

1999 Coastal Resource Management Customer Survey

Every three years the National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Center surveys the coastal resource managers of the nation to gauge the natural resource issues facing this community and their technical needs and capabilities. The Center and NOAA use survey results to direct future programs.

The survey was conducted in two parts. Part 1 focused on technology and Part 2 focused on management issues. The survey enjoyed a high success rate, with seventy percent of the 270 surveys completed and returned. Respondents included state resource and environmental protection agencies, coastal zone management programs, Sea Grant programs, National Estuarine Research Reserves, National Estuary Programs, and National Marine Sanctuaries.

To see the surveys and the results from 1999 and 1996, visit the Center's Web site at www.csc.noaa.gov/survey.

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Highlights of the 1999 Coastal Resource Management Customer Survey

- The use of geographic information system (GIS) is a basic skill in the coastal resource management community. It is used primarily for general and project-specific mapping.
- Over 45 percent of the respondents have one to two staff in the office who are trained in GIS and almost 40 percent have one to two staff who regularly use GIS. Combined GIS expertise in the office is at the beginning to intermediate level, although one-third of the respondents classify their staff at the advanced GIS level.
- Database management and remote sensing are emerging skills in the coastal resource management community. Sixty-five percent and 42 percent of the community use database management software and remote sensing software, respectively.
- Nearly 40 percent of the offices surveyed have one to two staff trained in remote sensing software use, and nearly 30 percent of the respondents have staff who regularly use remote sensing software.
- Over half of the respondents create metadata, with one-third creating metadata using Federal Geographic Data Committee (FGDC) standards.
- Eighty-nine percent of the offices that responded to the survey have Internet access.
- When not available in-house, respondents rely mostly on partnerships with federal, state, and local agencies for access to GIS and remote sensing.
- The respondents primarily use spatial data that have been collected, derived, or managed by others.
- Respondents take a lead in management techniques such as technical assistance and public outreach and education and more of a coordinating role in other techniques such as land use planning and GIS.
- Interagency coordination is the most common management technique employed by the community in managing habitats.
- Respondents see themselves primarily in a coordinating role when managing coastal issues.
- Habitat issues are the most common issues where spatial data are collected and managed and where agencies take a lead in management.
- Respondents are generally interested in both technology and process-skill training; this interest increases when the training is available locally.
- Primary data set needs include bathymetry, habitat, and human use.
- Respondents identified many resource needs, including resource inventories and assessments, environmental monitoring technologies, GIS, enhanced ability to interpret and apply spatial data and imagery for decision making, greater funding, additional human resources, greater public support, access to information from other offices, and enhanced interagency coordination.

Introduction

The NOAA Coastal Services Center (Center) is committed to serving the technology, information, and management needs of its customers in the coastal resource management community. To achieve this goal, the Center solicits input from the 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 understand the customers' priority issues, to plan effectively for new projects and training programs to address these issues, and to create products that are compatible with customers' hardware, software, and management needs. State coastal resource managers will also benefit from the survey results as they work towards the development of common goals and partnerships.

Methodology

The Coastal Resource Management Customer Survey, approved by the Office of Management and Budget and conducted in the late summer of 1999, was sent to 270 offices representing state resource and environmental protection agencies (state), coastal zone management programs (CZM), Sea Grant programs (both extension leaders and directors), National Estuarine Research Reserves (NERR), National Estuary Programs (NEP), and National Marine Sanctuaries. Sea Grant directors and extension leaders were surveyed separately because in many Sea Grant programs the extension leaders work in offices separate from their directors and thus have access to different resources and support services.

The survey was conducted in two parts. Part 1 focused on technology, including the use of spatial data, geographic information systems (GIS), remote sensing, environmental models, and metadata. This portion of the survey was sent to the agency's technology manager. Part 2 of the survey focused on the resource management issues facing the organization, including the role and approach the agency takes to address the issue and the necessary support needed to help manage these responsibilities more effectively. The office's overall manager completed this portion of the survey. Appendix A includes a copy of Part 1 of the survey, and Appendix B includes a copy of Part 2.

Respondents had two options for completing the survey—either on a hard copy or electronically through a Web site. The use of the Internet as an option for survey completion was a first-time effort for the Center, and approximately 25 percent of the respondents used it. Once the hard-copy surveys were received, they were entered into a database housing the electronic responses.

Results

Response Rate

Although those agencies surveyed were asked to complete both parts of the survey, in some instances, agencies only completed one of the two parts. All total, 70 percent of the 270 offices completed Part 1, Part 2, or both parts of the survey. Agencies returned 131 completed surveys from Part 1 and 158 from Part 2.

Response from the National Marine Sanctuaries was low, especially for Part 1, where only one-third of the sanctuary offices completed that portion of the survey. As a result, the sanctuaries' data were not included in this analysis. They will be resurveyed and information will be reported separately. Responses from the Sea Grant offices provided some inconsistent results as it appears that some Sea Grant directors were reporting for their entire university or consortium instead of for their office. This also appeared to be the case in Part 1 for the Sea Grant Extension leaders. Because of this potential for error, Sea Grant results from both directors and leaders for Part 1 and from directors for Part 2 were omitted from this analysis. A separate analysis and report of Sea Grant results will be conducted at a later time.

Tables 1 and 2 depict the response rate for both parts of the survey by agency and region, respectively.

Table 1. Responses to Part 1 and Part 2 of the Survey by Agency Type

Agency Type	Number Sent Out	Responses: Part 1	Responses: Part 2
NERR	25	17	16
NEP	28	11	14
CZM	37	28	30
State	103	60	71
Sea Grant Extension	34	NA	18

Table 2. Responses* to Part 1 and Part 2 of the Survey by Region

Region	Number Sent Out	Usable Responses: Part 1	Usable Responses: Part 2
Great Lakes Indiana, Michigan, Minnesota, Ohio, Pennsylvania, Wisconsin	21	15	17
Northeast Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Rhode Island, Virginia	66	35	54
Southeast and Gulf of Mexico Alabama, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina, Texas	55	34	40
West Coast Alaska, California, Oregon, Washington	36	20	22
Caribbean and Pacific Islands American Samoa, Commonwealth of the Northern Marianas Islands, Guam, Hawaii, Puerto Rico, and US Virgin Islands	21	12	16

* Does not include National Marine Sanctuaries and Sea Grant offices

Results for both survey parts are shown in Appendices A and B and are highlighted below. **Please note that for many questions, respondents could or did select more than one response; therefore, percentages oftentimes add up to more than 100 percent.**

Part 1: Technology Applications to Coastal Management

Special Purpose Software and Access

When asked to report which special purpose software their offices use to manage, analyze, or present spatial data, most respondents (91 percent) reported using geographic information systems (GIS). Other software includes database management systems (65 percent) and remote sensing software (42 percent) (Table 3).

Table 3. Special Purpose Software Used by the Office

Special Purpose Software	Percentage of Response
Geographic Information Systems	91
Database Management Systems	65
Remote Sensing	42
Visualization	36
Environmental Process Modeling	33
Computer-Aided Design	26
Decision Support/Decision Analysis	10

ESRI® ArcInfo® and ArcView® are the predominant GIS software products used by the respondents. For those offices that do not operate a GIS, more obtained GIS access through partnerships with other local, state, or federal agencies as compared to other avenues for access such as academic institutions, private sector companies, and nongovernmental organizations. For those respondents who utilize remote sensing products in their office, most use ERDAS® Imagine and ESRI's Image Analysis® (a module for ArcView). Access to remote sensing for those who do not have in-house software is through partnerships with other local, state, or federal agencies and through academic institutions.

