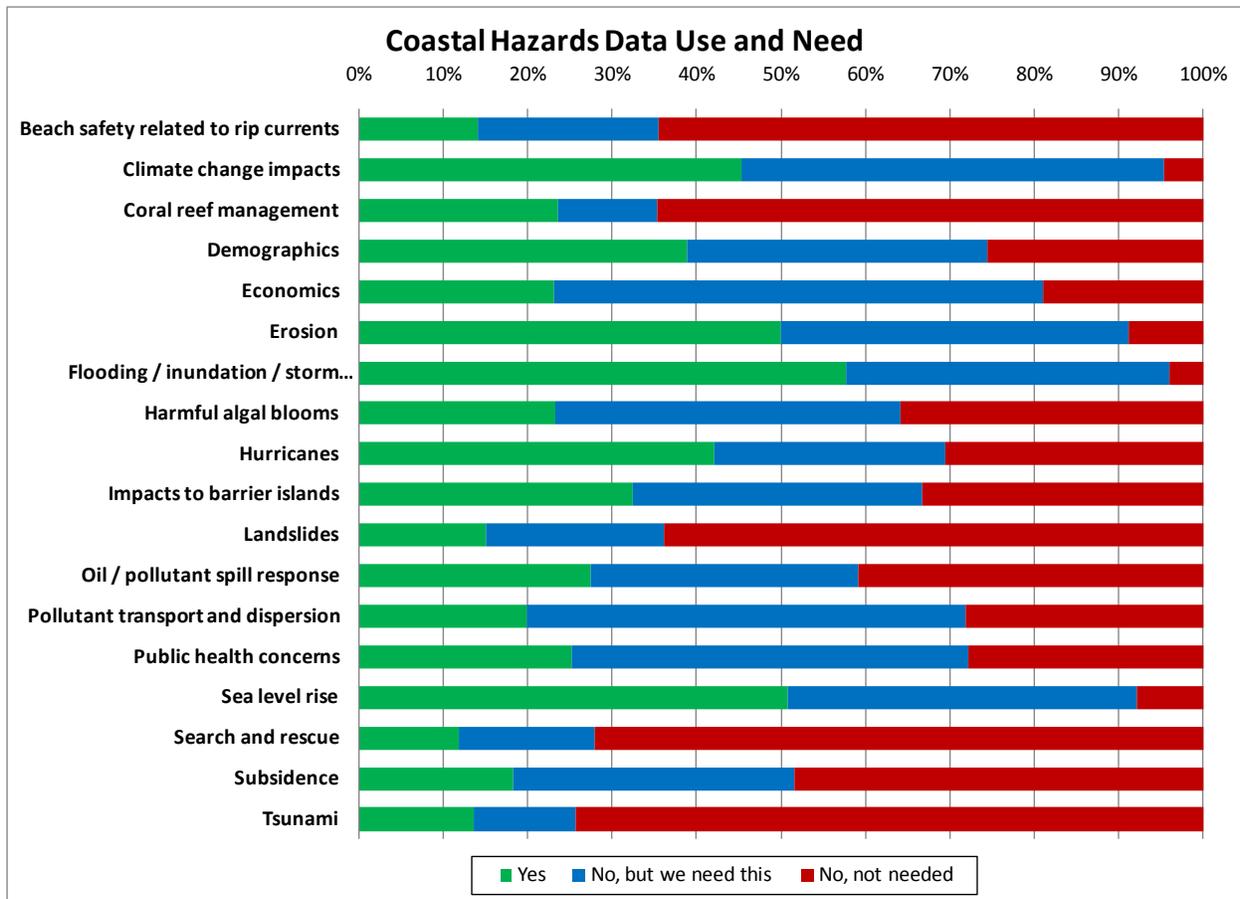


Figure 29: Spatial data use and need for coastal hazards issues. Results reported as percentage of total response.

Regional differences in spatial data *used* are illustrated in Figure 32 and Figure 33.

- The Northeast, Mid-Atlantic and Caribbean regions all indicated primarily using sea level rise data;
- The Mid-Atlantic and Caribbean, along with Gulf of Mexico regions largely use climate impacts data;
- Flooding, inundation, and storm surge data are used by the Southeast, Gulf of Mexico, Caribbean, Alaska, and Pacific Islands regions;
- Hurricane data are also primarily used by the Caribbean region;
- The West Coast respondents indicated primarily using oil and pollutant spill response;
- The Pacific Islands also use data for coral reefs management; and
- Alaska and the Great Lakes regions primarily use erosion data.

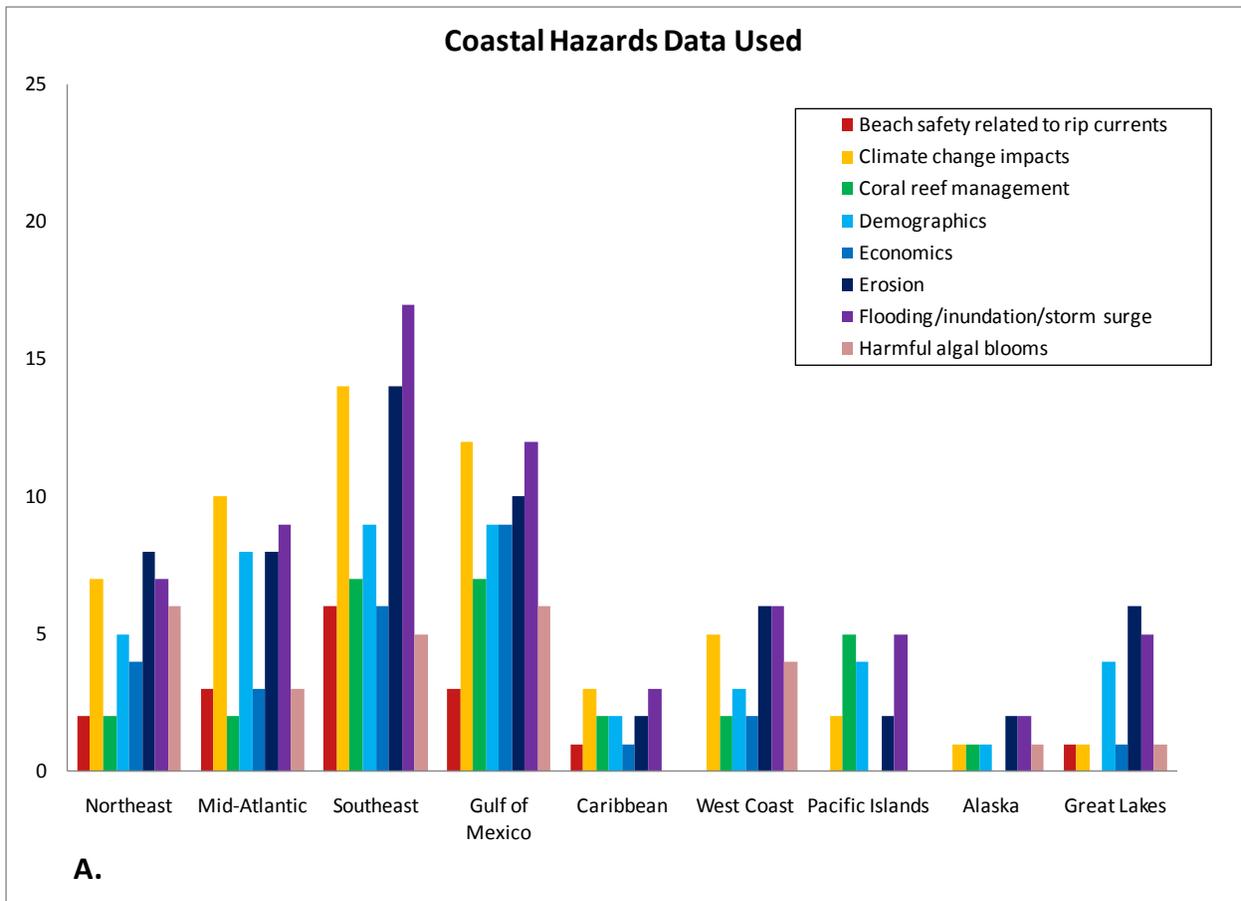


Figure 30: Spatial data used, as indicated by “yes” response, for coastal hazards issues by region, chart 1 of 2. Y-axis represents number of responses.

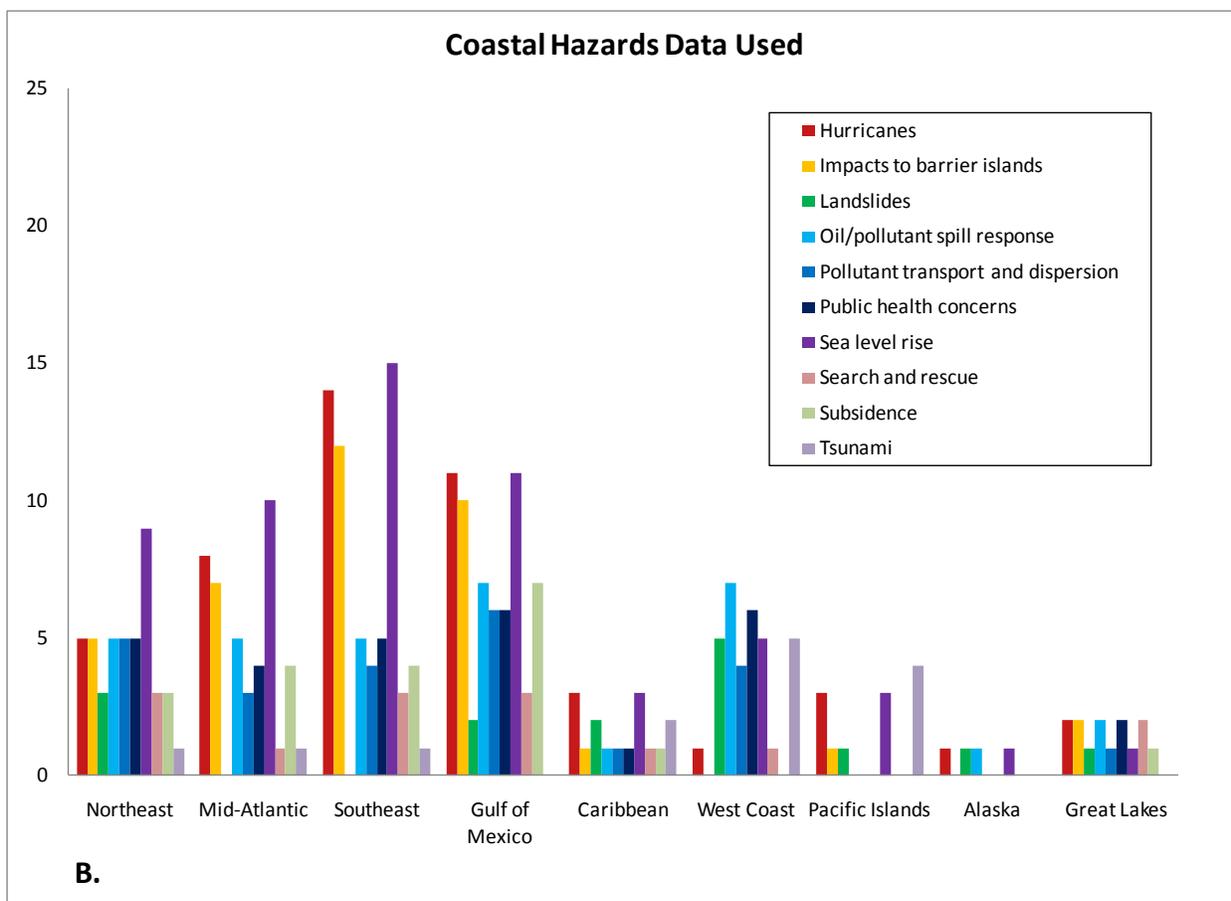


Figure 31: Spatial data used, as indicated by “yes” response, for coastal hazards issues by region, chart 2 of 2. Y-axis represents number of responses.

Regional spatial data *needs* for coastal hazards management issues are shown in Figure 32 and Figure 33.

- The Northeast region indicated a primary need for spatial data to manage public health concerns;
- Economics data were selected as primary needs for the Mid-Atlantic, Southeast, Gulf of Mexico, and Pacific Islands, the Pacific Islands and Alaska also need data related to pollutant transport and dispersion;
- The Caribbean region needs data on harmful algal blooms related to coastal hazards; and
- The West Coast region needs sea level rise and climate change impacts data, the latter is also a primary need for the Great Lakes region.

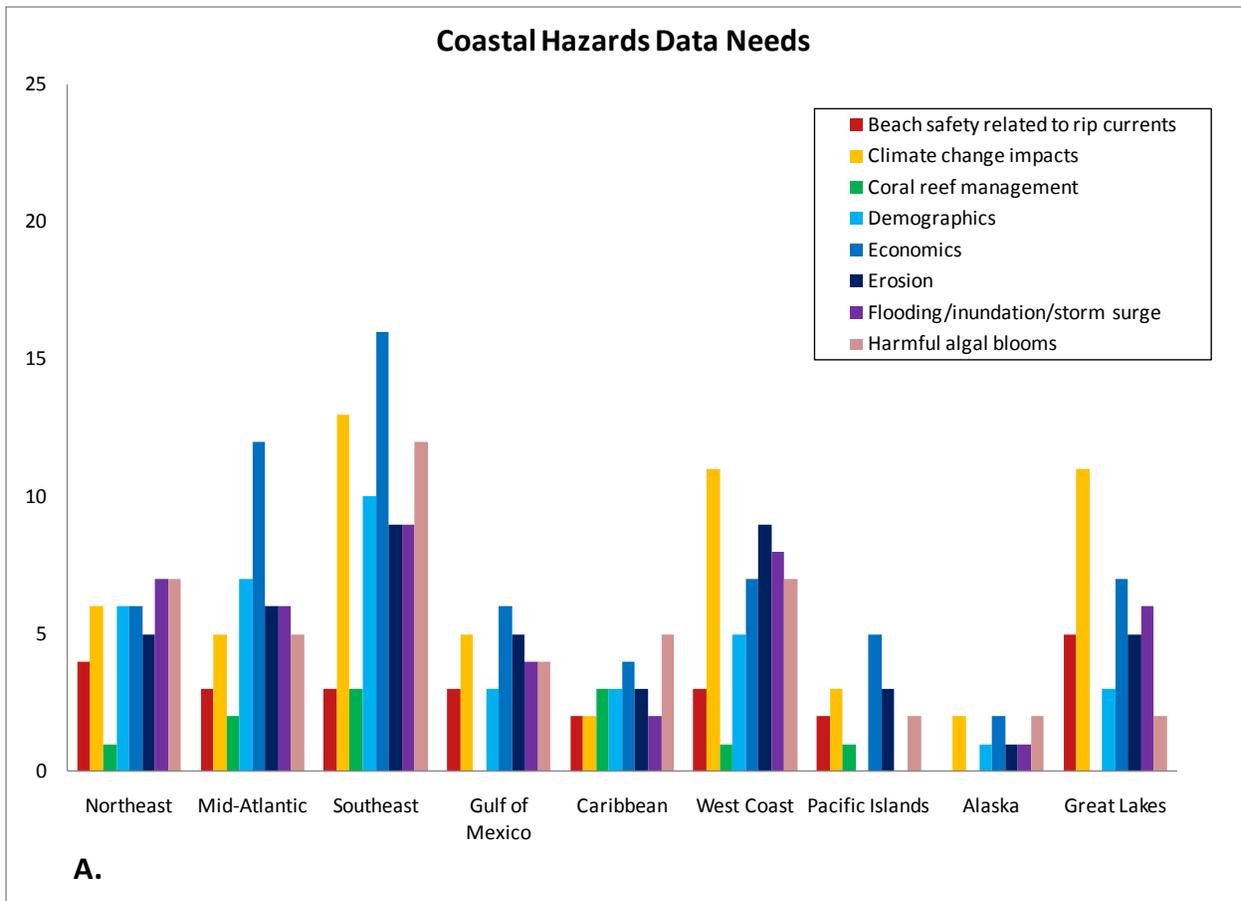


Figure 32: Spatial data needs, as indicated by “no [not used], but we need this” response, for coastal hazards issues by region, chart 1 of 2. Y-axis represents number of responses.

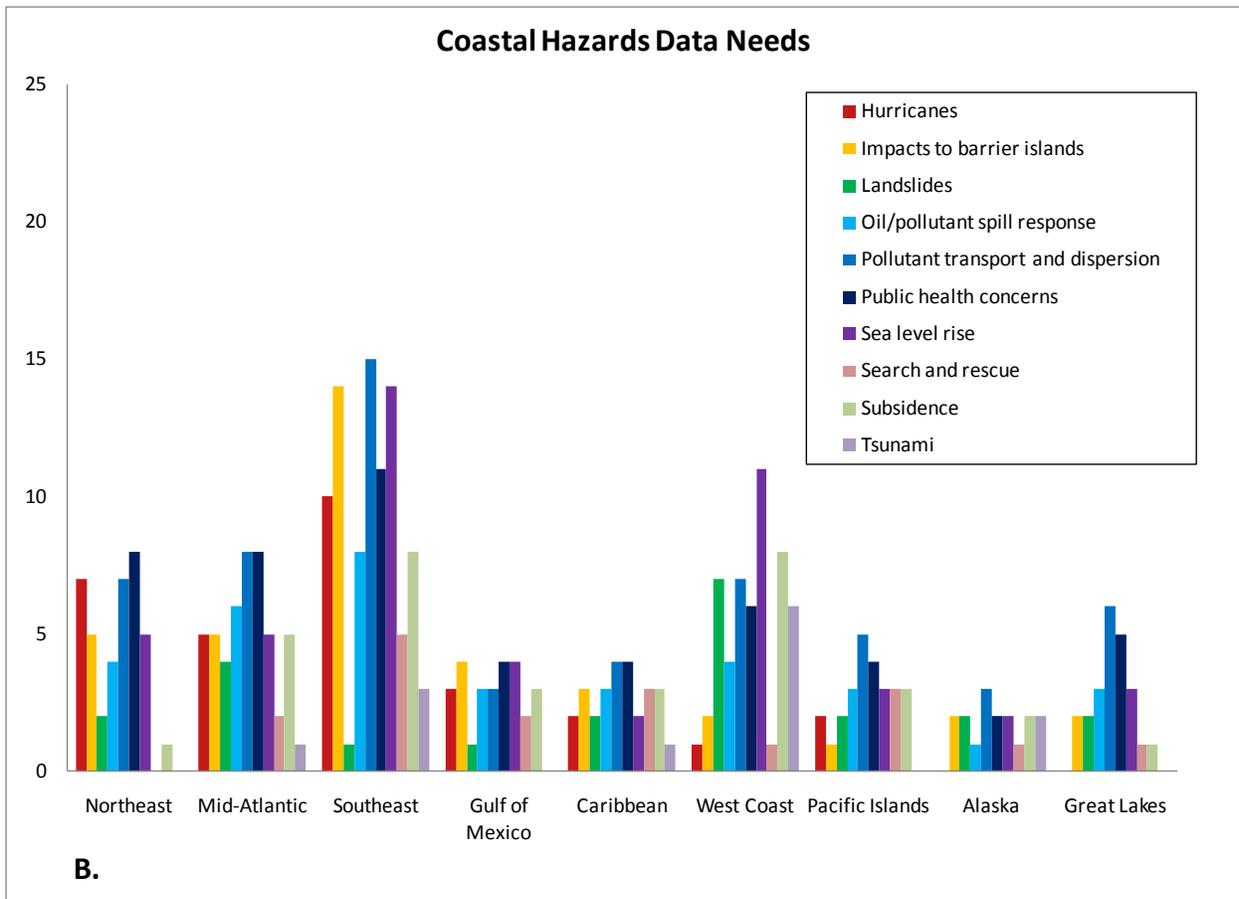


Figure 33: Spatial data needs, as indicated by “no [not used], but we need this” response, for coastal hazards issues by region, chart 2 of 2. Y-axis represents number of responses.

Management Trends and Needs

After indicating priority topics, data used and needs relating to the Center’s focus areas, respondents were asked to identify other topics of particular concern and additional information needs through a series of questions that considered data, social and economic needs, needs for effective coastal management and needs with respect to hazards management. The most prominent topics and needs listed by respondents are given below. Among them are topics and needs relating to ecosystem based management principles. As noted in preceding studies, one significant development for coastal management practitioners is the move toward adopting ecosystem based management principles. The most prominent information need identified in these studies was for information related to the human dimensions of ecosystem function and management (MRAG 2009a; 2009b).

Additional Topics of Concern

Some general patterns and broader topics of concern were identified by multiple respondents. More specific topics are generally unique to a particular region and/or job function.

Broader topics identified by respondents include:

- Marine spatial planning/ocean zoning (noted as a high priority)
- Planning for renewable ocean energy
- Ecosystem based management
- Participatory GIS
- Ecosystem services
- Limited capacity, as an issue that affects managers' ability to respond to the issues
- Improving scientific understanding of the ecosystem (including development and assessment of ecosystem indicators)
- Increasing ocean literacy
- Education

More specific topics of particular concern identified include:

- Coastal pathogens
- Inclusion of estuarine (sheltered coasts) as part of coastal management
- Coastal land use change and its effects on water quality
- Green infrastructure conservation planning
- Climate change and sea level rise impacts to coastal areas would benefit from LIDAR maps of coastal areas
- Role of microbial ecology in coastal ecosystems
- Marine biodiversity conservation
- Marine protected area design and planning
- Community-based marine resource management
- Biological monitoring
- Pollutant source tracking
- Watershed planning best management practices
- Source water and ground water conservation and protection
- Opportunities for mitigation (in-water and wetland)
- Marine vegetation
- Emergency preparedness and planning for dealing with a variety of coastal storms
- Impacts due to ocean acidification
- Impacts to water quality based on population increases
- Regulation of Lake Ontario water level
- Shore protection structures, bluffs, sand budget
- Protection and restoration of functional habitats, protected species management

Additional Data Needs

There were no apparent patterns among the information needs identified as most of these were specific to an individuals' job and/or region. However, multiple respondents identified general resource needs beyond specific data needs, and there were some broader needs listed by multiple respondents.

Resource needs identified (comments directly from survey):

- We do not need just data; we need people to [be] present and continue to be engaged with the data and the audiences we serve
- A better way to share the data to support comprehensive and local shoreline planning
- More complete data sets (example given: nearshore and offshore habitat data, data on eelgrass and kelp, but not comprehensive bottom-type)
- Additional and more specific spatial data
- High Resolution Bathymetry, Offshore Ecosystem Characterization/Habitats
- More frequent high-resolution elevation data
- Need better means for using data

Specific information/data needs identified (comments directly from survey):

- Human use mapping offshore, both infrastructure (e.g. transatlantic cable crossings, etc.) and ecosystem services (e.g. commercial & recreational fishing, etc.)
- Coastal inundation models for the Delaware Estuary
- Marine Debris, Acidification impacts
- Green infrastructure conservation planning
- Military exclusionary zones
- Distribution and abundance of commercially and recreationally important fish species
- Decay of organic particulates in sediment, Nitrogen cycling in marine habitats
- Ability to map cumulative impacts and integrated concepts of economics and ecology needed for EBM
- Consistent, comprehensive high resolution bathymetry, huge need in offshore habitat mapping and characterization
- Economic data, specifically the need to determine the long term economic value of healthy coastal ecosystem services and use to justify their protection and restoration
- Offshore wind energy spatial data for advanced planning and evaluation of proposed projects in the Great Lakes
- Inventory of shore protection structures, bluff heights, coastal reaches

Demographic and Economic Information Needs

Among respondents, the leading critical demographic and economic information needs identified were for non-market values, followed by time-series data, population counts, and population attributes (Figure 34).

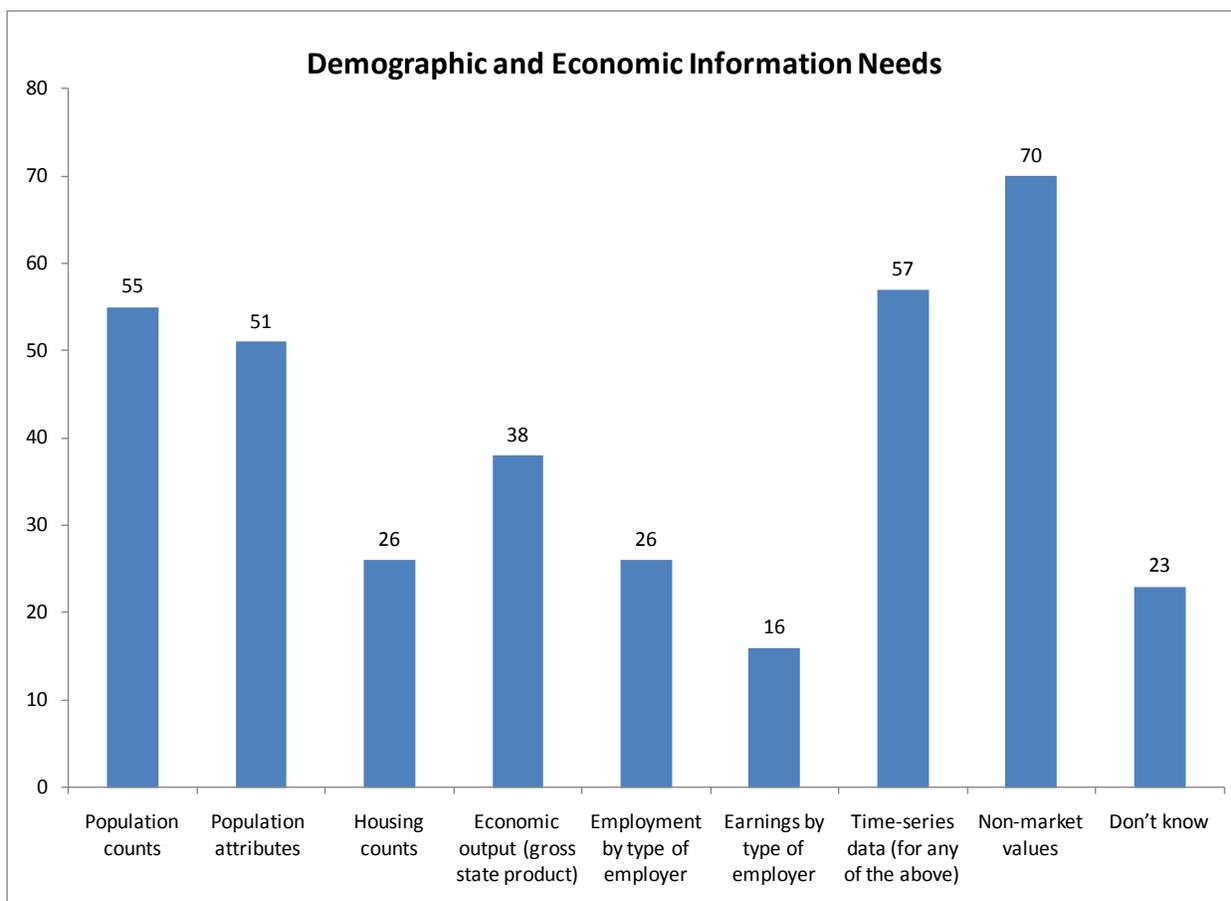


Figure 34: Consensus of respondents' demographic and economic information needs; question type allowed for selection of up to three needs. Y-axis represents number of responses.

The leading critical demographic and economic information needs identified by region are given in Figure 35.

- Information on non-market values were the primary need for the Northeast, Mid-Atlantic, Southeast, West Coast, and Great Lakes;
- Population counts were indicated as needed in the Gulf of Mexico region;
- Time-series data are needed in the Caribbean region;
- Data on population attributes are needed in the West Coast and Pacific Islands regions; and
- There was no predominant need identified by respondents from Alaska.

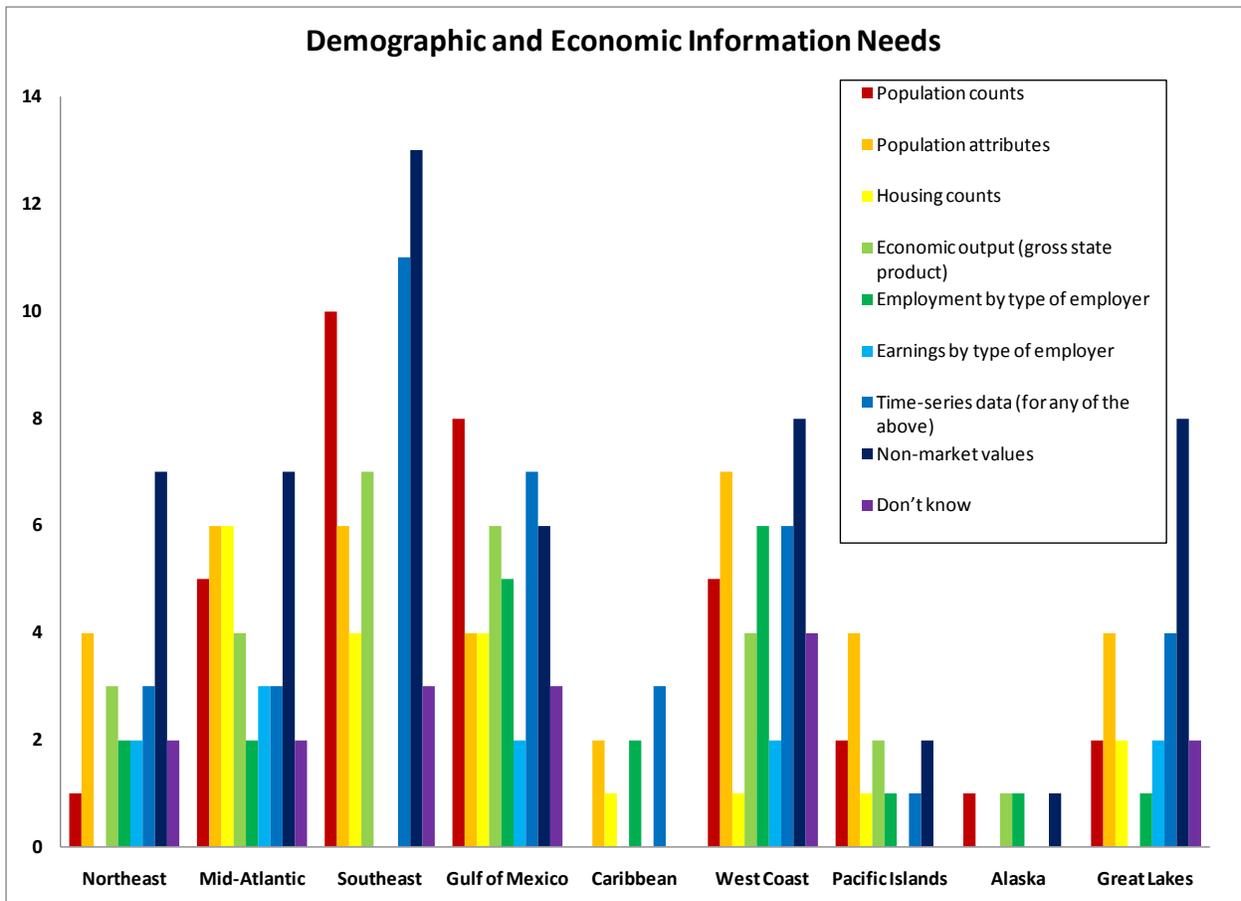


Figure 35: Regional differences in demographic and economic information needs. Y-axis represents number of responses.

Primary Needs for Effective Coastal Management

Respondents were asked to identify their top three needs for effective coastal management. Relevant and necessary data were the primary need identified by consensus, followed by education and communication with the public, coordination with local entities, other resources (e.g. funding), and staff (Figure 36).

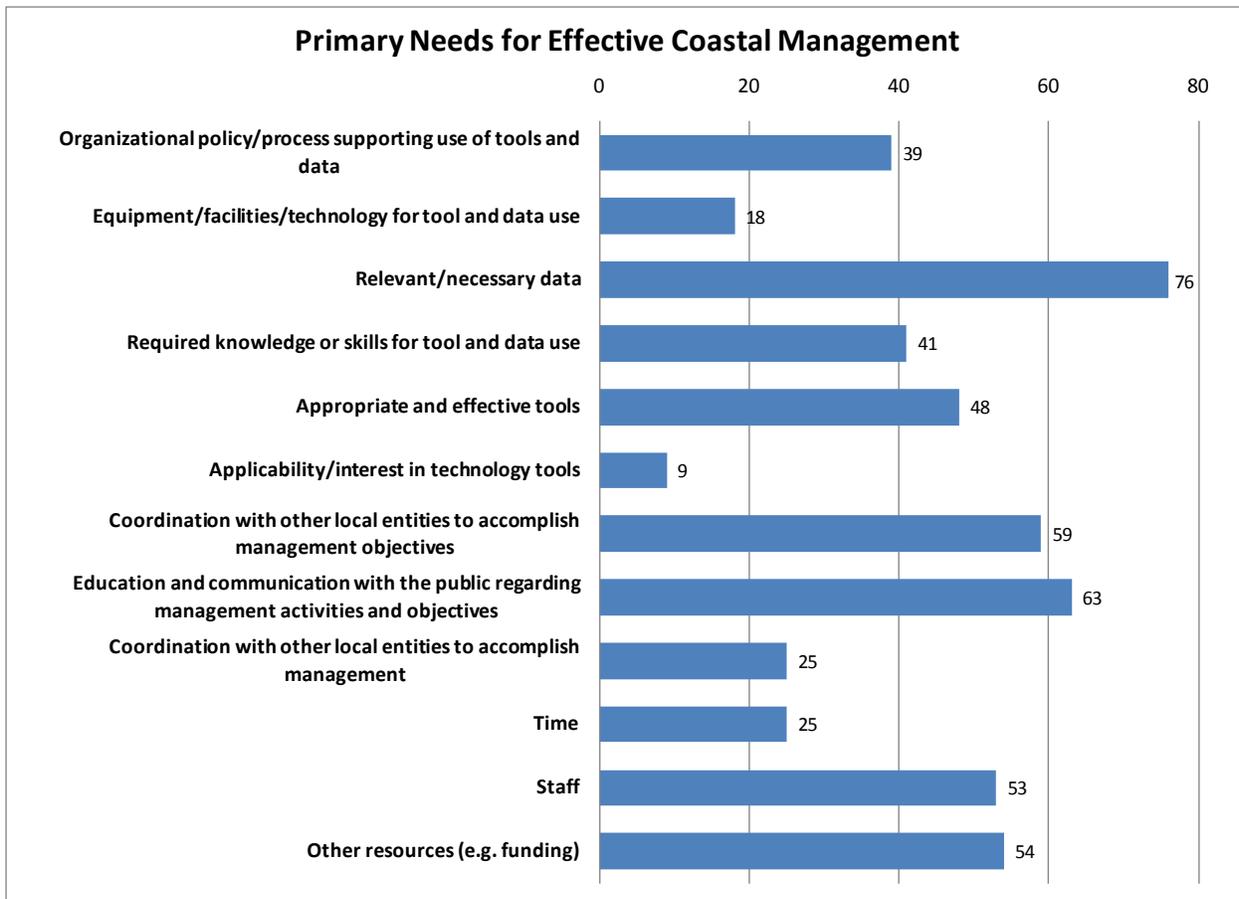


Figure 36: Primary needs indicated for effective coastal management, X-axis represents number of responses.