GIS Capability Profile

Respondents were asked about various aspects of their office's GIS capabilities including expertise, number of staff who regularly use GIS, and common uses for GIS (Table 4 and Figures 1 and 2).

Table 4. Combined GIS Capability or Expertise in the Office

Level of Expertise	Percentage of Response
None	14
Beginning	42
Intermediate	44
Advanced	33

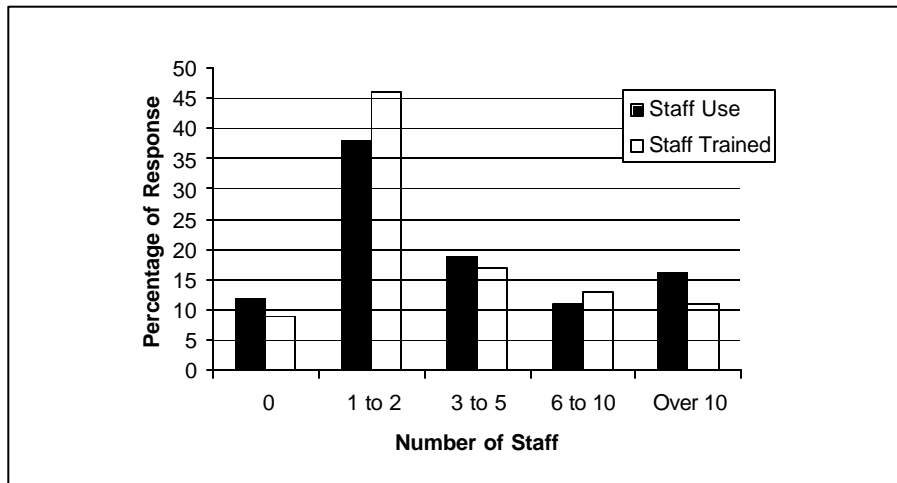


Figure 1. Number of Staff in the Office Who Regularly Use GIS and Who Are Trained in GIS

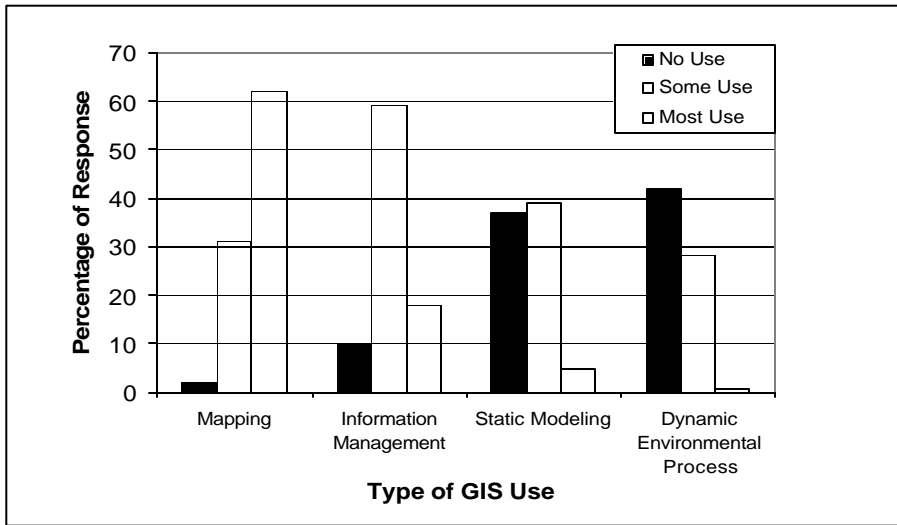


Figure 2. Use of GIS for Various Purposes

Remote Sensing Capability Profile

In this series of questions, respondents were asked about various aspects of their offices’ remote sensing capabilities, including expertise and number of staff who regularly use remote sensing software (Table 5 and Figure 3).

Table 5. Combined Remote Sensing Capability or Expertise in the Office

Level of Expertise	Percentage of Response
None	47
Beginning	24
Intermediate	22
Advanced	9

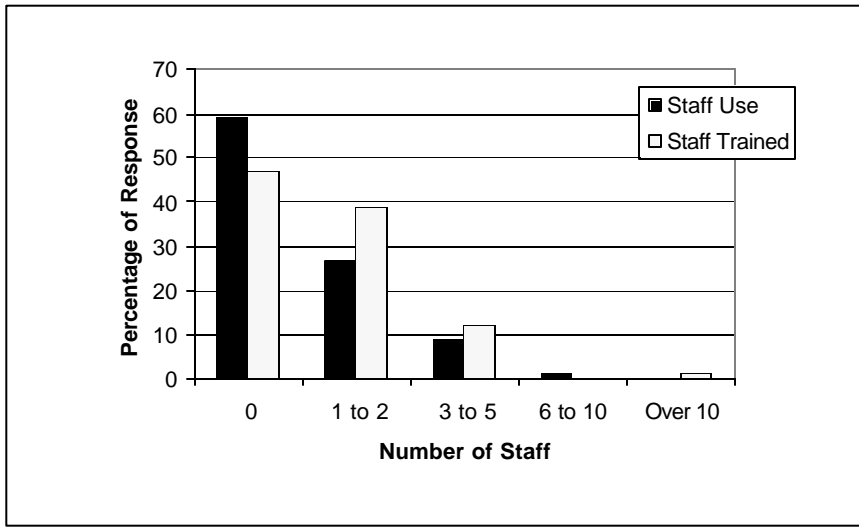


Figure 3. Number of Staff in the Office Who Regularly Use Remote Sensing Software and Who Are Trained in the Use of Such Software

Environmental Models

In addition to remote sensing and GIS, 45 percent of the agencies use environmental models to aid in the management of coastal resources. Table 6 lists the percentage of respondents using certain models; the general type of model is in parentheses.

Table 6. Environmental Models Used by at Least 5 Percent of the Respondents

Environmental Model	Percentage of Response
BASINS (water quality)	14
HEC-x (hydrologic)	11
WASP (water quality)	9
QUAL2EU (water quality)	8
HSPF (hydrologic)	8
SWMM (hydrologic)	8

Metadata

Thirty-four percent of the respondents do not create metadata. Of the 51 percent that do create it, most (37 percent) use Federal Geographic Data Committee standards, while a smaller percentage (14 percent) use a state standard.

Respondents were also asked about their interest in establishing a FGDC clearinghouse node for their metadata holdings. Table 7 depicts the results from this question.

Table 7. Interest in Establishing an FGDC Clearinghouse Node for Metadata

Interest	Percentage of Response
Need more information	58
Would NOT like to establish	16
Already have	12
Would like to establish	7

Internet and Data Exchange

Eighty-nine percent of the respondents have Internet access, with the majority (48 percent) using a lease line with a fairly fast connection.

Respondents were also asked about the type of media they prefer to use to exchange data. Table 8 lists the top five media preferred.

Table 8. Top Five Preferred Media for Data Exchange

Media	Percentage of Response
CD-ROM	66
File Transfer Protocol (FTP)	65
ZIP disk	59
3 1/4 inch diskette	56
HTTP (web browser)	43

Use of Spatial Data for Coastal Issues

Resource management offices were asked if and how they use spatial data for a variety of specific coastal issues broadly categorized as habitat, water quality, coastal development, hazard, and resource management (including human uses) issues. If agencies used spatial data for an issue, they were also asked whether the data were collected or derived by their office; collected, derived, and managed by others; or managed within a GIS.