Figure 37 illustrates the leading needs identified by region.

- The need for relevant/necessary data was a primary need identified by the Northeast, Southeast, West Coast, Pacific Islands, and Great Lakes;
- Education and communication with the public regarding management activities and objectives was a leading need for the Mid-Atlantic and Caribbean;
- Coordination with other local entities to accomplish management objectives was a primary need identified by the Gulf of Mexico and Pacific Islands regions; and
- The Pacific Islands also identified other resources (e.g. funding) as a need.

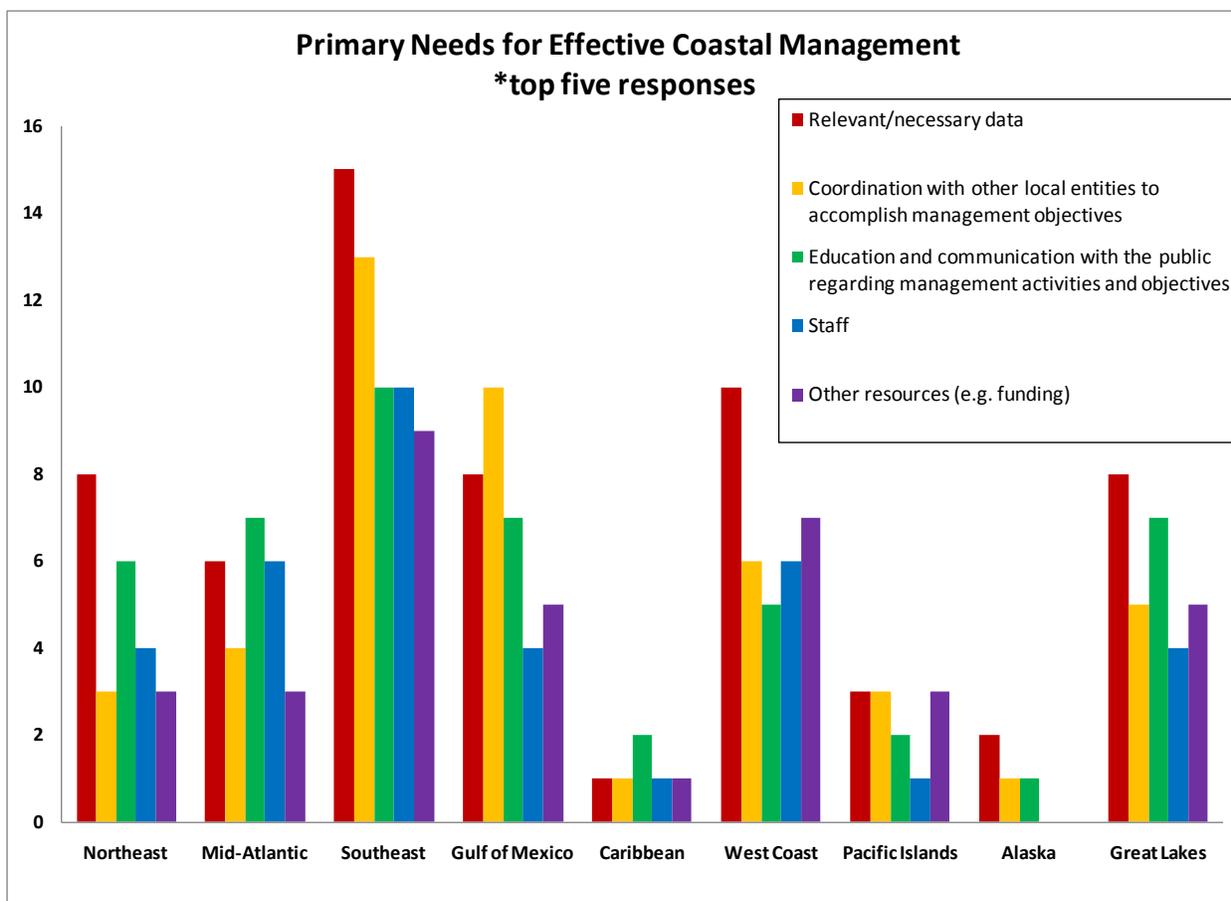


Figure 37: Primary needs indicated for effective coastal management by region. Y-axis represents number of responses.

Additional needs provided in the comments field by respondents included:

- Funding to implement plans, projects and programs
- Stronger laws and policies
- Efficient use of resources
- Learning from the public about their needs and interests
- We need long-term staff who are skilled facilitators of long term dialogues amongst diverse stakeholders
- New thinking about the nexus of coastal management that directs resources to the field, station CSC people in work sites for tours of duty at coastal programs, Sea Grant and NERRS
- Awareness of data/tools available
- Appropriate data so that management can be developed to fit the area where it is applied

Priority Information Needs with respect to Hazards Management

Previous studies revealed that within the hazards resilience theme, the most specific needs cited were for research and planning for climate change effects, improved risk communication, vulnerability studies that focus on the socio-economic consequences of climate change effects, and improved communication, coordination, collaboration between agencies and organizations (MRAG 2009a; 2009b). Survey results directly align with these findings and indicate that products and services to assist in understanding and communicating risks are a leading need for hazards management practitioners.

Risk and vulnerability assessment (56.9%) was identified as a very important information need, followed by hazards mitigation (54.9%); all other needs were selected less than 50% of the time (Figure 38). All needs were selected as very important by more than 20% of respondents.

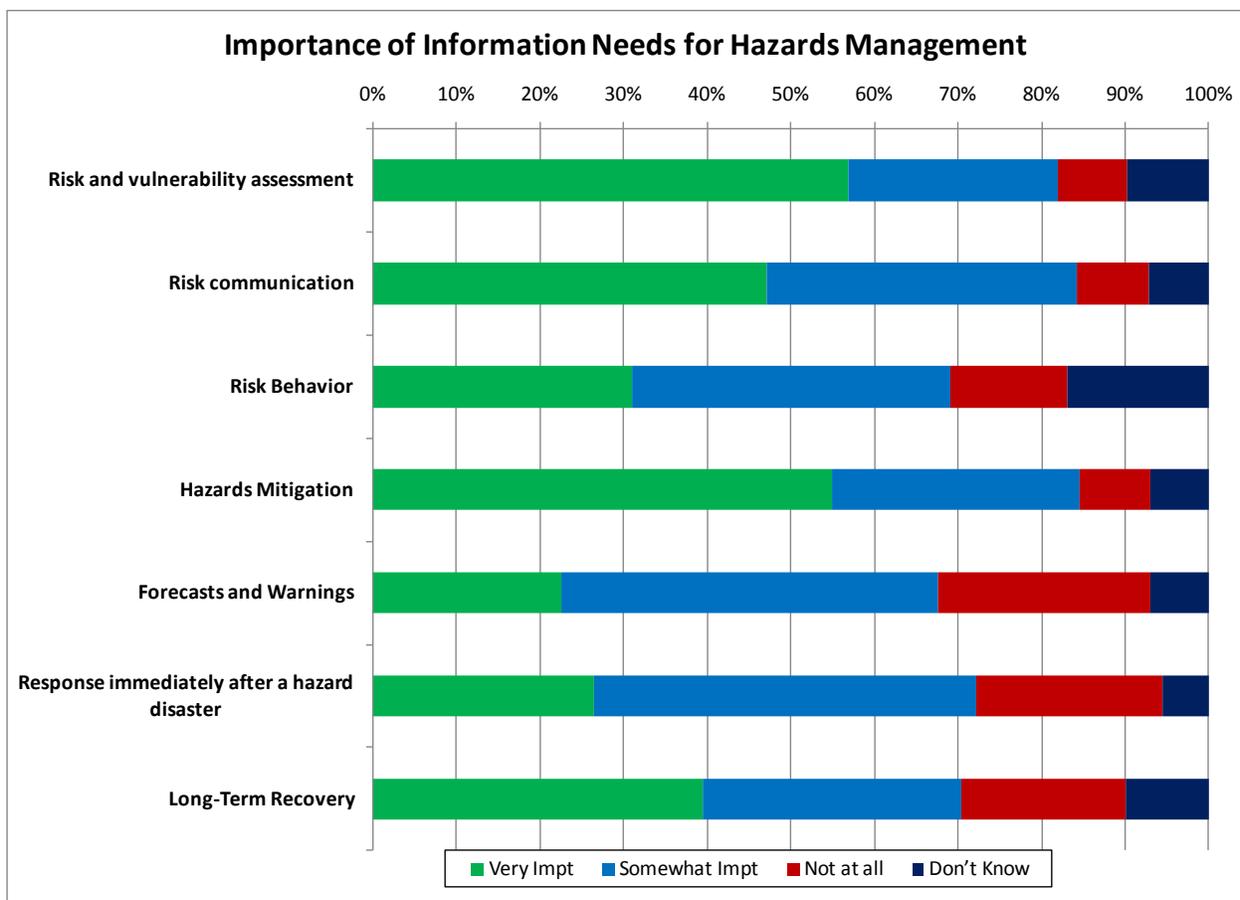


Figure 38: Importance of information needs for hazards management. Results reported as percentage of total response.

In addition to indicating the importance of priority information needs with respect to hazards management, respondents were asked to select their top three primary needs for improving hazards management. This portion of the survey aimed to address resources needed, in addition to the tools for hazards management which was considered in the former topic area.

The top two needs identified by respondents were an increase in communities' ability to be resilient and an increase in planning capacity and resources at local levels (Figure 39). Although, twenty-four respondents indicated that they did not need to know about these areas for their job.



Figure 39: Primary needs for improving hazards management identified by consensus of respondents. X-axis represents number of responses.

Primary needs identified for each region were either to 'increase communities' ability to be resilient' – leading choice in the Northeast, Gulf of Mexico, and Pacific Islands regions – or to 'increase planning capacity and resources at local level' – leading choice for the Southeast, West Coast, and Great Lakes regions. Both the Mid-Atlantic and Alaska regions ranked the two aforementioned needs equally (Figure 40).

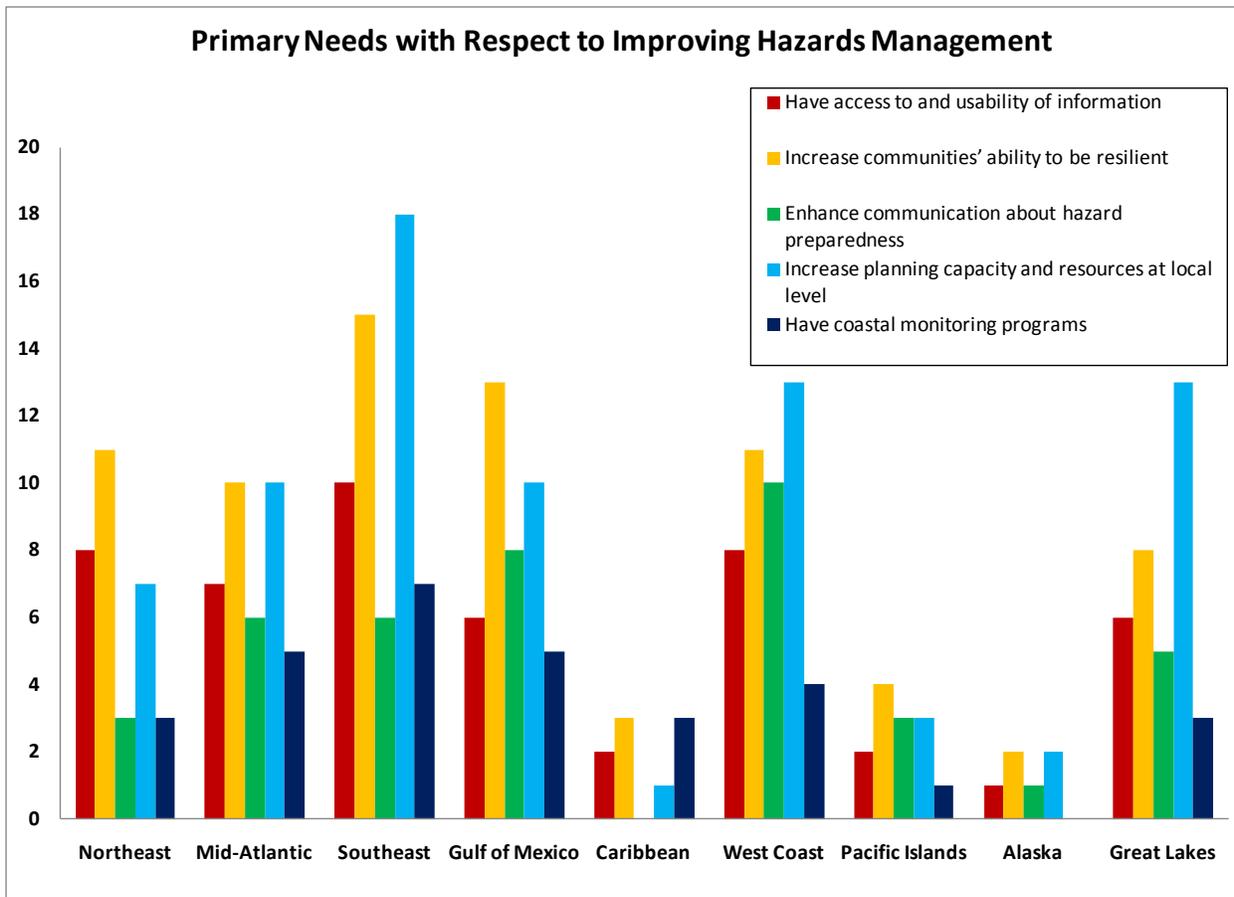


Figure 40: Regional needs identified for improving hazards management. Y-axis represents number of responses.

Interdisciplinary Management Approaches

Human use, socio-economic impacts, and climate change must now be considered alongside longstanding issues of habitat conservation and water quality (COST 2008). Ecosystem based management (EBM) has been brought to the forefront as a different approach for addressing this challenge and responding to this need within resource management. “EBM accounts for both ecological and socio-economic factors as well as their cumulative impacts on a management area. EBM provides for geographically specific, holistic resource management of habitats, species, and ecosystem level effects of resource use, such as food web impacts” (MRAG 2008).

As global awareness of EBM increases, so does the call for its local implementation (NOAA CSC 2008). In response to the call for EBM and similar interdisciplinary management approaches in regional needs assessments conducted by the Coastal Service Center, the survey aimed to consider the use and recognition of this emerging management approach.

Among respondents, 40.67% indicated that yes, their office has adopted for use (and finds more useful than other approaches) a specific interdisciplinary framework or approach such as Integrated Coastal Zone Management (ICZM), Ecosystem-Based Management (EBM), Adaptive Management, and others. Roughly thirty percent (34.67%) have not adopted an interdisciplinary approach to coastal management and 24.67% don't know. Regional responses are provided in Figure 41, note that these results only represent the views of the respondents from those regions, and some regions had low participation.