Figure 4 depicts spatial data use by broad coastal issue type. As shown in this figure, habitat spatial data are more often collected, managed, or used compared with the other issue types. Table 9 lists the top three specific coastal issues per broad issue type that are managed within a GIS.

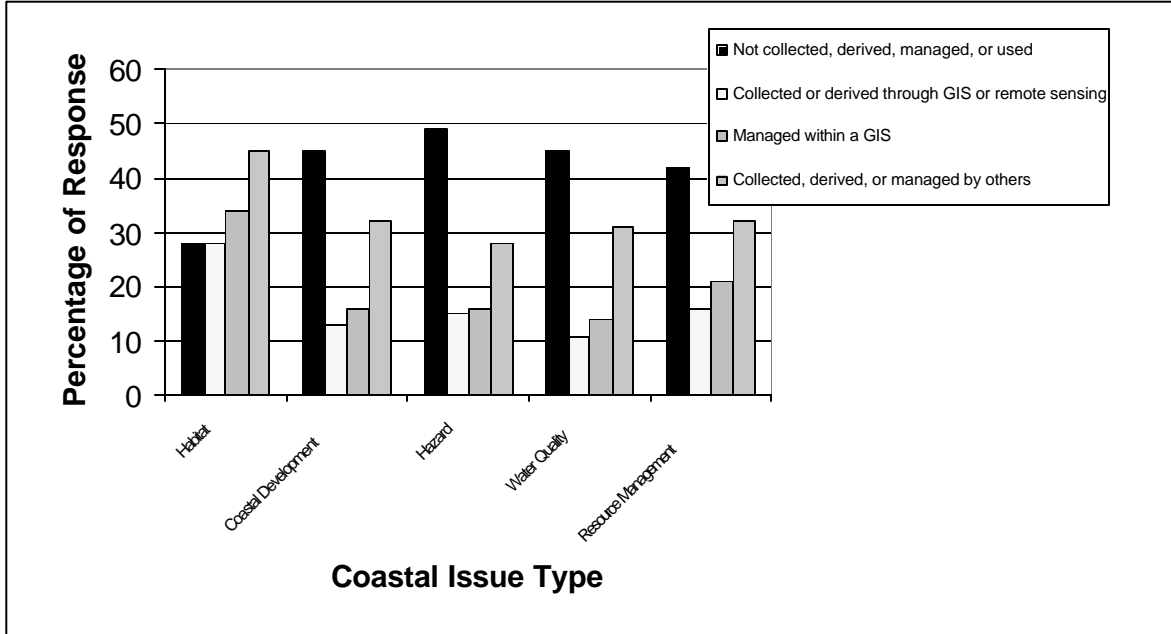


Figure 4. Use of Spatial Data for Broad Coastal Issue Types

Table 9. Top Three Specific Coastal Issues that Are Managed Within a GIS

Issue Type	Specific Issue	Percentage of Response
Habitat	Habitat mapping	48
	Habitat status and health	39
	Protected area management	37
Coastal Development	Land use or changes in land use	25
	Public access to coast	19
	Dredging or port issues	18
Hazard	Coastal erosion or accretion	23
	Oil spill planning or response	19
	Hazardous material spill planning or response	15
Water Quality	Nonpoint source pollution	22
	Point source pollution	22
	Eutrophication or hypoxia	9
Resource Management	Watershed management planning or assessment	38
	Protected, threatened, or endangered species	29
	Fish and shellfish stocks; surface water (tie)	26

Spatial Data Needs

Respondents were asked about the usefulness (very, moderately, minimally, or not useful) of a variety of data sets organized into four broad categories: bathymetry or topography, habitat and resource, water quality, and human use and other. Data sets relating to habitat and bathymetry/topography are both considered useful by respondents, with human use and water quality considered less useful. Table 10 lists the data sets considered "very useful" and "moderately useful" (combined) by respondents for each of the broad categories.

Table 10. Data Sets by Broad Category Considered "Very Useful" and "Moderately Useful" (Combined) by Respondents

Broad Category	Data Set	Percentage of Response
Habitat and Resource	Fish distributions	74
	High resolution aerial photography	73
	Habitat suitability indices	70
	Wetland function	69
	Coastal land cover and change maps	66
	Benthic habitat maps in turbid waters	66
	Live bottom distribution maps	65
	Impervious surface maps	65
	Soft bottom distribution maps	63
	Shellfish bed distribution maps	63
	Coastal land cover and land use maps	56
	Seagrass distribution maps	54
	Coral distribution maps	16
Bathymetry or Topography	Nearshore bathymetry	73
	Shoreline erosion or accretion rates	71
	Estuarine and bay bathymetry	67
	Coastal topography	66
	Shoreline	60
	Storm surge inundation zones	58
	Offshore bathymetry	36
Human Use and Other	Water use classification	65
	Protected area boundaries	64
	Human demographics of coastal areas	63
	Marine boundaries	52
	Marine transportation	46
Water Quality	Salinity	52
	Sea surface temperature	49
	Primary productivity for ocean waters	43
	Suspended sediments for ocean waters	37

Technology Training

In general, respondents are interested in technology training for themselves and their staff, especially if the training is offered locally (Table 11). The number in parentheses in the "yes" column indicates the percentage of "yes" respondents that are interested in the training only if it is locally available.

Table 11. Interest in Technology Training

Training Subject	Percentage of Response to "Yes"*	Percentage of Response to "No"
ArcView GIS	72 (31)	12
Introduction to Coastal Remote Sensing	69 (28)	16
Interpretation of Aerial Photography	62 (27)	21
Image Processing Techniques	62 (21)	21
Avenue Programming for ArcView GIS	61 (26)	17
Introduction to GIS	58 (28)	19
Information Management Technologies for Coastal Executives	53 (20)	22
Procedures and Protocols of the Coastal Change Analysis Program	50 (18)	24
Developing FGDC-compliant Metadata**	41 (20)	28
How to Train Others in Developing FGDC-compliant Metadata**	25 (15)	40

* Number in parentheses indicates the percentage of "yes" respondents who are interested in the training only if locally available.

** Almost 1/3 of the respondents did not respond.

Part 2: Coastal Management Activities and Training Needs

Role in Addressing Coastal Issues

Respondents were asked about the role (lead, coordinating, or independent) their office plays in managing a variety of coastal issues. These issues were grouped into five broad categories: habitat, coastal development, hazard, water quality, and resource management. Figure 5 depicts the office role by broad coastal issue type. In general, offices take a coordinating role when managing coastal issues. Table 12 lists the top three coastal issues where offices take a coordinating role in managing for each of the broad categories.

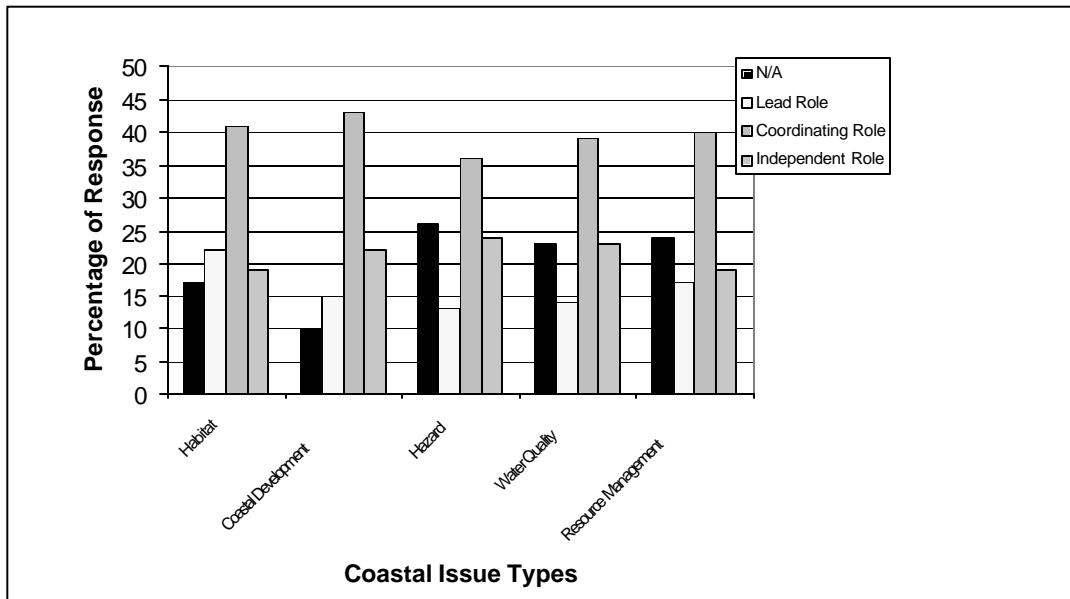


Figure 5. Role of Office in Managing Coastal Issues

Table 12. Top Three Specific Coastal Issues Where Respondent Offices Have a Coordinating Role

Issue Type	Specific Issue	Percentage of Response
Resource Management	Watershed management planning or assessment	54
	Protected, threatened, or endangered species	53
	Surface water	50
Coastal Development	Dredging or port	49
	Cumulative impacts	46
	Land use or changes in land use	44
Water Quality	Nonpoint source pollution	49
	Point source pollution	44
	Eutrophication or hypoxia	41
Habitat	Habitat status or health	45
	Habitat restoration	44
	Habitat mapping	42
Hazard	Natural hazards	40
	Oil spill planning or response	40
	Hazardous material spill planning or response;	36
	Coastal erosion or accretion (tie)	

As a follow-up question, respondents were asked about the role they take in employing a variety of management techniques. Respondents take the lead role in employing a number of techniques ranging from technical assistance to regulation or permitting to public education and outreach. The top five techniques are listed in Table 13.

Table 13. Top Five Management Techniques Where Respondent Offices Have a Lead Role

Management Technique	Percentage of Response
Technical assistance	52
Public outreach and education	48
Resource management planning	44
Demonstration and other pilot projects	42
Regulation or permitting; Environmental modeling (tie)	41

Approach to Managing Coastal Habitats

To further understand the types of management approaches being used, respondents were asked to indicate the approach(es) they use to manage a variety of specific coastal habitats. On average, respondents utilize interagency coordination and public education when managing

coastal habitats (Table 14). The top three habitats managed via each management approach are listed in Table 15. Coastal waters, estuarine waters, and tidal wetlands are the habitats most often managed. Habitats that are more geographic-specific, such as coral reefs, kelp beds, rocky shorelines and marine outcrops/hard bottoms, are the least often managed according to the nationwide responses.

Table 14. Approach Employed When Managing Coastal Habitats

Management Approach	Percentage of Response (Average)
Interagency Coordination	40
Public Education	32
Restoration	20
Land Use Planning	19
Permit Actions	10
Not Applicable	38

Table 15. Top Three Coastal Habitats Managed Via Each Approach

Management Approach	Coastal Habitat	Percentage of Response
Interagency Coordination	Coastal waters	73
	Estuarine waters	66
	Tidal wetlands/marsh	64
Public Education	Coastal waters	64
	Estuarine waters	63
	Beaches and dunes	54
Restoration	Tidal wetlands/marsh	41
	Estuarine waters	40
	Fresh wetlands	36
Permit Actions	Coastal waters	39
	Estuarine waters	38
	Tidal wetlands/marsh	34
Land Use Planning	Estuarine waters	29
	Tidal wetlands/marsh	28
	Fresh wetlands	28

Education and Volunteer Programs

A little over half of the respondents (58 percent) indicated that they have developed education curricula or programs, and half of the respondents (52 percent) indicated that they operate volunteer programs. Target audiences for public outreach or education (see Table 16) include the general public (85 percent) and local government (79 percent).

Table 16. Target Audiences for Public Outreach and Education

Target Audience	Percentage of Response
General public	85
Local government	79
State legislature	68
Resource managers	66
Businesses	61
State executive branch	60
Teachers	60
Kindergarten to 8 th grade school children	56
9 th to 12 th grade high school children	56
Industry	56
Not responsible for education	12

Technology and Non-Technology Resources

Respondents were asked to rank (none, low, medium, high) both technology and non-technology resource or improvement needs. Tables 17 and 18 list the top ten "high" and "medium" (combined) needs for technology and non-technology resources, respectively.

Table 17. Top Ten Technology Resource or Improvement Needs Identified as a "High" and "Medium" (combined) Need

Resource or Improvement Needs	Percentage of Response
Resource inventory and assessment	85
Environmental monitoring technologies	81
Geographic information system	80
Enhanced ability to interpret and apply spatial data and imagery for decision-making	75
Mapping capability	74
Environmental remediation technologies	67
Environmental modeling	66
Remote sensing technologies	65
Faster computer systems	58
Technical training*	42

* Based on a very low response rate.

Table 18. Top Ten Non-Technology Resource or Improvement Needs Identified as a "High" and "Medium" (combined) Need

Resource or Improvement Needs	Percentage of Response
Additional human resources	91
Funding for research or data collection	90
Funding for outreach initiatives	86
Greater public support	86
Funding for demonstration/pilot projects	85
Access to information about how other offices have addressed similar issues, management options	80
Enhanced interagency coordination	78
Planning tools	70
Summary of case studies or best management practices	68
Conflict resolution training for staff	64
Public participation training	64

Non-Technology Training

In general, respondents are interested in non-technology training for themselves and their staff, especially if the training is offered locally (Table 19). The number in parentheses in the "yes" column indicates the percentage of "yes" respondents who are interested in the training only if it is locally available.

In addition, over half of the respondents (65 percent) indicated that their interest in any of the non-technology training would increase if training was delivered via the World Wide Web or other distance education technologies.

Table 19. Interest in Non-Technology Training

Training Subject	Percentage of Response to "Yes"*	Percentage of Response to "No"
Public involvement processes	74 (41)	23
Public outreach plans	71 (33)	23
Conflict resolution	70 (34)	28
Developing communication plans	66 (38)	31
Research methods for coastal management	66 (22)	30
Developing management plans	65 (26)	32

* Number in parentheses indicates the percentage of "yes" respondents who are interested in the training only if locally available.

Discussion

The purpose of the survey was to assess respondents' technology capabilities and uses and management roles and approaches. In addition, the survey provided information on respondents' wants, needs, and desires as they relate to spatial data, resources, and training. Trends and priorities are apparent in the survey results and these are discussed in detail below. However, as is the case with any type of survey, there are data limitations. The results are based strictly on answers to specific questions. Therefore, interpretation of the results beyond what was asked has been kept to a minimum. In addition, although every effort was made to phrase the questions as unambiguously as possible, there were most likely some questions that were interpreted in different ways by different respondents. Finally, several of the questions had a high (greater than one-third) no response rate, possibly because respondents did not understand the question or felt it did not apply to them. This high "no response" rate is noted when applicable.