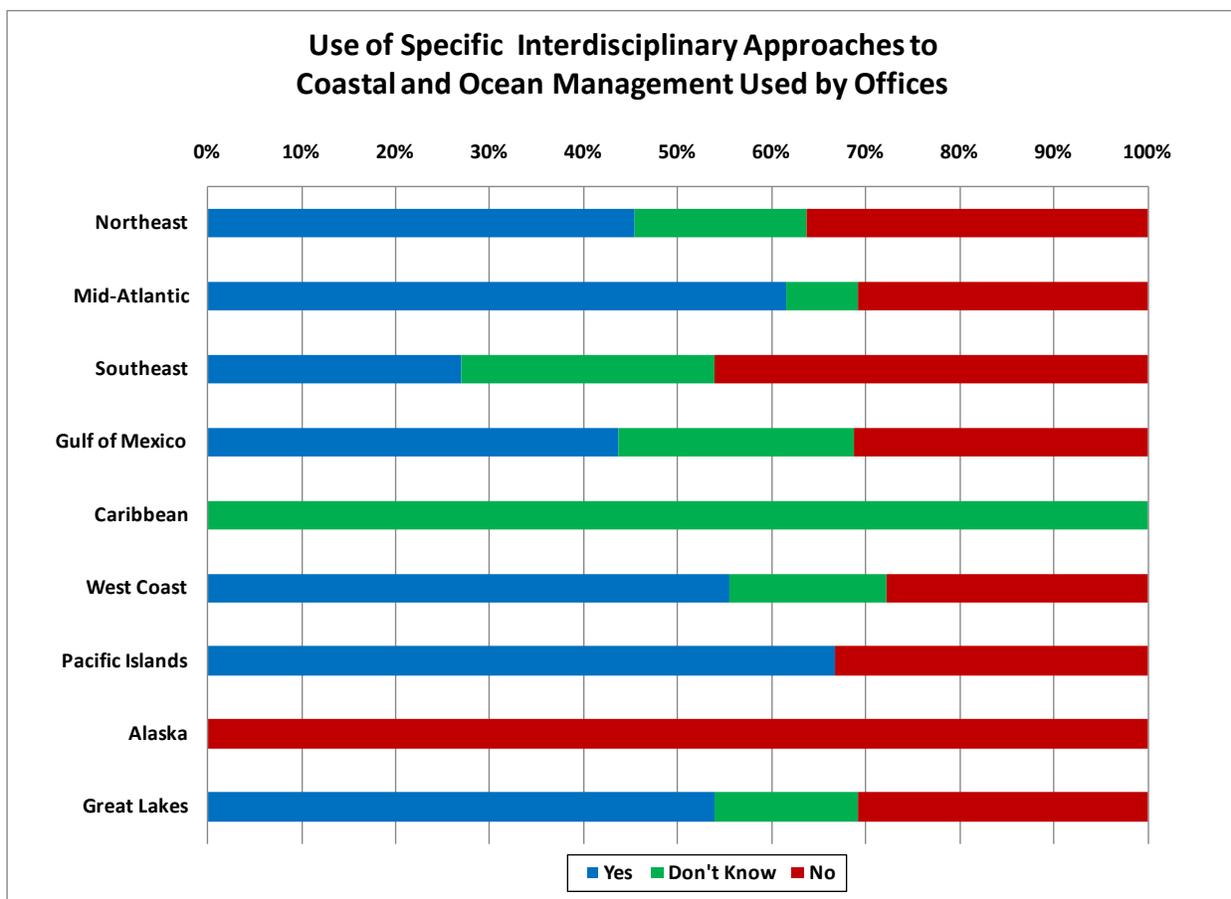


Figure 41: Regional uses of interdisciplinary management approaches. Results reported as percentage of total response.

Respondents were asked to describe their use of interdisciplinary approaches in coastal and ocean management. The most frequent comments indicated uses of EBM or a combination of approaches to best meet the challenges with respect to a given problem. There were also a number of other approaches listed. Below, a selection of specific comments and the ways that these approaches are being used is provided.

Ecosystem Based Management (Comments directly from survey)

- Ecosystem-Based Management - My CZM Program Director/Deputy Secretary of State for Coastal Resources was instrumental in NY enacted a law that requires NY to integrate EBM into all state decision making (Mid-Atlantic).
- We are using an ecosystem approach for watershed, bay and nearshore ocean issues.
- EBM or collaborative learning. Bringing diverse stakeholders together, exploring common interests to learn about specific ecosystems.
- Statewide we generally utilize an EBM approach to resource management issues. However, the land-water linkage in our approach has been somewhat weak. Ongoing organizational changes are likely to help with this in the future (Great Lakes).
- We are working on EBM and Marine Spatial Planning (MSP) approaches.
- EBM & Integrated Ecosystem Assessment.
- Ecosystem-Based Management enables us to look across the whole region and gain a more complete picture of issues we are facing (Gulf of Mexico).
- Starting to look into and explore Marine Spatial Planning and how it works with EBM.
- We are coordinating development of research and information plan for ecosystem-based management of the NY Bight.
- EBM in clam management and bay management.
- EBM. We have a state program, could do a better job of comprehending the ecosystems and impairments in order to prioritize activities (Mid-Atlantic).

Combination of Approaches (Comments directly from survey)

- Different approaches work best for different problems, no one best approach.
- We have adopted and implemented the general frameworks of ICZM and Adaptive Management, as well as principles of EBM.
- Opportunistic, when funding is available we always try for it and try to maximize it by leveraging it with other funds.
- EBM approaches and tools for restoration projects in particular. ICZM principles play out in a lot of watershed planning and water quality projects addressing land-based sources. Adaptive management is/will be a core principle of marine alternative energy management and policy However, I would not know how to comment to what extent the frameworks are integrated into individual program activities or frameworks.
- Adaptive management is more often used in the work that I do, though there are some efforts at EBM.
- Our Territorial Sea Plan requires an inventory and effects analysis, which is akin to both Ecosystem-Based management and Adaptive Management.
- Ecosystem-based management is a principle underwriting all of the program work that our organization does. Also, our projects follow adaptive management practices via the project monitoring and evaluation cycle.
- Ecosystem-Based Adaptive Management (EBAM) integrates learning and measurable improvement into the management process.
- I apply community based ecosystem management in my work which includes adaptive management as a component and follows the principles of ICZM. It differs in that it

depends upon collaborative development of shared goals and objectives and occurs at a more local scale than EBM (Northeast).

- We employ each of the above (ICZM, EBM) and 'command and control' through statewide regulatory and funding initiatives (Mid-Atlantic).
- We use adaptive management extensively in permitting for particular activities. We are exploring ways to move toward ecosystem-based management through local planning as well as developing the necessary tools (ecosystem assessments and indicators) with broader state and regional partnerships (West Coast).
- State has adopted EBM as process for decision making (and, as you know, Adaptive Management is one of the components of EBM) in all state agencies with responsibilities for managing human use, this Office is responsible for coordinating the state's EBM activities (Mid-Atlantic).
- EBM and AM.
- We use everything that makes sense from an ecologically practical point of view, and embrace elements of each approach above which frankly have huge elements of overlap (and that's a good thing). It's not as though we have diverging approaches to what makes sense from a coastal management perspective (Northeast).
- ICZM. We see this as the most effective approach and work closely with CZ programs on various islands (Pacific Islands).
- We use a combination of all those you mentioned. We are a National Estuarine Research Reserve so we do research, education, outreach, and Resource stewardship.
- EBM and Adaptive Management philosophy used.

Other Approaches (Comments directly from survey)

- The Natural Step, a sustainability planning framework that originated in Sweden; and DPSIR (Driver-Pressure-State-Impact-Response) a framework used by FAO, UNEP and many EU communities for natural resource- social communities framework (Southeast).
- Collaboration and integration of NOAA programs and keystone partners through NOAA's Gulf of Mexico Regional Collaboration Team.
- Collaborative learning.
- Behavioral decision making; learning from and with stakeholders.
- I believe CZMA captures all of these things already but does not get the respect it deserves from the outside interest groups who continue to advance these concepts. The result is confusing. I do believe, however, that Special Area Management Plans (SAMPs) are the best way to achieve/demonstrate these concepts if done well - by tailoring policies to sub-regional circumstances (ecosystems, watersheds, etc). Through partnerships, strong public participation, and good science.
- Lake Erie Balanced Growth Program.
- Special Area Management Planning to do focused, place based projects in a comprehensive/integrated manner.
- Ocean Resources Management Plan and the Tsunami Risk Assessment Project.
- Regional Sediment Management (RSM), Environmental Operating Principles.
- No Adverse Impact.

More than ninety percent (93.2%) of respondents agree that humans should be included as part of a coastal resource management framework, 6.8 % don't know if they agree and zero respondents don't agree. Additional comments from the survey indicate that survey respondents strongly agree that humans should be included, some indicating that EBM could not be done otherwise, and that management frameworks are primarily managing human impact.

With respect to further understanding the use of interdisciplinary management approaches, respondents were asked to classify constraints as primary, secondary and tertiary constraints to an interdisciplinary approach to coastal and marine management. Financial and technical capital was the top primary constraint identified followed by political support (Figure 42). Other responses given indicated limits on time, funding, staff resources as well as buy-in from stakeholders and government as constraints.

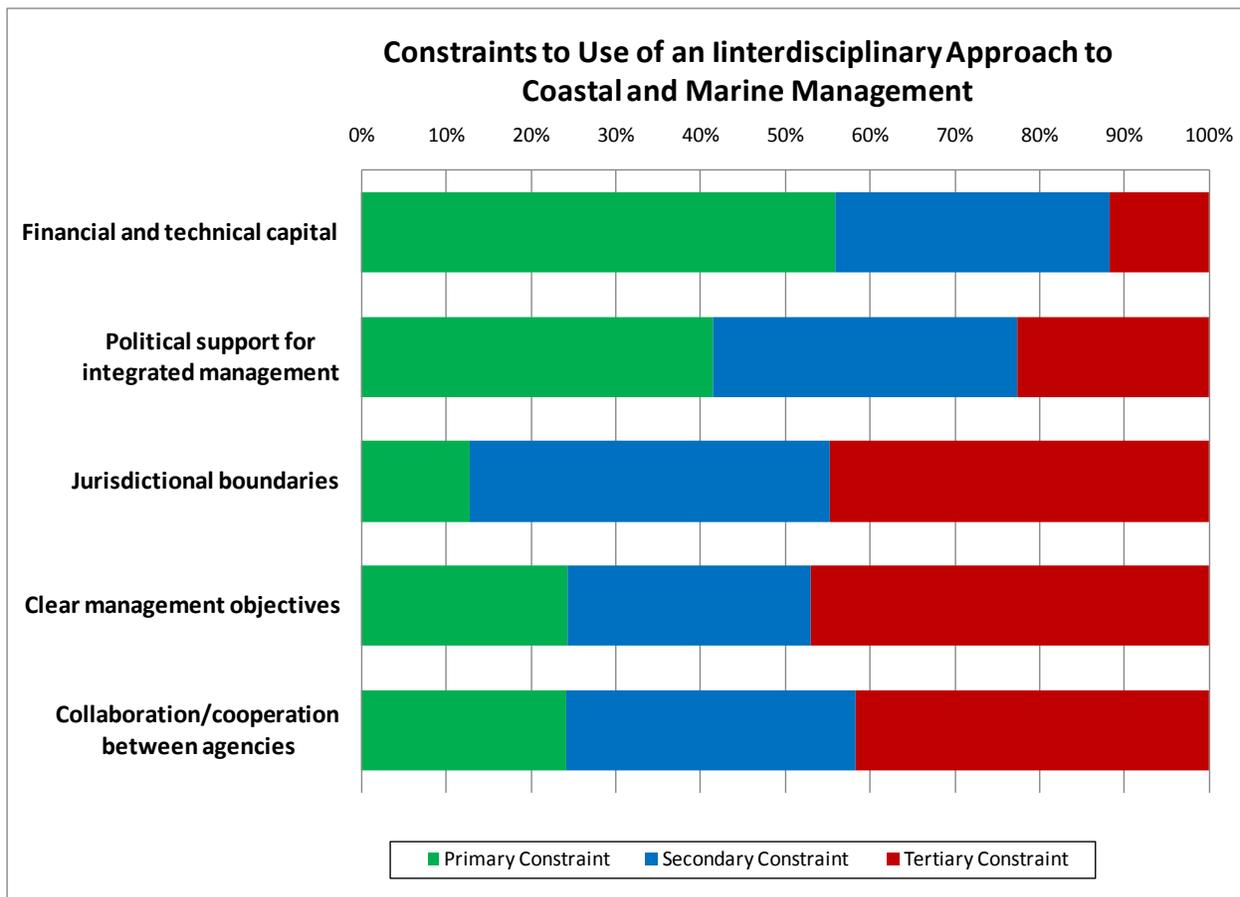


Figure 42: Top constraints to use of an interdisciplinary approach to coastal and marine management. Results reported as percentage of total response.

Respondents were asked to select up to three areas where they felt improvements were needed for an effective interdisciplinary approach to coastal and marine management, those results are provided below in order of importance.

- 62.7% selected 'Engaging community and stakeholder groups in decision-making';
- 60.8% selected 'Advancing coastal land use practices by accounting for land-sea interactions in land use decisions';
- 52.3% selected 'Including humans, society, and government in the equation';
- 41.2% selected 'Socio-economic impact studies';
- 21.6% selected 'Developing methods for implementing ecosystem approaches to fisheries management';
- 20.9% selected 'Developing methods for establishing multiple-use marine zones';
- 12.4% selected 'Conserving marine biodiversity';
- 11.1% selected 'Managing marine protected areas'; and
- 2.6% selected 'Demographic studies'.

Tools and Information Resources

Web Technology

Beyond understanding the information needs and management issues that coastal resource practitioners face, the Center regularly develops and provides tools for decision making, and therefore must consider how their customers obtain information and utilize it. Respondents were asked to identify the new, emerging sources and formats of web technology being used to obtain information.

Respondents were guided to check all that apply.

- 86.0% selected 'Web services (RSS, Google Maps/Earth, map service, streaming)';
- 69.9% selected 'Static sites (FTP, agency home page)';
- 46.2% selected 'Warehouse or portal (The National Map, Digital Coast, Geospatial One Stop)';
- 35.7% selected 'Social networking/collaborative (Facebook, Twitter, Wikipedia)';
- 19.7% selected 'Professional networks (LinkedIn)';
- 11.2% indicated 'Other'.

Other responses provided included (comments directly from survey):

- Blocked access to any social networking sites (and many other websites) from work computers.
- I have worked with the Web since 1993 and Desktop communicators are probably the best looking, most usable and timely new tool I have ever seen.
- Ning, Yahoo and Google Groups.
- Produce our own Data Portal: www.nyoglatlas.org

- Agency partners.
- Webinars hosted by various public and private entities on coastal and marine issues.
- Distributed content management systems – e.g. Joomla CMS.
- Phone calls and interpersonal interaction. University library search engines.
- Using Social networking outside office, as government agency is slow to endorse, provide access to it.
- Old fashioned person to person contact, mixed with data sharing portals.
- Need some training to keep up and how to use.
- List served email news and web links.
- Access to published scientific information is a big problem - I have reasonable access via a University appointment, but most agency scientists do not have this sort of access.

Web-based Training

Eighty percent of respondents have participated in web-based training (other than mandatory topics such as safety or information technology security). Interestingly, only 38.6% of respondents expressed high interest in web-based training; 51.7% have medium interest; 9% have low interest and 0.7% are not interested.

Frequency of Technology Use and Importance for Decision-Making

Respondents were asked to indicate their use of listed technologies in support of coastal resource management and the importance of that technology in decision-making. Few technologies are used on a daily or weekly basis (Figure 43). The main finding coming from respondents regarding frequency of use is the disparity in time between using a technology monthly and never; it is quite common and understandable that as the need arises, a technology or tool may be employed several times a year or only occasionally.

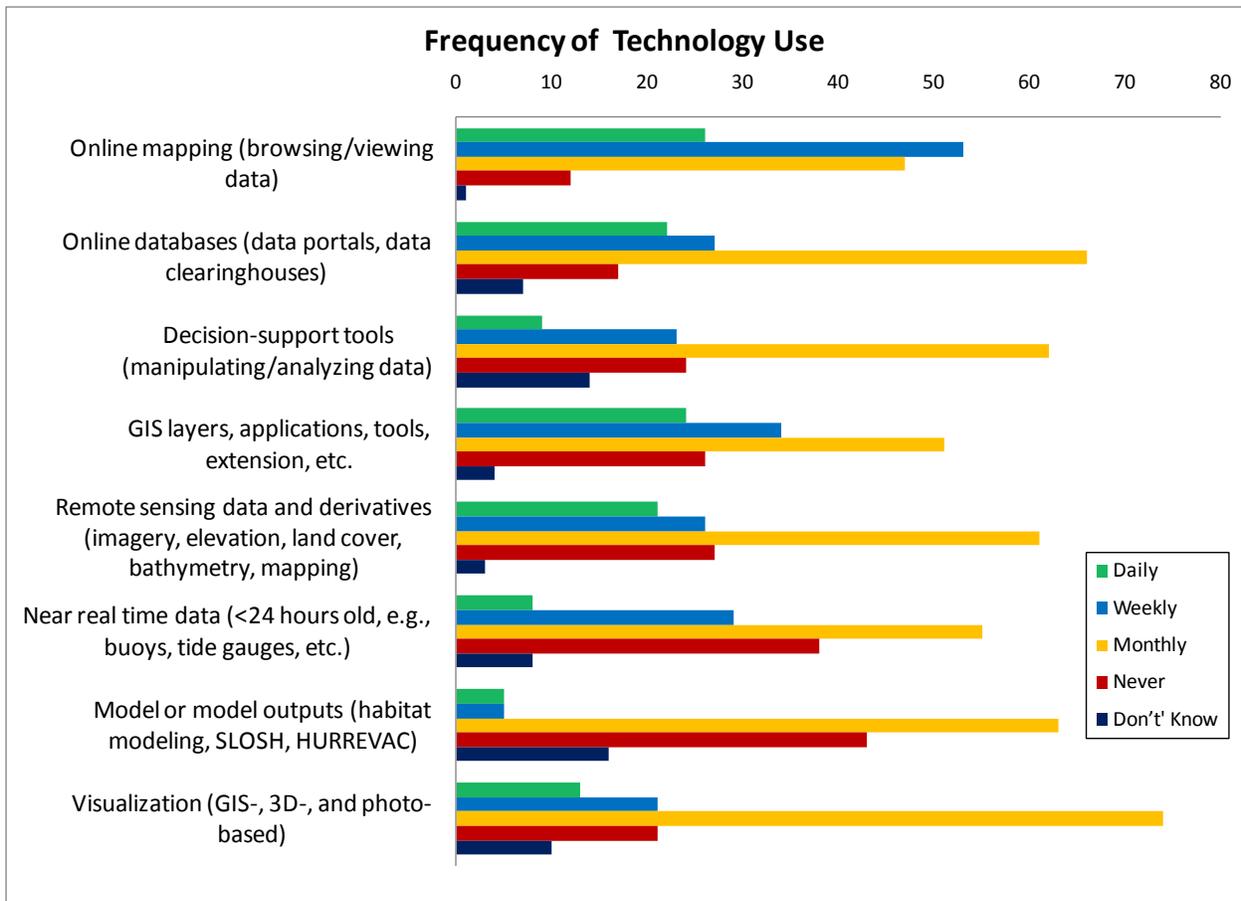


Figure 43: Frequency of use of various technologies to support coastal resource management. X-axis represents number of responses.

All tools and technologies provided in the list were indicated as providing high or medium importance in decision-making by the majority of respondents (Figure 44). Regionally, there are no obvious leading technologies that are rated as far more important than others. Generally, all regions rely on visualization software, GIS, and remote sensing data above others (Figure 45).

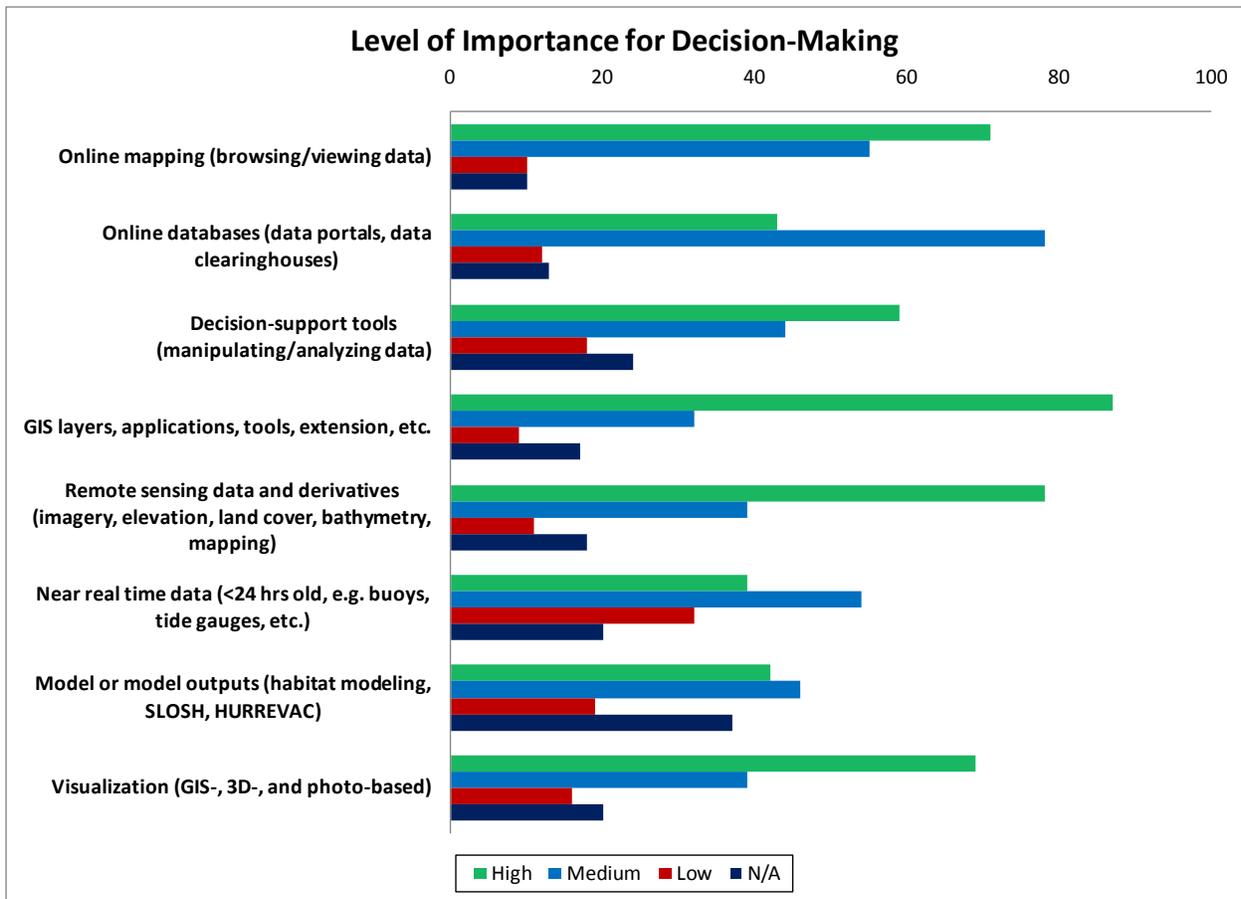


Figure 44: Important technologies for use in decision-making. X-axis represents number of responses.

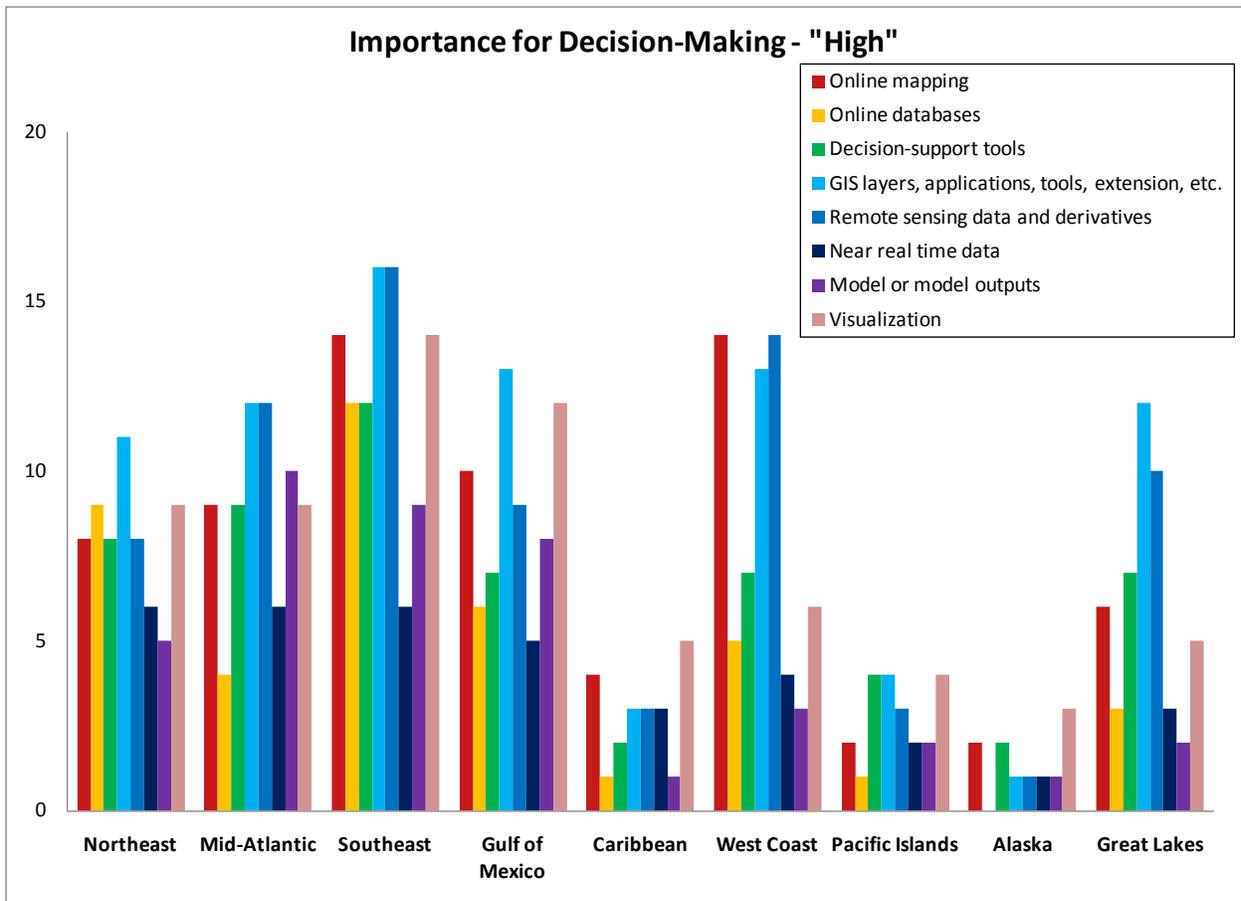


Figure 45: Regionally recognized 'highly' important technologies for use in decision-making. Y-axis represents number of responses.

Use of Visualization Software

Forty-four percent (44.2%) of respondents do utilize visualization software tools for decision making, 41.3% do not, but indicated that they would be useful, and 14.5% do not need them. Of the nine regions, six indicated (with $\geq 50\%$ response rate) that visualization software tools are important for decision making (Figure 46).

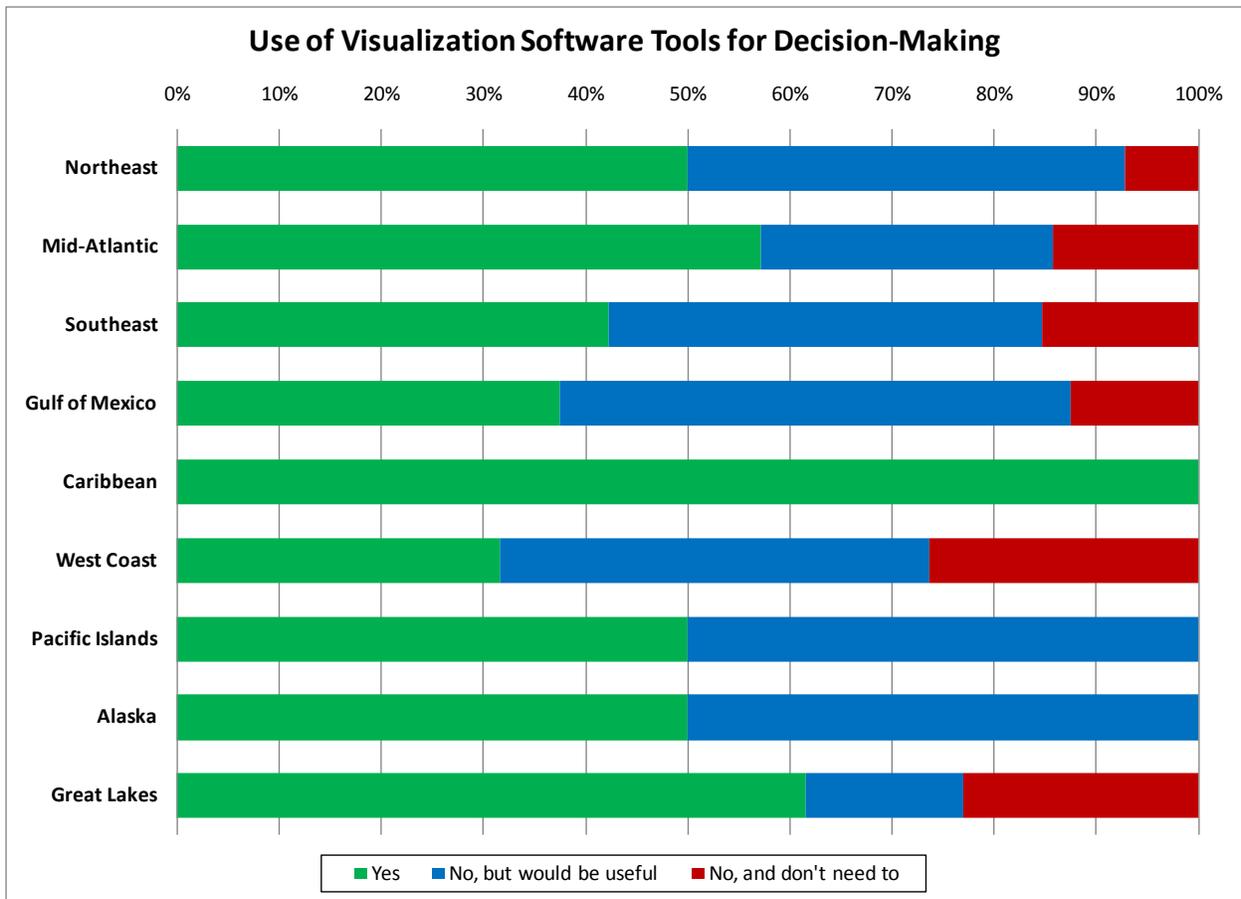


Figure 46: Regional use of visualization software tools for decision-making. Results reported as percentage of total response.

Respondents identified a selection of specific visualization tools in use, GIS-related tools were the most commonly noted (Table 1).

Table 1: Specific visualization tools identified by respondents, number of respondents noted in the right-hand column.

Visualization software tools being used for decision-making		
Mapping and Geographic Analysis	ESRI products (ArcGis, Arc Info, etc.)	12
	MapInfo	1
Coastal Services Center Decision Support Tools	CanVis	7
	Digital Coast Tool (N-SPECT, CCAP)	1
Google Earth		4
Community Viz		4
Imaging Software (i.e. Photoshop, Gimp)		2
Quick Terrain Modeler		1
Charting Software		1

Technical Assistance and Decision-Support Tools

The Center continually develops and improves products and services designed to address coastal issues and support coastal resource practitioners. This survey did not evaluate specific products and service (that evaluation will be conducted separately), however it was important to gauge the awareness and usefulness of the different types of assistance available in order to assist the Center as they work to accommodate the needs of the coastal resource community.

Types of Technical Assistance

The most useful program management and social science tool indicated by respondents was related to applying data for decision-making (61.26%), followed by data access (58.41%), and using GIS for coastal management (57.89%; Figure 47).

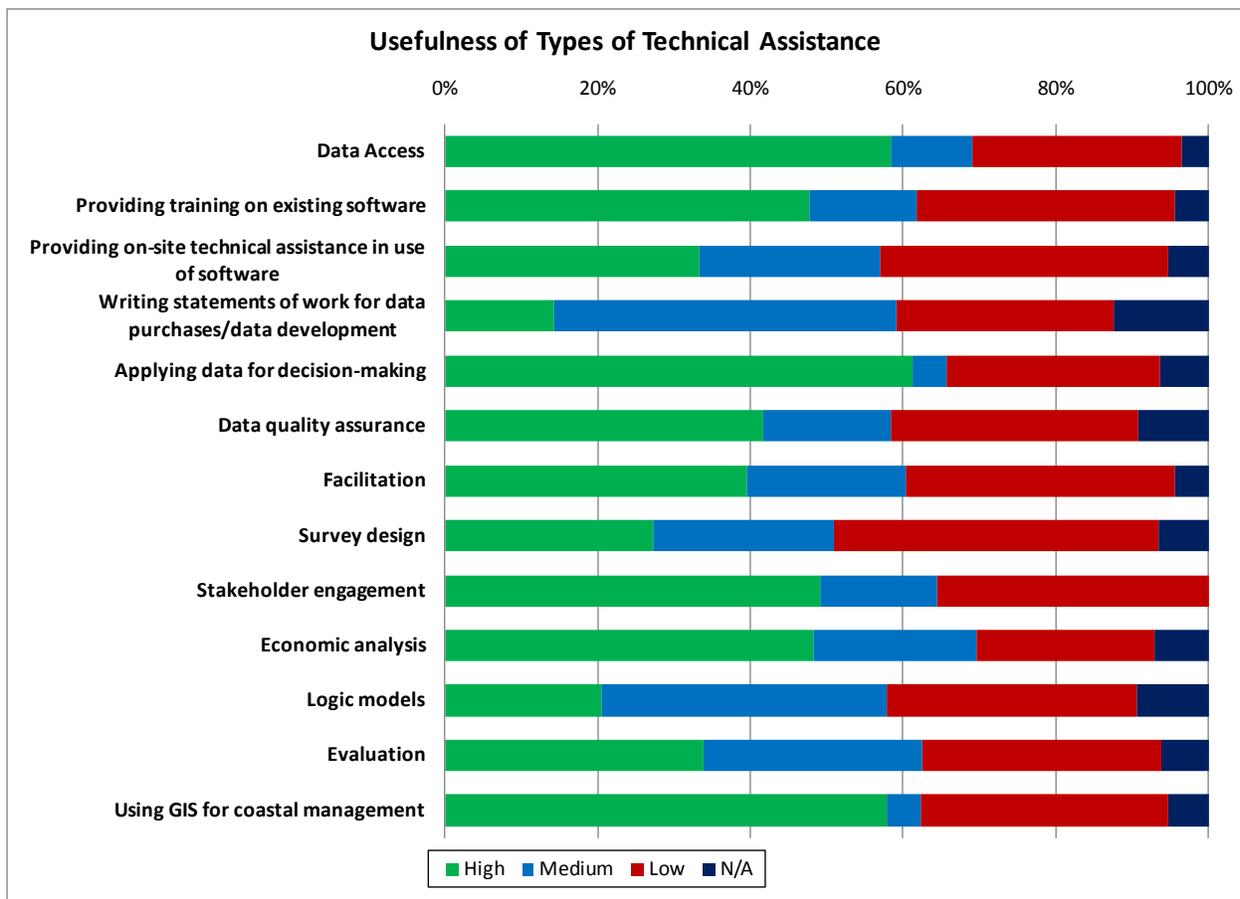


Figure 47: Usefulness of types of technical assistance. Results reported as percentage of total response.