Spatial Data Capabilities

By far, more respondents (91 percent) use geographic information system (GIS) than other special purpose software, although database management software, such as Microsoft® Access®, and remote sensing software also have a high percentage of use (65 percent and 42 percent, respectively). The percentage of remote sensing software use is surprising, given the cost and training associated with its use. It appears, based on these results, that GIS use could be considered a basic skill among the state coastal resource management community and that use of database management software and remote sensing software could be considered emerging skills. Over one-third of the respondents (36 percent) also use visualization software, so this could be considered an emerging skill as well.

When GIS and remote sensing is not available in-house, respondents indicated that they turn to partnerships with other federal, state, or local agencies to obtain the needed access. An interesting note is that, unlike GIS access, respondents utilize universities for remote sensing access. This is not too unusual, given the high level of training and computational difficulties associated with remote sensing software.

Because GIS use is so high in the surveyed community, it is not unexpected that respondents in general have one to two staff members both trained in GIS and using GIS. These staff range in expertise from beginner to advanced, indicating that there still is a need for GIS training at all levels (Table 4 and Figure 1). When GIS expertise is compared across agency type (NERR, state, CZM, and NEP—see definition of these agencies under "Methodology"), the NERRs that responded have all of their staff at least at the beginning level of expertise, while approximately 20 percent of the NEPs and CZMs have staff with no expertise. It should be noted that at least one staff member from each NERR site was trained via the Center's Protected Area GIS project. In comparing agency type, responses indicate that a higher percentage of the NERR staff are at the beginning level of expertise, CZM have a higher percentage of staff at the intermediate level, and a higher percentage of state staff are at the advanced level (see Figure 6 below).

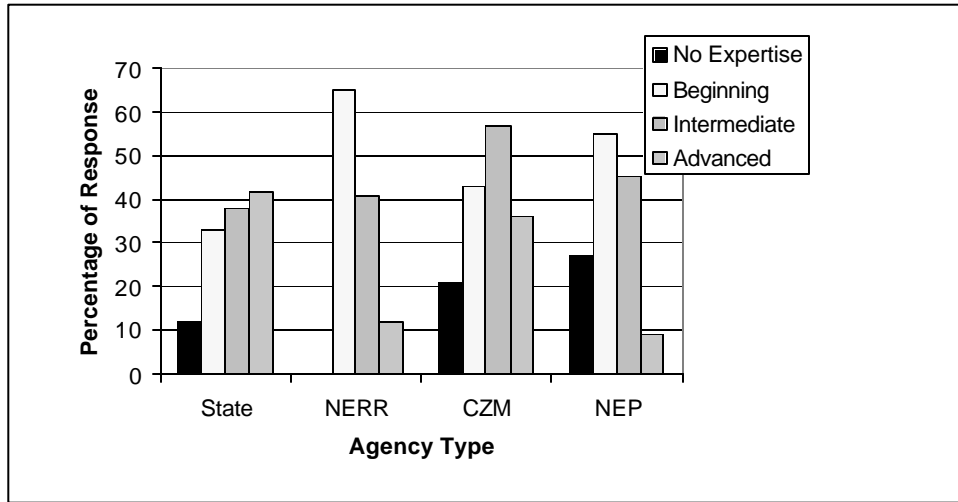


Figure 6. GIS Expertise by Agency Type

In contrast to GIS use and expertise, approximately 50 percent of the respondents indicated that they have no one on staff trained in or using remote sensing software (Table 5 and Figure 3). This is not unexpected given that over half do not use the software. When comparing remote sensing expertise across agency type, the data indicates that CZM offices have a higher percentage of staff at the beginning level, and states have a higher percentage of staff at the intermediate level (see Figure 7 below).

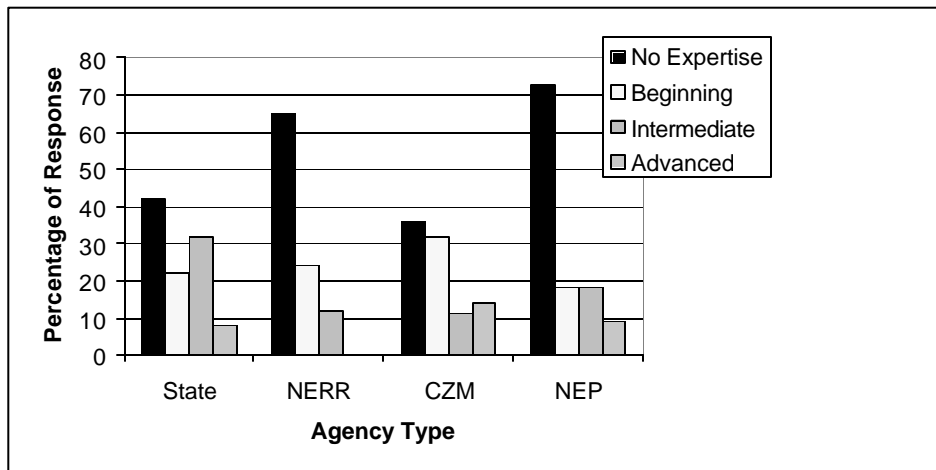


Figure 7. Remote Sensing Expertise by Agency Type

Forty-five percent of the respondents indicated that they use environmental models, primarily those relating to water quality (Table 6). This result is not too surprising given the mandate that

states have from the U.S. Environmental Protection Agency (EPA) on water quality issues. Although HEC-x is listed as a hydrologic model (see Table 6), it is part of the EPA protocol for water quality monitoring.

According to the survey results, over half of the respondents create metadata, with a third of them employing Federal Geographic Data Committee (FGDC) standards. All data projects with federal government funding must follow FGDC standards for metadata creation, so this result may imply that a number of those responding may secure funding from non-federal government sources. Over half of the respondents need more information before deciding about establishing an FGDC clearinghouse node for metadata. It appears, based on these results, that the coastal management community needs more information and possibly training on FGDC standards and clearinghouse nodes.

Data Access and Exchange Capabilities

Most of the respondents indicated that they prefer to exchange data using a variety of mechanisms including CD-ROM, file transfer protocol, ZIP disk, 3-1/4 inch diskette, and HTTP (Web browser) (see Table 8). Digital versatile disk (DVD), and 4- and 8-millimeter tapes were the least preferred means of data exchange.

The majority of the respondents (89 percent) have internet access and, of those, most (71 percent) have a high-speed line (56 kilobytes or higher). A 2000 survey by the National Association of Counties revealed that, unlike the state agencies surveyed in the Center's study, over half (54 percent) of county governments do not have Internet access anywhere in their offices. It should be noted, however, that most of these counties with no Internet access have populations of fewer than 50,000.

Spatial Data Use

Most respondents indicated that they use spatial data that has been collected, derived, or managed by others. The Internet makes data sharing more likely, and even those agencies that collect their own spatial data will still collect data from others. This is especially true when unique data sets exist.

Seventy-two percent of the respondents indicated that they use spatial data to manage habitat issues. Approximately half of the respondents use spatial data to manage the other coastal issues (coastal development, hazard, water quality, and resource management). Respondents collect or derive, and manage, habitat spatial data more than for the other coastal issues, possibly indicating a higher resource commitment to habitat issues than for some of the others (see Figure 4). Within the habitat category, habitat mapping, habitat status or health, and protected area management are the issues where more than 60 percent of the respondents collect and manage spatial data. Within the other coastal issue categories, watershed management planning or assessment (under resource management) is another issue where more than 60 percent of the respondents collect and manage spatial data (Table 9). This commitment to some of these issues, especially those relating to habitat, could be due to the ease of access to these particular spatial data sets and the importance and priority of the issue within the surveyed agency.