Regional differences in highly useful types of technical assistance are shown in Figure 48 and Figure 49.

- Technical assistance with data access is most useful for the Northeast, Southeast and Alaska regions;
- Assistance in applying data for decision-making is most useful for the Caribbean, Alaska and Great Lakes regions;
- The Caribbean also identified providing training on existing software and using GIS for coastal management, the latter of which would be highly useful for the Gulf of Mexico and Pacific Islands regions as well;
- The Mid-Atlantic region indicated assistance with facilitation as highly useful; and
- The West Coast and Alaska regions would highly benefit from assistance with stakeholder engagement.

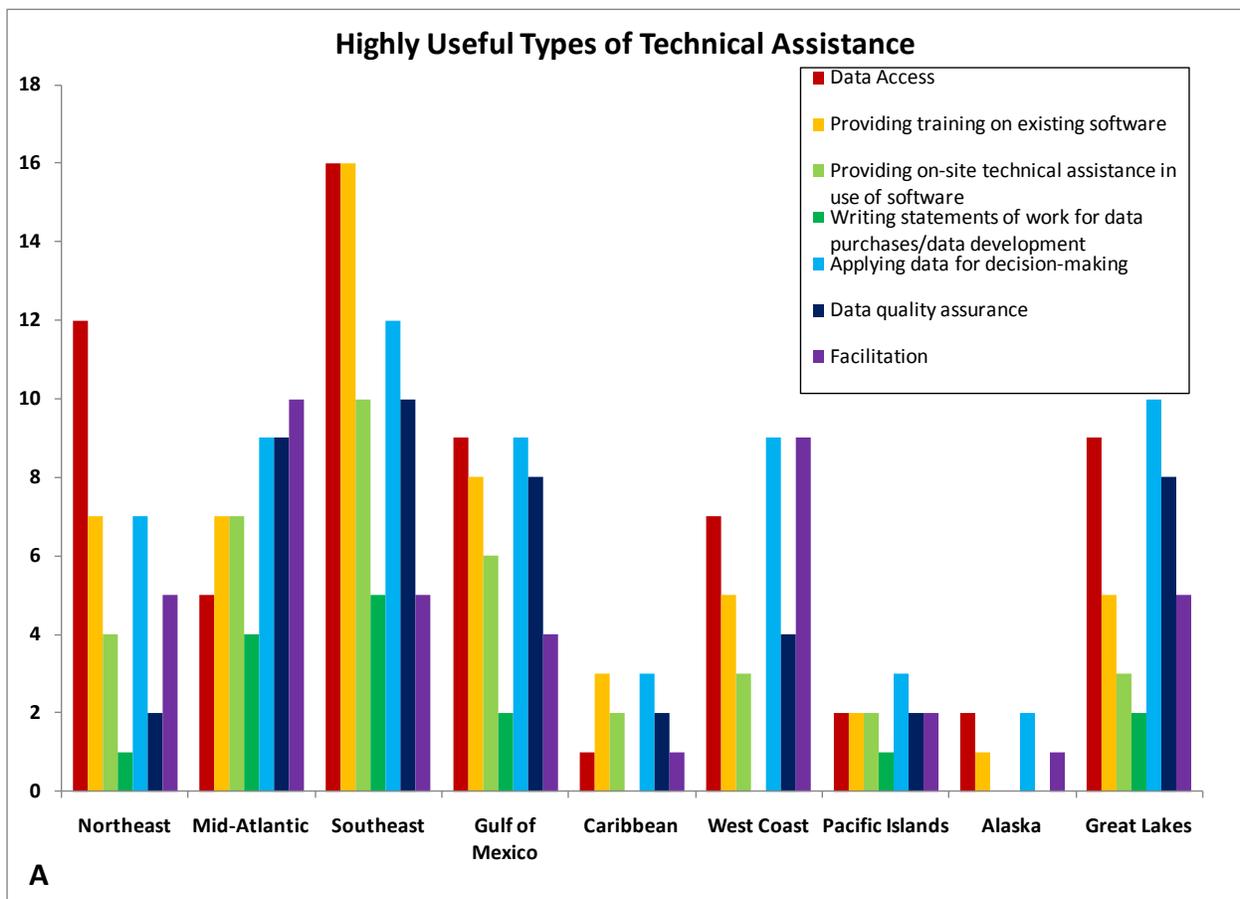


Figure 48: Regional results indicated as highly useful types of technical assistance, chart 1 of 2. Y-axis represents number of responses.

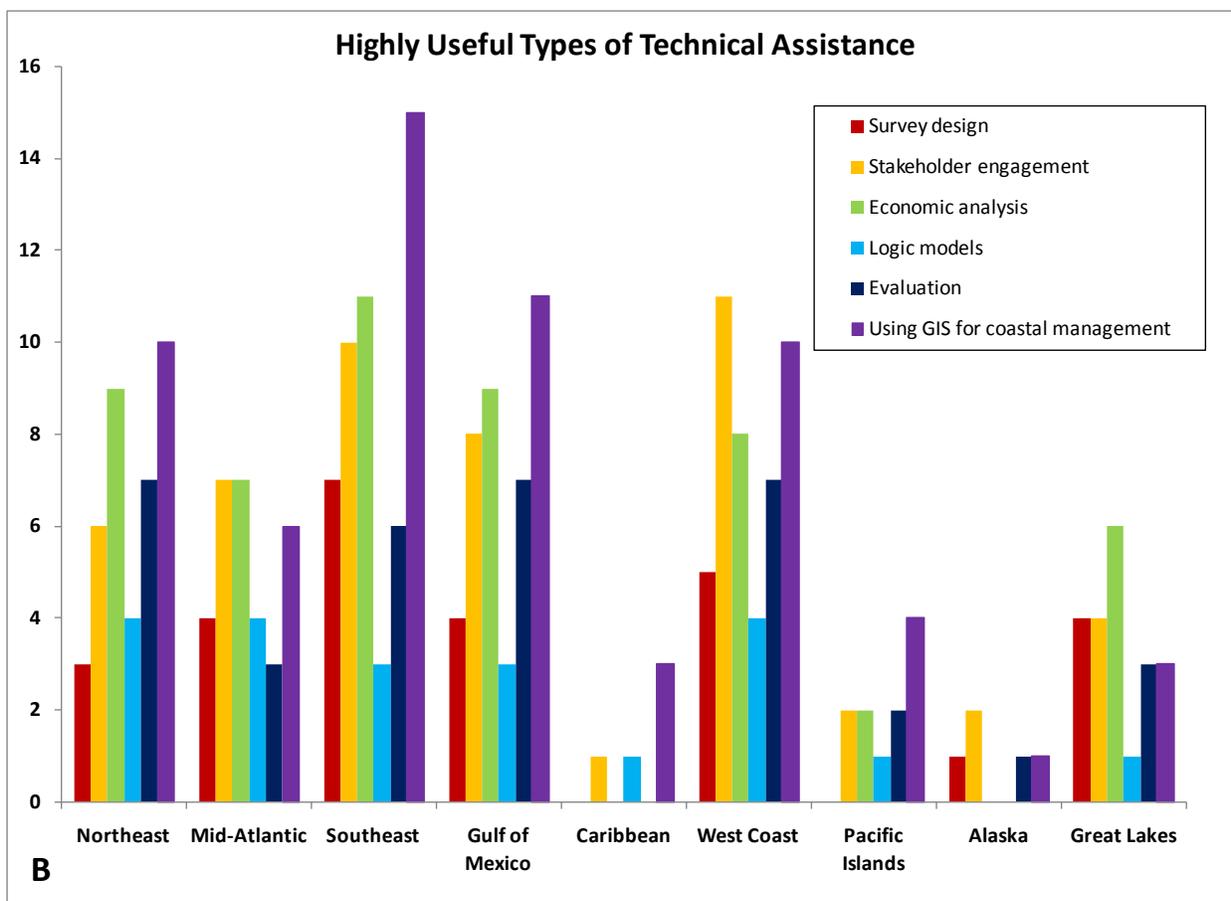


Figure 49: Regional results indicated as highly useful types of technical assistance, chart 2 of 2. Y-axis represents number of responses.

Additional comments (directly from survey) regarding useful types of technical assistance (respondent's region provided):

- Sharing outputs of modeling for use with stakeholders. Biggest need is to get the help with, and the products of, the output of models and visualization tools to share with stakeholders. Small, rural communities and reduced state staffing limit what we can do ourselves (Southeast).
- Actual viz that creates scientifically sound "stories" to use with decision makers. Using Viz with local decision makers about land use zoning that impacts resource sustainability (Southeast).
- Logic models are a waste of time (Southeast).
- Expertise in remote sensing is one of the primary forms of assistance we value. Helping review statements of work for data purchases or for quality assurances of the products received is primary (Pacific Islands).
- Providing access to experts on an as-needed basis. What is needed is long-term staff (that don't 'move on' after a few years) who can build trust and adequately guide collaborative decision making focused on individual ecosystems. Scientists need to be involved with these not as central members, but as servants to the process. There

needs to be defined leadership in this arena and these leaders need to be trained to do their jobs better (West Coast).

- Joint fact finding, participatory GIS (Mid-Atlantic).
- Marine Spatial Planning (Pacific Islands).
- With travel restrictions: on-site or web based are a high priority (Southeast).
- Have an expert from CSC or NOAA spend a year on site at our NERR learning about our needs and helping with projects (Northeast).
- Assistance with deciphering models as they morph through development and the input of data that may not be as current as the model it is being input into (Mid-Atlantic).
- Using GIS for Coastal Management is rated "Low" only because we have a pretty good handle on this (Mid-Atlantic).
- We need LIDAR data for our coast (Northeast).
- Tech assistance to local officials (Northeast).
- Evaluations that depend on user self-evaluation are a waste of time and money, and provide highly biased data. If you supported evaluations that involved objective, independent testing of subjects, that would be wonderful. If you are talking about ecological evaluation of coastal management I'm all for that too (Northeast)!
- We need reliable coastal data (littoral budget, bathymetric data and shoreline protection structure design and placement criteria) to engage the coastal land owners on proper shoreline placement of protection structures and the acceptance of a public easement along the shoreline of Lake Erie (Mid-Atlantic, Great Lakes).

Program Management and Social Science Tools

The leading tools and applications being used by at least 50% of respondents include strategic planning (77.93%), performance measures or indicators (76.39%), meeting facilitation (73.76%), surveys (71.53%), stakeholder engagement processes (70.83%), project management (70.63%), needs assessments (63.01%), evaluation of products or projects (59.72%), focus groups (56.64%), evaluation of entire programs (56.03%), interviews (55.94%), and observation (54.23%; Figure 50). Content analysis (40.85%) and social network analysis (37.50%) were the tools that the most respondents were unaware of.

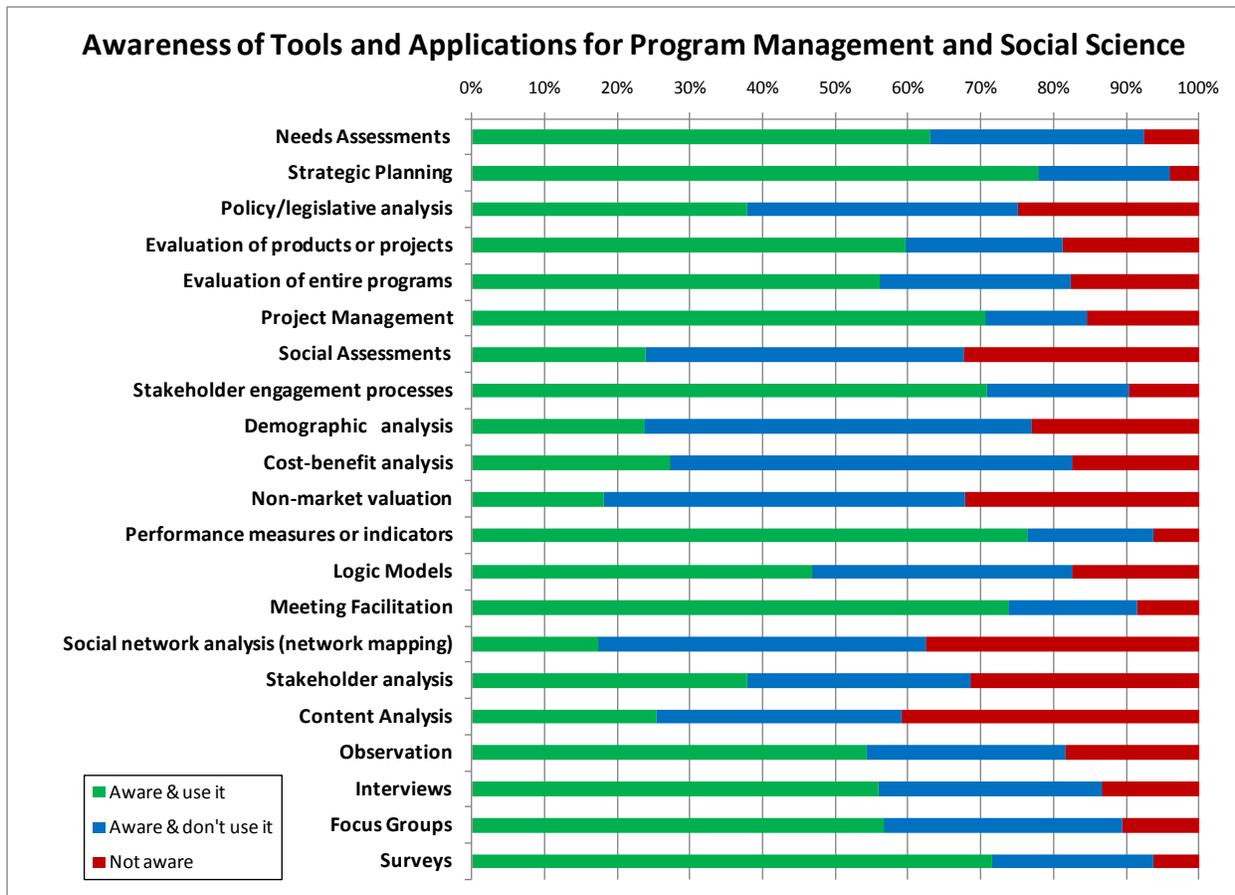


Figure 50: Awareness and use of program management and social science tools and applications. Results reported as percentage of total response.

Respondents also rated the usefulness of the same list of program management and social science tools and applications. Of the twelve tools listed as being used by more than 50% of respondents, nine of them were also indicated as highly useful by more than 50% of respondents. These include project management (68.94%), strategic planning (67.91%), stakeholder engagement processes (67.41%), meeting facilitation (66.67%), needs assessments (58.65%), surveys (54.96%), evaluation of products or projects (51.91%), focus groups (50.79%), and evaluation of entire programs (50.38%; Figure 51).

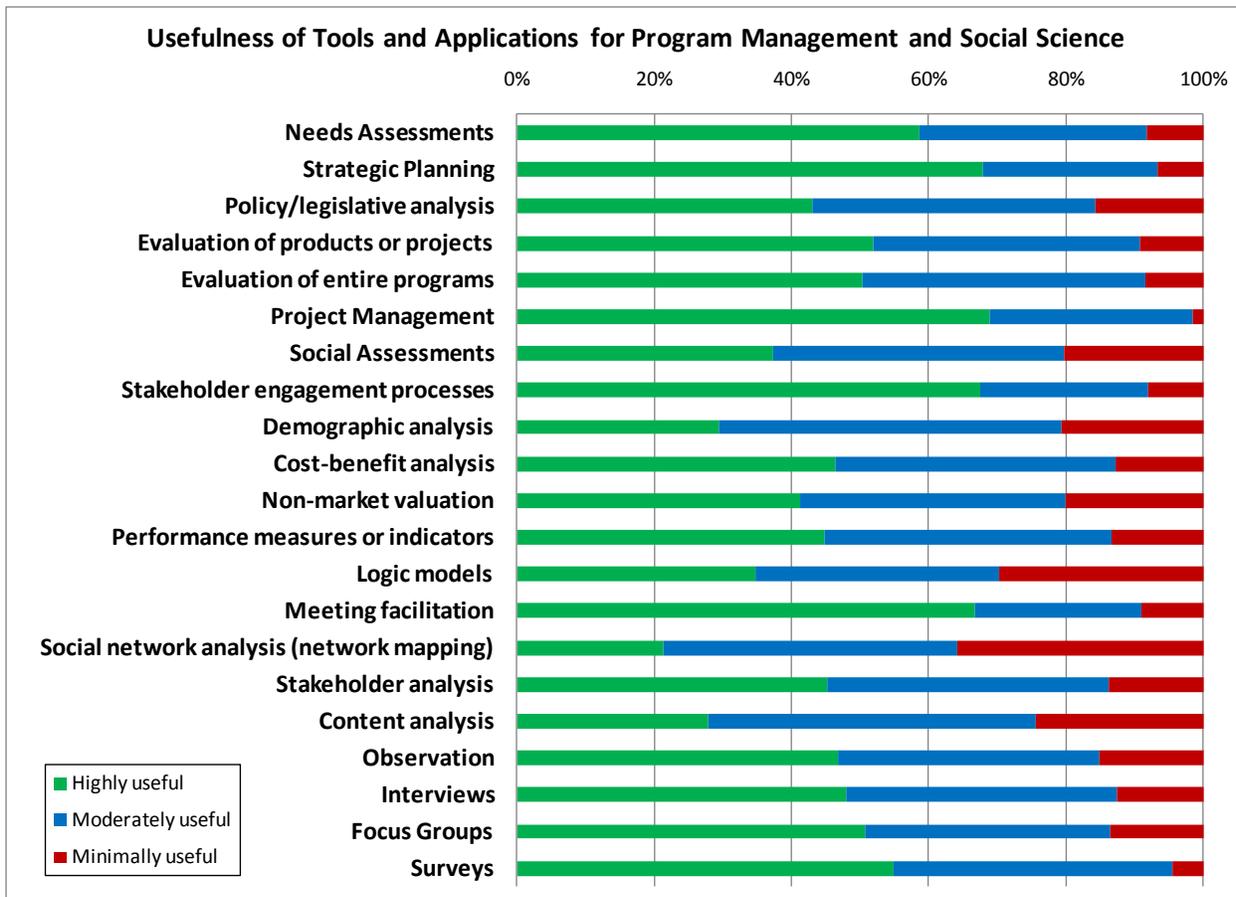


Figure 51: Usefulness of program management and social science tools and applications. Results reported as percentage of total response.