When spatial data use is examined across agencies and coastal issue type, the results are not too surprising, given the various agency missions and mandates. As seen in Figure 8, the NERRs primarily collect and manage habitat data. The CZMs collect and manage coastal development, hazard, and resource management data; however, the states and NERRs are nearly as equally involved as the CZM agencies in the collection and management of coastal development and resource management spatial data. For water quality data, it appears that all the agencies have a similar spatial data commitment to the issue.

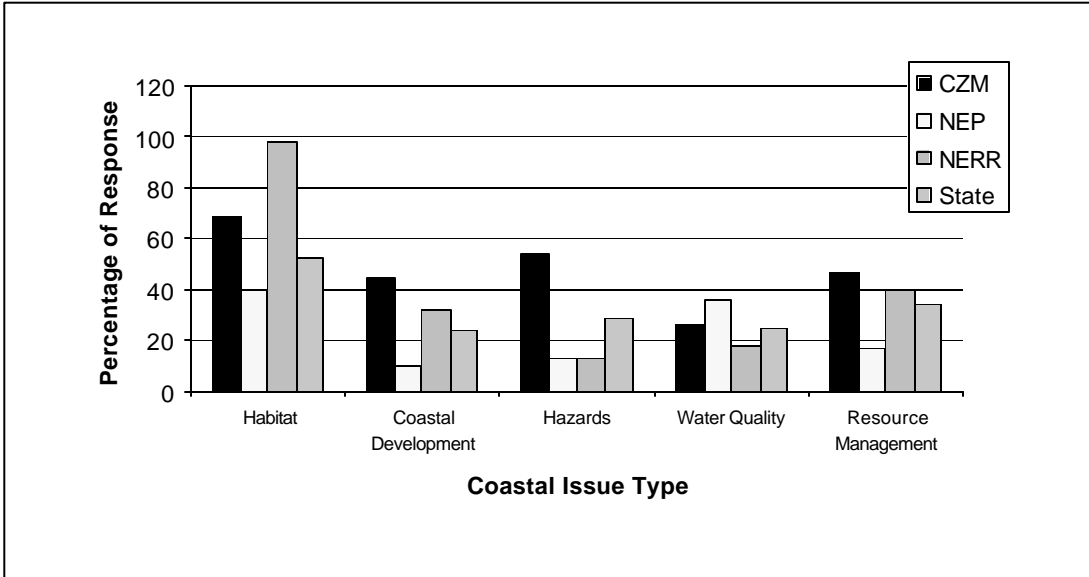


Figure 8. Those Respondents that Collect, Derive, or Manage Spatial Data by Broad Coastal Issue Category per Agency Type

The majority of respondents use GIS for general and project specific mapping (Figure 2). If "most" and "some" are combined, 93 percent of the respondents use GIS for general and project specific mapping and 67 percent use it as an information management tool. Both the modeling uses ("tool for static modeling" and "dynamic environmental process models") were low, which is in line with the other responses received on modeling questions. It should be noted that there was a fairly high no response rate for "supplying state of the system data sets to dynamic environmental process models," which could indicate that respondents did not understand what was being asked.

Data Needs

In general, respondents indicated that they currently do not have a number of the data sets listed in the survey question but that they do have a desire for many of them. When "very useful" and "moderately useful" are combined, most of the bathymetry, habitat, and human data sets are desired by more than half of the respondents (Table 10). Those data sets with results lower than 50 percent include offshore bathymetry, coral, and marine transportation, which is not surprising

considering these are more geographic and agency mission-specific data. The desire for water quality data sets is lower than for the other categories, possibly because respondents do not see the applicability of the data to their coastal management role. When examining data usefulness by region, more geographic-specific needs become apparent, such as the Island region desire for coral data (75 percent compared with 16 percent nationwide). However, when examining the top five data needs per region (see Table 20 below), it can be seen that particular data sets that are considered useful by a number of regions, regardless of geography, such as nearshore bathymetry, high resolution aerial photography, and shoreline erosion or accretion rates.

Table 20. Top Five Spatial Data Needs By Region

Region	Data Needs	Percentage of Response
Islands	Nearshore bathymetry	84
	Shoreline erosion or accretion	84
	Benthic habitat maps in turbid waters	84
	Live bottom distribution maps	84
	Habitat suitability indices	84
	High resolution aerial photography	84
	Suspended sediments for ocean waters	84
Great Lakes	Nearshore bathymetry	80
	Coastal topography	80
	Shoreline erosion or accretion rates	80
	Habitat suitability indices	80
	High resolution aerial photography	80
West	Nearshore bathymetry	75
	Fish distributions	75
	Coastal land cover and land use maps	70
	High resolution aerial photography	70
	Wetland function	70
	Protected area boundaries	70
Northeast	Fish distributions	83
	Live bottom distribution maps	80
	Soft bottom distribution maps	77
	Shellfish bed distribution maps	77
	Shoreline erosion or accretion rates	72
	High resolution aerial photography	72
Southeast	Wetland function	74
	Estuarine and bay bathymetry	74
	High resolution aerial photography	71
	Water use classification	70
	Nearshore bathymetry	68

Table 20. Top Five Spatial Data Needs by Region (continued)

Region	Data Needs	Percentage of Response
Southeast (continued)	Coastal topography	68
	Shoreline erosion or accretion rates	68
	Benthic habitat maps in turbid waters	68
	Shellfish bed distribution maps	68
	Coastal land cover and land use maps	68
	Protected area boundaries	68

Technology Training Needs

According to the survey results, respondents desire technology training, from beginning level courses such as Introduction to GIS to more advanced levels such as Avenue Programming for ArcView GIS (Table 11). Despite the clear differences between GIS and remote sensing capabilities noted earlier, a high percentage of respondents (69 percent) are interested in introductory remote sensing training, and over half are interested in more advanced remote sensing courses such as image processing techniques and interpretation of aerial photography. It should be noted that over one-third of the respondents did not indicate a training preference to the two metadata training options ("Developing FGDC-compliant metadata" and "How to train others in developing FGDC-compliant metadata"). Interest in training increases if it is available locally. Of the 72 percent who indicated an interest in ArcView GIS, 31 percent are interested only if it is available locally. In the case of introduction to remote sensing, of the 69 percent who expressed an interest, 28 percent would participate only if it was available locally.

Role and Management Approaches

In addressing coastal issues, respondents see themselves as playing a coordinating role instead of a leading or independent role (Table 12). However, more of the respondents do take a lead role in habitat related issues (22 percent on average) as compared to coastal development, hazard, water quality, and resource management issues (13 to 17 percent on average). This is consistent with the results from Part 1 of the survey where habitat issues were the most common issues in which spatial data were collected or managed.

Specific issues where a third to a quarter of the respondents take a lead role include protected area management (30 percent), watershed management planning or assessment (25 percent), and competing uses of coastal waters (24 percent). Several issues that respondents felt were not applicable to them include ocean management (40 percent), air deposition of nutrients (35 percent), and cultural resources (34 percent). These results are not surprising given the agencies that completed the survey and their missions and mandates.

When comparing management roles by agency, again, the results are interesting and in most cases, not unexpected (Figures 9 and 10 below). The CZM programs see themselves as having the lead on coastal development and hazard issues, while habitat is often the primary issue within

a reserve (especially protected area management, 75 percent) (Figure 9). One-third or more of the Sea Grant extension offices, NEPs, and, with the exception of habitat issues, NERRs see themselves as having more independent roles as they relate to coastal management, especially with particular issues such as coastal development and hazard (Figure 10). This result for the NEPs is not congruent with their role as coordinating organizations.