Partnerships and Collaboration

“Collaboration” and “partnership” are two long-standing, cornerstone operating principles of the NOAA Coastal Services Center. The Center works through partnerships to enhance effectiveness and efficiency to accomplish goals (NOAA CSC 2010). The survey asked questions designed to evaluate and characterize current cross-disciplinary partnerships and needs to identify where enhanced partnerships and coordination are necessary.

Engagement with Audiences

When asked if their office collaborates with other groups to enhance its work, 99.3% of respondents indicated yes. The most common audiences that are frequently engaged with are the coastal management community (92.57%), scientific community (91.22%), public (85.03%), education (72.30%), and water quality and quantity (65.54%; Figure 52).

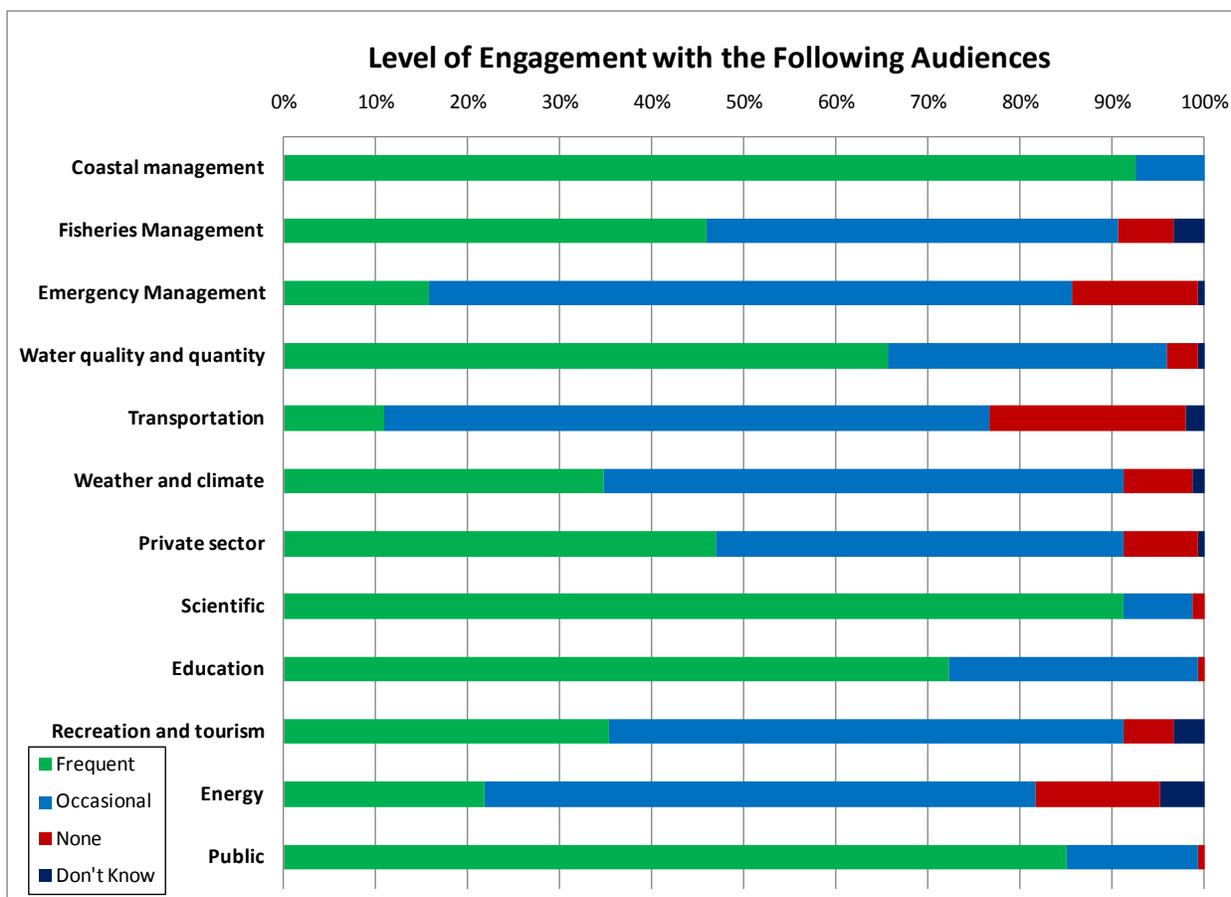


Figure 52: Level of engagement with different audiences. Results reported as percentage of total response.

Audiences frequently engaged with by respondents from various regions are provided in Figure 53. As a result of disproportionate regional representation, there isn't always a clear leading selection within regions with a low number of responses.

- Respondents in the Northeast most frequently engage with water quality and quantity, scientific, education, public audiences;
- Mid-Atlantic respondents most commonly engage with coastal management and scientific audiences;
- Scientific audiences are also frequently engaged with in the Southeast, Caribbean, and West Coast regions;
- The Gulf of Mexico, Pacific Islands, and Great Lakes regions frequently engage with the coastal management community;
- The Pacific Islands and Caribbean regions most commonly engage with the public, the Caribbean also commonly engages with education audiences; and
- There was not a clear audience that Alaskan respondents most frequently engaged with.

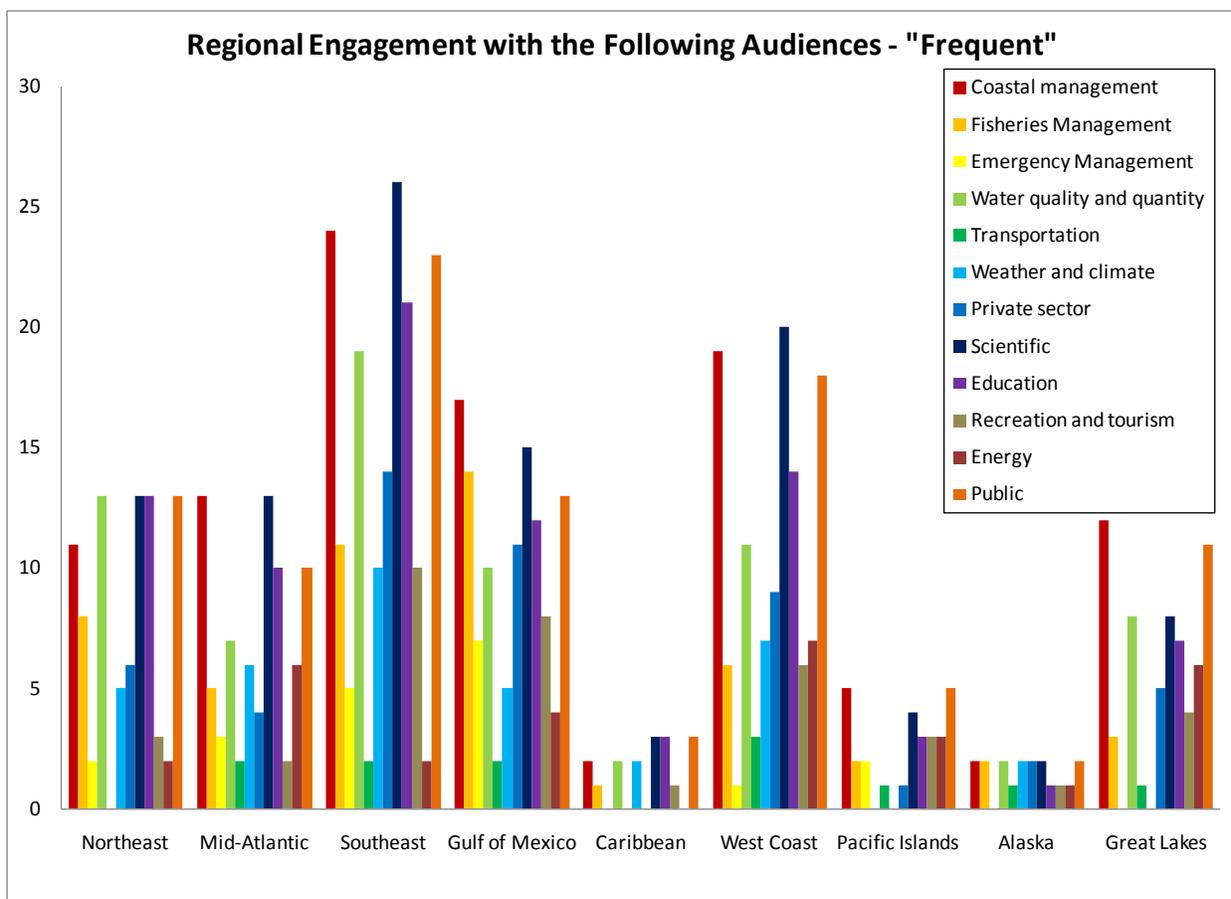


Figure 53: Regional differences in engagement with audience categories, results charted illustrate “frequent” level of engagement. Y-axis represents number of responses.

Among the response population, 56% indicated that they had no issue with regards to difficulty engaging different audiences. More than forty percent (44%) indicated audiences that they do have difficulty engaging with, a selection of respondent comments are provided (directly from survey):

Scientific and Education

- Scientific-academia. Most in academics will not (or can't) provide their expertise unless funding is associated with the assistance.
- Education - most Universities are research driven. Difficulty arises in getting Outreach plan and the applied science built into projects.

Fisheries

- Fisheries Management, most especially the WESPAC Fisheries Management Council's local employee who seems bent on undoing the local Marine Preserves legislation and is a constantly planting seeds of misinformation to undermine our local conservation/management efforts.
- Other marine management agencies because they lack time, financial resources, mainly fishermen. They don't do meetings.

- Fisheries management - divided issue on Marine Protected Areas Water Quality/Quantity - jurisdictional issues

Energy

- Energy and Transportation: Less overlapping job duties than the others.
- Energy - because our policies don't address these new technologies (Offshore Wind Energy and Natural Gas recovery under Lake Erie), we find ourselves without the proper information to address permit applications or lacking the proper tools and data to properly prepare to address these new requests.

Recreation and Tourism

- Recreation and tourism. Widely dispersed, relatively small operations with a high degree of variability in services and needs.
- Recreation and tourism. They do their own thing.
- Recreation, because they have a different mindset.

Emergency Management

- Emergency management -- We have been unable to identify and make contact with an appropriate partner.
- Difficult to engage the Emergency Management community. They view their jobs as essential and planning as non-essential. They tend to be poor cooperators and view broader management concerns as obstacles. They are narrowly focused on getting their job done. They have little patience for longer term, strategic planning. This is in my experience. I have met some nice persons in the EM community, but overall I think the above represents my impressions.
- While we haven't tried much, I expect Emergency Management may be a difficult audience for us to engage because I believe we emphasize different time scales in different ways.

Private Sector

- Private sector, for all the usual reasons in a market driven, unregulated society
- Private Sector - hard to get them to see the benefit.
- Private sector is usually not interested to be part of local environmental issues. They mostly want to comply with the regulations imposed by the government for their operations but strictly in their facility boundaries.
- Private sector - they don't care or don't get it or are too busy or think we are too slow or they can't make money talking to us.
- Private Sector. Seem to have different cultures. Get along fine, but don't work together very often.
- Private sector - it's an audience that is not intuitively engaged in the work that we do, although it would be extremely useful to engage the private sector a lot more.
- Private sector, mainly because I have a very hard time finding the right contacts.

Public

- The public. First, getting a representative sample of the public at public hearings, outreach events, etc. has proven very difficult. I don't feel we do a good enough job implementing social marketing techniques, and often lose to commercial activities in the competition for people's attention and time. Second, we often have to battle through a

layer of mistrust/distrust before making much progress. In some instances, this mistrust appears to be intentionally nurtured by special interest groups, sometimes through flagrant misinformation dissemination. And, finally, many natural agencies I've dealt with are not especially good at engaging the public in a way that successfully holds their attention, gathers and incorporates their input, and changing behaviors.

- The public is difficult to engage meaningfully.
- Public is sometimes difficult to engage in fisheries management issues, despite attempts utilizing multiple media to get information out to the public.
- We have difficulty engaging the public in our programs and motivating behavior change through our programs. We are interested in training on community based social marketing.
- Public. Lack of good quality ecosystem / integrated coastal assessments to document change over time and why they should care.
- Public. They only come out when there is an issue they have.
- General public that visits protected areas but has no interaction with staff.

Government

- It depends on the issue, but sometimes we have difficulty engaging our Local County Commissioners and other elected officials on politically charged issues.
- Local governments.
- Elected officials - they have limited time and knowledge or interest, scientific - often forget the educational and human dimensions.
- Elected / appointed officials, because their time is so limited. Private sector businesses, for same reason as above, as well as lack of interest and/or lack of contacts.
- Elected & Appointed Officials; municipal and county staff are easier to engage, but elected/appt are more difficult.
- Difficult to get elected officials participation in training events relevant to the coastal issues affecting the communities they serve.

General

- If we had more time/funding/staff, we'd have capacity to engage any of the audiences we need to. It's really a capacity issue and a relationship building issue.
- In general, it is difficult to get feedback from users.
- We do work with underserved and underrepresented audiences, but I think this could be greatly increased. I think this is also an internal issue. Our organizations need to be diverse if we expect to be more effective in reaching diverse audiences with our programs. I think more training needs to be offered in engaging this audience.
- Any interaction with non-informed stakeholder groups takes enormous time and energy, and it is time/staff that is by far the biggest impediment to coastal management in Maine, and especially within my organization.

Enhancements

Engagements between offices, across disciplines and with various audiences can typically be enhanced by employing different techniques and learning from previous successful and/or

failed partnerships. More than half of the respondents indicated that each of the identified areas (meeting facilitation, workshops, demonstration of successful partnerships, lessons learned from previous partnerships, identify potential partners with common issues, and assist with agreements for cost/data sharing among potential partners) would be valuable to enhance partnerships and coordination in their office. Among these, ‘lessons learned from previous partnerships’ was ranked the highest by respondents (83.08%, Figure 54).

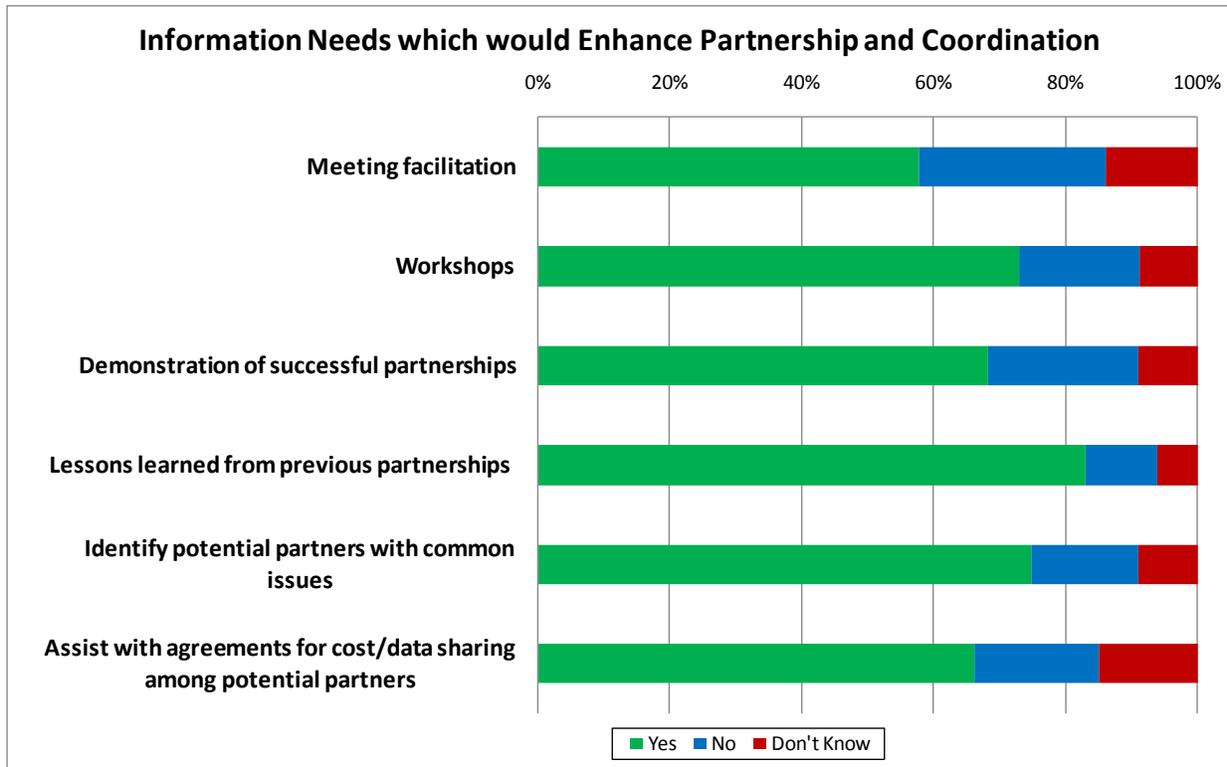


Figure 54: Areas that would enhance partnership and coordination. Results reported as percentage of total response.