When managing specific habitat types, respondents rely the most on interagency coordination, which corresponds with the coordinating role they take on the coastal issues discussed above. Coastal waters, estuarine waters, and tidal wetlands are the most common habitats managed, although this obviously changes regionally. For instance, coral reefs and kelp beds are managed more in the Islands than in the other regions.

Most respondents target a variety of audiences. Over half indicated that they have specifically developed education curricula or programs, and over half have volunteer programs.

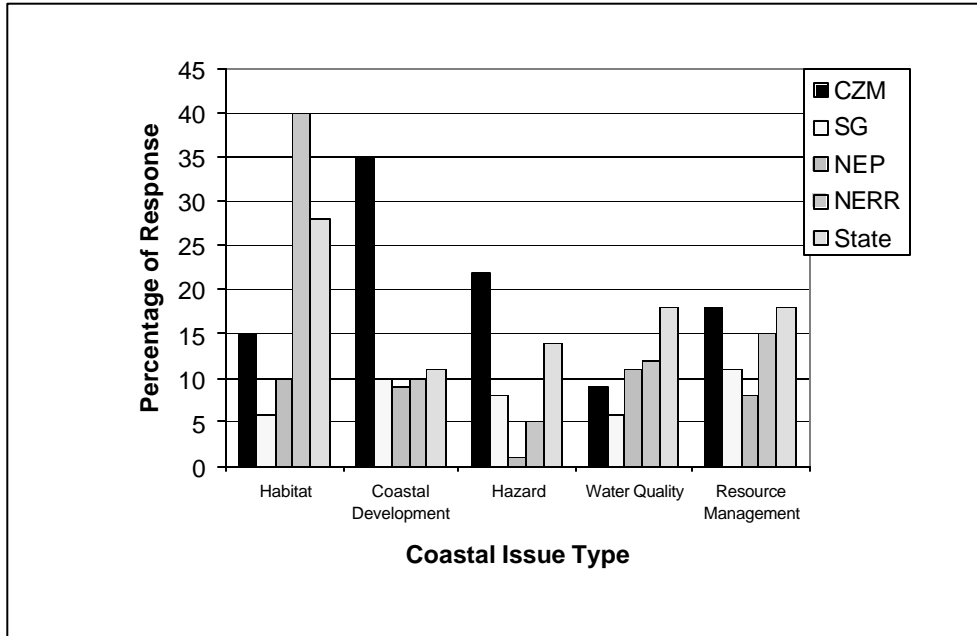


Figure 9. Those Respondents that Take a Lead Role by Broad Coastal Issue Category per Agency Type

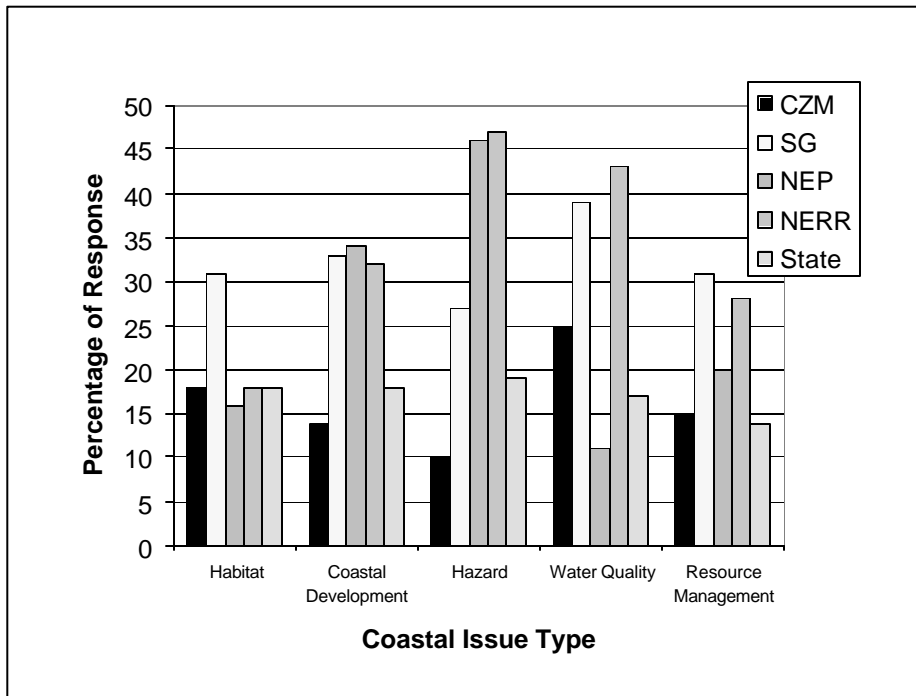


Figure 10. Those Respondents that Take an Independent Role by Broad Coastal Issue Category per Agency Type

Resource and Non-Technology Training Needs

Over three-quarters of the respondents identified a number of resource needs that would help to better address their office responsibilities. These include resource inventories and assessments, environmental monitoring technologies, GIS, enhanced ability to interpret and apply spatial data and imagery for decision making, greater funding, additional human resources, greater public support, access to information from other offices, and enhanced interagency coordination.

As was the case with technology training, over 60 percent of the respondents indicated an interest in a number of process training subjects including public involvement processes, public outreach plans, and conflict resolution. Interest definitely increases if the course is offered locally. Of the 74 percent who expressed an interest in a public involvement processes course, 41 percent are interested only if it is offered locally. In comparing training interest by agency, results are generally similar with one notable exception. Sixty-four percent of the NEPs are not interested in a training course on developing management plans, probably because they already feel proficient at writing and coordinating the development of such plans.

Conclusions

The 1999 Coastal Resource Management Customer Survey results are providing, and will continue to provide, the Center with valuable information from the state and local management community on customer issues and needs. Results indicate that geographic information system (GIS) use is a basic skill that is utilized to manage particular coastal issues, especially those related to habitat. Remote sensing and database management are emerging skills that may become even more critical in the next several years. Partnerships and interagency coordination are relied upon greatly within the community, especially for GIS and remote sensing access and for managing a variety of habitats and coastal issues. The survey also indicates the needs and desires of the management community for technology and process-skill training, data sets, and resources. All of this information will help shape and design the NOAA Coastal Services Center's future projects and activities to better serve the needs of its clients in the coastal resource management community.

Appendix A: Part 1 Survey Results

Total* Respondents: 116

Including: State Agencies, Coastal Zone Management programs, National Estuarine Programs, National Estuarine Research Reserves

Note: Added percentages may be greater than 100 because each question can have multiple answers. Percentages calculated using n = 116.

* Indicates essay response.

1. Does your office collect, derive, manage or use spatial data for any of the following coastal issues? (Please circle appropriate letter[s] for each issue that applies.)