Lack of capacity and resources are typically the leading obstacle to successful partnership building. Comments provided by respondents included (directly from survey):

- All of the above are important for enhancing partnerships and coordination, but I'm not sure that they are things we would focus on. There is always more to learn but I think we do a good job with most given the resources we have. Really, it comes down to staff and time as limiting factors.
- I have a few partners that steal all the credit, and as a result I have a hard time working with them.
- Leadership training and oversight.
- We need your top notch people speaking to large stakeholder groups in Texas.
- NGO agreements and facilitation.
- The time, staff and funding to expand our work which is already successful but limited in capacity.
- We have very strong partnership building and coordination within our office.

Demographics/Office information

Several demographic questions were asked in the final section of the survey, but results will be presented here. Respondents were queried on their regional representation (Figure 1), professional affiliation, number of years in coastal management, and interaction with regional CSC offices. Survey responses on interaction will be discussed separately below.

Eleven professional affiliation options, along with 'other', were listed as choices. One-quarter of respondents work in education and outreach and nearly ¼ (23%) in local, state or federal government (Figure 55). The next highest group represented by survey respondents were program or site administration/management (11%), which is a population of interest to the Center given that they are typically the on-the-ground decision makers. Representatives from emergency management were completely absent from the survey population; this affiliation was also notably absent from previous surveys. With growing attention on climate change impacts and hazards management, there may need to be efforts made to include a subset of this population. Ten percent of respondents indicated 'other' as their affiliation; these included multidisciplinary professions that bridged between some of the indicated affiliations (e.g. combination position academic and coastal training, lead science communication with non-scientists, government researcher, and interface/overlap of academics and managers).

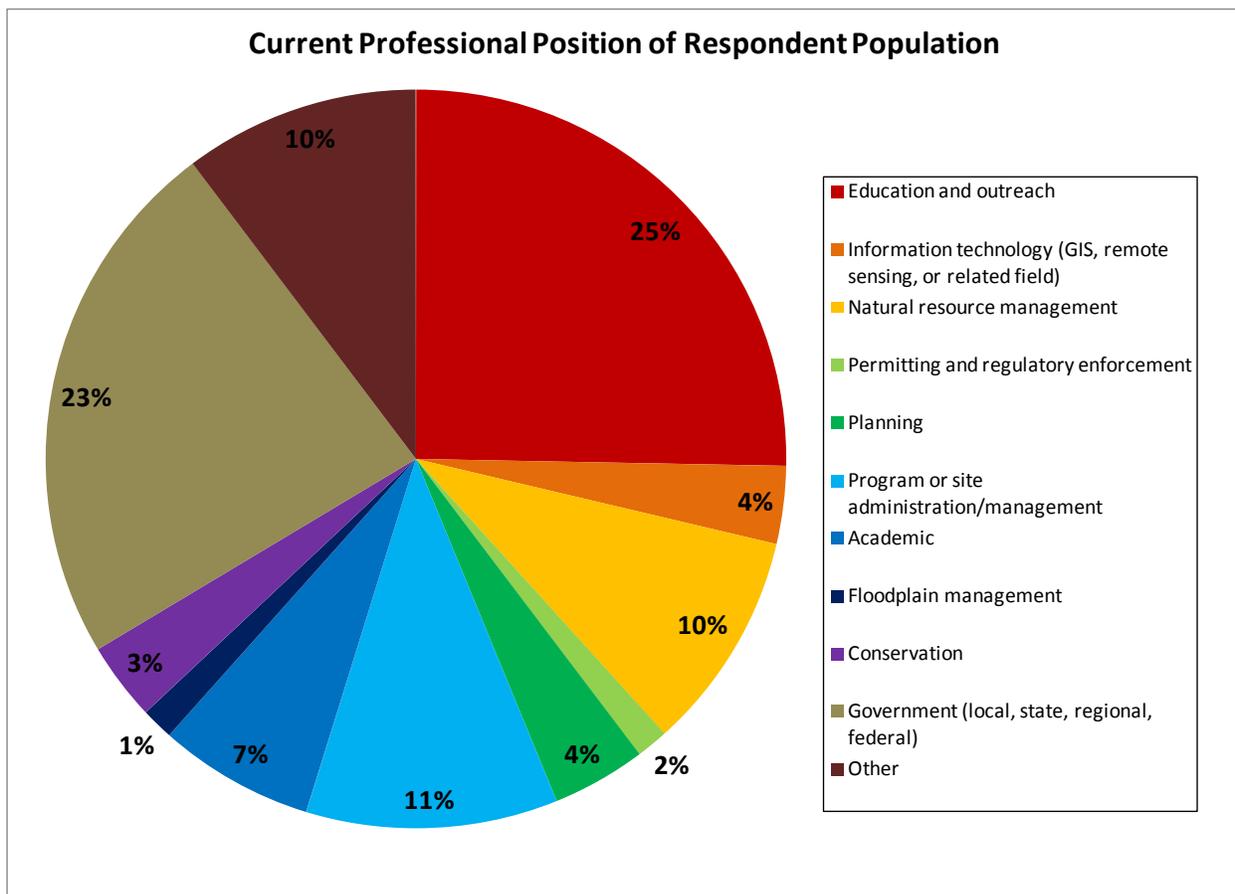


Figure 55: Professional position/affiliation of respondent population.

Most survey respondents were within their first ten years in coastal management and there were very few respondents representing mid-career level individuals. Not surprisingly, respondents earlier in their careers in coastal management have remained in their current positions. In general, there was little deviation between years spent in the coastal management field among respondents (10% for 16-20 years at the lower range and 25.7% for 6-10 years at the higher range [Figure 56]).

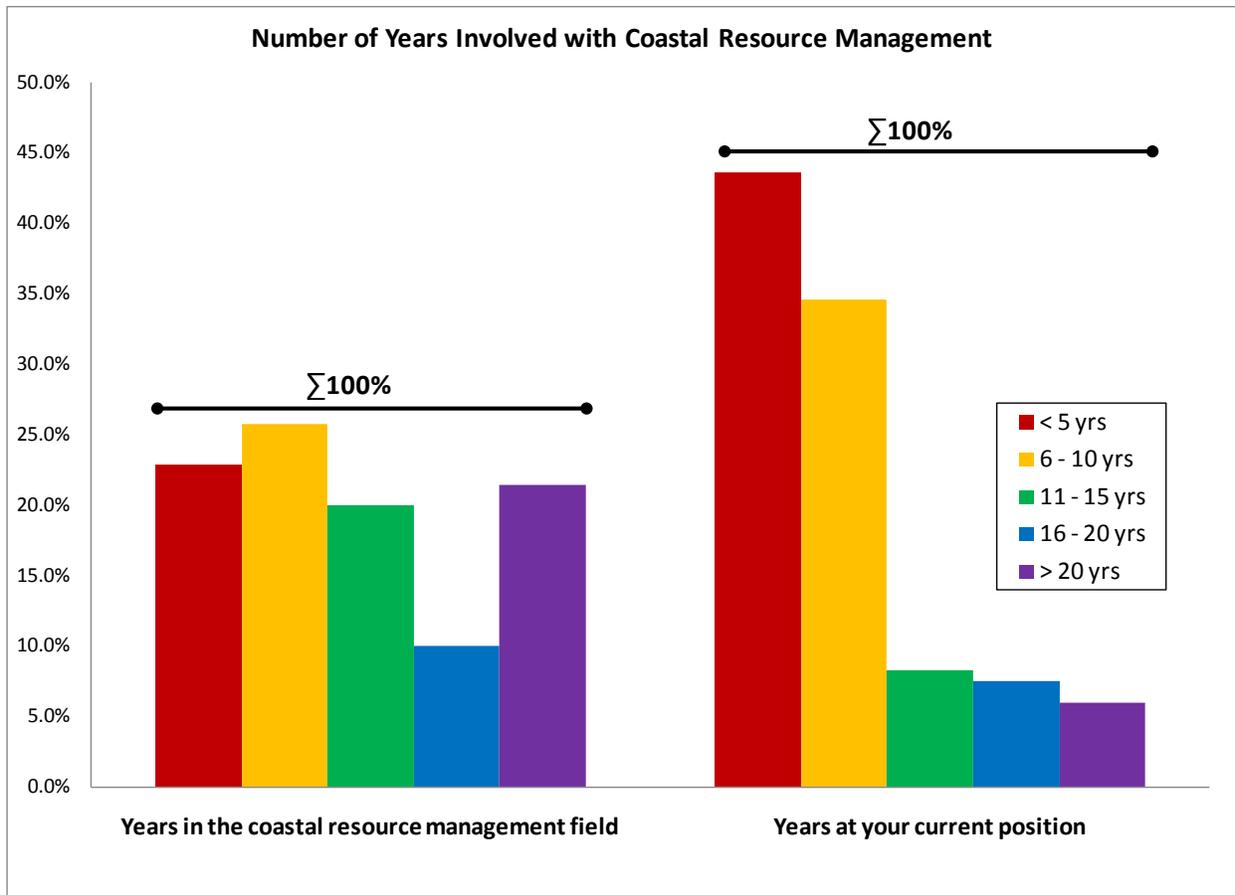


Figure 56: Number of years involved in coastal resource management.

Familiarity with the Coastal Services Center

One survey question was designed to measure respondent’s familiarity with the Center. This question allowed for multiple choices (select up to three) to be selected as it is highly likely that respondents would have attended workshops and/or conferences, used tools, participated in training, etc. A very small proportion of respondents indicated no previous familiarity with the Center. There was little difference in the types of relationships respondents have had with the Center, 23% are generally familiar to 16.9% have attended a Center conference (Table 2). There were no considerable differences in the level of familiarity among regions.

Table 2: Measure of familiarity with Coastal Services Center; question allowed for multiple answers. Percentage of total response shown in the right-hand column.

Familiarity with Coastal Services Center	
This is my first interaction with the Center	2.20%
I am generally familiar with the Center	23.01%
I have attended a Center workshop	17.09%
I have attended a Center conference (i.e. Coastal Zone, GeoTools)	16.92%
I have participated in training or technical assistance provided by the Center	21.66%
I utilize tools and/or data from the Center	19.12%

In addition to general familiarity with the Center, the survey measured interaction with regional NOAA CSC offices. Consensus results indicated that few respondents were unaware that the Center has regional offices and less than 30% either don't interact with the office or are unaware of its presence. Nearly half of respondents have partnered with their regional Center office and about 25% have had limited communications (Figure 57); this result implies that the Center has a considerable presence in the coastal resource management community. Of all the regions, select respondents in the Mid-Atlantic (MA), Southeast (SE), Gulf of Mexico, West Coast (WC), and Great Lakes (GL) were not aware of the Center's office in their region.

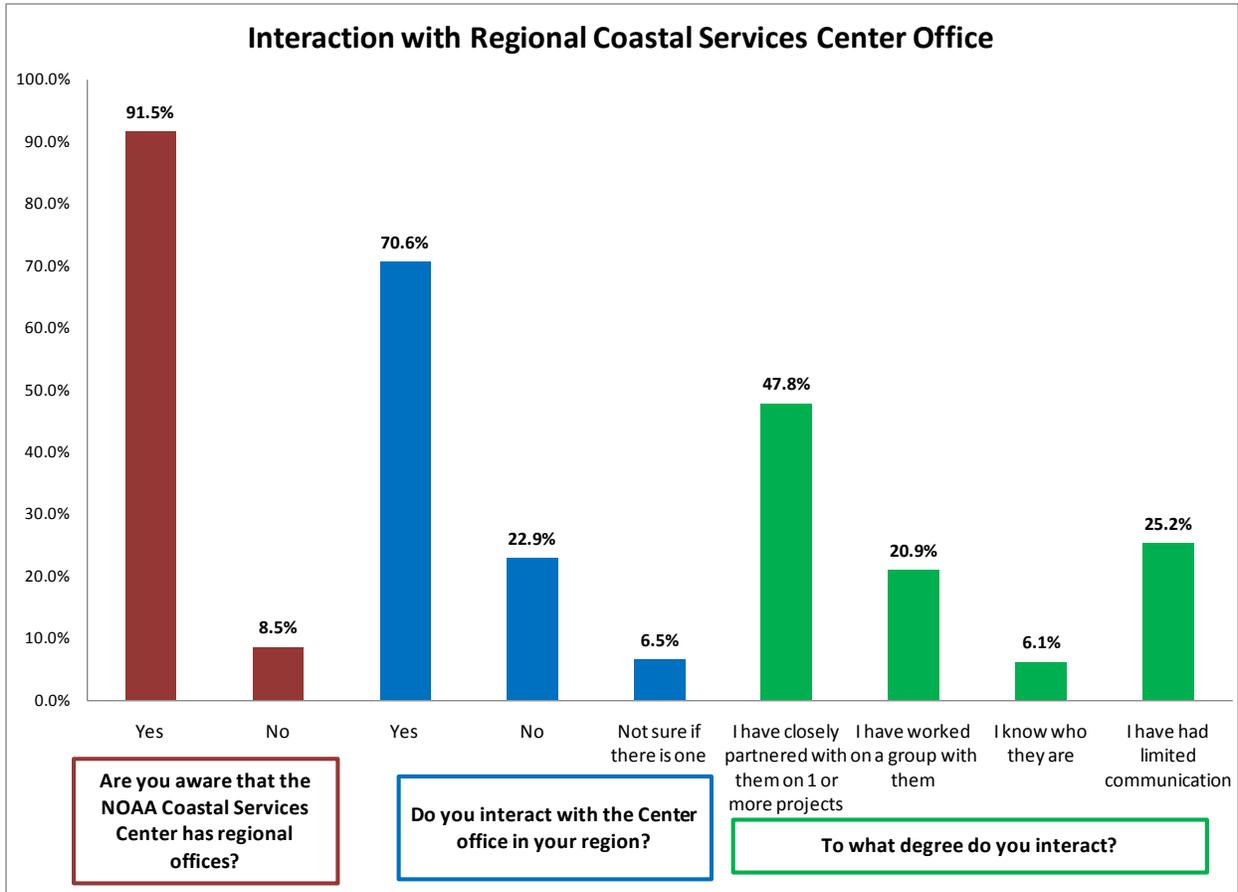


Figure 57: Respondents' interaction with regional Coastal Services Center offices.

References

- California Ocean Science Trust (COST). 2008. Literature Review for the West Coast Regional Needs Assessment. Prepared for the National Oceanic Atmospheric Administration Coastal Services Center. July 28, 2008. 61 p.
- Desotelle Consulting, PLC, Community Growth Institute and Beaster Consulting. 2006. Great Lakes Needs Assessment. Issue Area: Coastal Community Development. Produced July 2006 for the Great Lakes and NOAA Coastal Services Center. 106p.
- Louisiana Sea Grant (LA Sea Grant) Website, Accessed January 2009:
<http://www.laseagrant.org/>
- MRAG Americas. 2008. Science Tools to Implement Ecosystem Based Management in Massachusetts. A Report to the University of Massachusetts at Boston and the Massachusetts Ocean Partnership. December 1, 2008.
- MRAG Americas. 2009a. Trends in Resource Management Needs and Issues: A Literature Review. Report to the NOAA Coastal Services Center. February 2009.
- MRAG Americas. 2009b. A Systematic Review of the Needs and Issues of the U.S. Coastal Resource Management Community. A Qualitative Meta Analysis Submitted to the NOAA Coastal Services Center. April 3, 2009.
- National Centers for Coastal Ocean Science (NCCOS). 2007. National Centers for Coastal Ocean Science Human Dimensions Strategic Plan (FY2009-FY2014). Silver Spring, MD: National Oceanic and Atmospheric Administration, National Ocean Service, National Centers for Coastal Ocean Science. 54p.
<http://coastalscience.noaa.gov/human/strategy/NCCOSHDPan.pdf>
- NOAA Coastal Services Center (NOAA CSC) 2006b. Hazard Resilience Theme Narrative. Draft 3/30/06.
- NOAA Coastal Services Center (NOAA CSC) 2007. Coastal and Ocean Planning Logic Model and Narrative. December 20, 2007.
- NOAA Coastal Services Center (NOAA CSC). 2008e. Summary Report for the Coastal Ecosystem-Based Management Course Needs Assessment. NOAA/CSC/RPT 08-01. Charleston, SC: NOAA Coastal Services Center.
- NOAA Coastal Services Center (NOAA CSC) Website. Accessed June 2010.
<http://www.csc.noaa.gov/>