Coastal Issues	Spatial Data Not Collected, Derived, Managed, or Used	Spatial Data Collected or Derived through GIS or Remote Sensing	Spatial Data Managed within a GIS	Spatial Data Used That Has Been Collected, Derived, or Managed by Others
Habitat Issues				
Habitat mapping	13%	41%	48%	59%
Habitat status or health (characterization)	27%	30%	39%	48%
Habitat restoration	31%	24%	30%	42%
Protected area management	27%	31%	37%	44%
Invasive species	44%	15%	17%	31%
Coastal Development Issues				
Growth management	50%	10%	12%	30%
Land use or changes in land use	24%	22%	25%	57%
Dredging or port issues	42%	10%	18%	34%
Waterfront planning or development	53%	8%	13%	27%
Public access to coast	43%	17%	19%	27%
Cumulative impacts	52%	13%	13%	22%
Tourism or recreation	52%	9%	12%	26%
Hazard Issues				
Natural hazards	47%	16%	12%	30%
Coastal erosion or accretion	41%	22%	23%	29%
Beach nourishment	60%	10%	13%	18%
Hazardous material spill planning or response	50%	11%	15%	28%
Oil spill planning or response	46%	14%	19%	34%
Water Quality Issues				
Nonpoint source pollution	30%	20%	22%	42%
Point source pollution	33%	15%	22%	41%
Air deposition of nutrients	57%	7%	8%	22%
Eutrophication or hypoxia	46%	10%	9%	29%
Harmful algal blooms or <i>Pfiesteria</i>	57%	5%	8%	22%
Resource Management and Other Issues				
Watershed management planning or assessment	21%	33%	38%	48%
Ocean management	62%	8%	10%	15%
Shoreline management planning	45%	16%	20%	34%
Land or property management	40%	15%	22%	36%
Protected, threatened, or endangered species	24%	22%	29%	52%
Fish and shellfish stocks	32%	16%	26%	42%
Aquaculture	58%	8%	8%	22%
Cultural resources	47%	9%	15%	30%
Groundwater sources	43%	15%	18%	27%
Surface water	28%	21%	26%	41%

Permit tracking	47%	19%	24%	22%
Competing uses of coastal waters	58%	9%	12%	15%
Other(s), please specify		*	*	*

2. Which of the following types of special purpose software does your office use to manage, analyze, or present spatial data?

(Please select all that apply.)

- 91% Geographic information systems, GIS (a computer-based system for input, storage, retrieval, and analysis of spatial or map data)
- 42% Remote sensing (analyze or interpret satellite images, air photos, ground-based radar, side scan sonar, and other non-contact measurements or signals)
- 26% Computer-aided design, CAD (drawing environment for designing or engineering systems)
- 65% Database management system, DBMS (text or data management)
- 10% Decision support/decision analysis (tools relating data or information and criteria to outcomes)
- 36% Visualization (graphical rendering and visual data exploration)
- 33% Environmental process modeling (e.g., simulating population, hydrodynamic, climate, landscape, or other changes through time)
- 1% Do not use any of these software types
- 5% No Response

3. Which GIS software product(s) does your office now use?

(Please select all that apply.)

- 7% Do not use GIS software
- 61% ARC/INFO (ESRI)
- 84% ArcView (ESRI)
- 3% Atlas GIS (ESRI)
- 0% Backland GRASS (Texas A&M University)
- 17% Imagine (ERDAS, Inc.)
- 2% MapSheets (ERDAS, Inc.)
- 2% Gena Map (Genasys)
- 1% GRASS (USACOE - CERL)
- 0% GRASSLANDS (Global Geomatics, Inc.)
- 3% GeoMedia (Intergraph)
- 3% IDRISI (Clark University)
- 2% LandView (Census Bureau)
- 9% MapInfo (MapInfo Corp.)
- 13% MapObjects (ESRI)
- 2% Marplot (NOAA)
- 5% No Response

4. If your office does not operate a GIS, which of the following describes your alternate GIS access?

(Please circle appropriate letter.)

- 44% Operate GIS, not applicable
- 2% No access available
- 7% State GIS coordinating council or office
- 14% Partnership with other local, state, or federal agency
- 5% Academic institution
- 3% Private sector company
- 2% Non-governmental organization
- 37% No Response

5. How would you describe the combined GIS expertise or capability of the people in your office?
(Please circle all letters that apply.)

- 14% No expertise
- 42% Beginning (able to input and view data or able to make simple queries and maps)
- 44% Intermediate (able to analyze data using existing software applications)
- 33% Advanced (able to develop or adapt custom software applications)

6. How many current staff members (permanent or temporary full-time equivalents) in your office use GIS regularly?
(Please circle appropriate letter.)

- 12% 0
- 38% 1 to 2
- 18% 3 to 5
- 11% 6 to 10
- 16% Over 10

7. How many current staff members (permanent or temporary full-time equivalents) have had formal GIS training (certified training or college/university courses)?
(Please circle appropriate letter.)

- 9% 0
- 46% 1 to 2
- 17% 3 to 5
- 13% 6 to 10
- 11% Over 10

8. What portion of GIS use in your office targets the following activities?
(Please circle appropriate letter.)

Activity	None of Our Use	Some of Our Use	Most of Our Use
General and project specific mapping	2%	31%	62%
Information management tool for spatial analysis	10%	59%	18%
Tool for static modeling in a spatial context	37%	39%	5%
Supplying “state” of the system data sets to dynamic environmental process models	42%	28%	1%
Other(s), please specify		*	*

9. Which remote sensing software product(s) does your office now use to collect or process imagery?
(Please select all that apply.)

- 61% Do not use remote sensing software
- 3% EASI/PACE (PCI)
- 1% ELAS (NASA and USACOE)
- 1% ENVI (Research Systems, Inc.)
- 1% ER Mapper (Earth Resource Mapping)
- 0% I² (International Imaging Systems)
- 0% IDIMS, or other modules (Terra-Mar)

1%	IDRISI (Clark University)
10%	Image Analyst (ESRI)
19%	Imagine (ERDAS, Inc.)
1%	Land Analysis System, LAS (NASA - USGS)
0%	Meridian (McDonald Dettwiler)
2%	MicroStation (Intergraph)
0%	Resource (Decision Images)
0%	SeaWiFs Data Analysis System (NASA)
3%	TNTmips (MicroImages, Inc.)
10%	No Response

10. If your office does not use the remote sensing software products listed in Question 9, does your office access these capabilities through any of the following?

(Please select all that apply.)

16%	Use remote sensing software, not applicable
13%	No access available
9%	State remote sensing (or GIS) coordinating council office
18%	Partnership with other agency
22%	Academic institution
9%	Private sector company
3%	Non-governmental organization
32%	No Response

11. How would you describe the combined remote sensing expertise of the people in your office?

(Please select all that apply.)

47%	No expertise
24%	Beginning (able to input and view data and perform simple processing)
22%	Intermediate (able to analyze data and perform routine processing using standard software applications)
9%	Advanced (able to develop and apply custom algorithms or image processing software applications)

12. How many current staff members (permanent or temporary full-time equivalents) in your office use remote sensing software regularly?

(Please circle appropriate letter.)

59%	0
27%	1 to 2
9%	3 to 5
1%	6 to 10
0%	Over 10

13. How many current staff members (permanent or temporary full-time equivalents) have had formal remote sensing training (certified training or college/university course)?

(Please circle appropriate letter.)

47%	0
34%	1 to 2
12%	3 to 5
0%	6 to 10
1%	Over 10

14. Does your office use any of the following environmental models?

(Please circle all letters that apply.)

55% Do not use environmental models.

For Water Quality Modeling

14% BASINS (EPA)

9% WASP (EPA)

2% EXAMS (EPA)

8% QUAL2EU (EPA)

3% ToxiRoute (EPA)

For Hydrologic Modeling

8% HSPF (EPA)

11% HEC-x (USACOE)

8% SWMM (EPA)

3% AGNPS (USDA/NRCS)

For Chemical Fate Modeling

2% PRZM (USDA)

1% GLEAMS (EPA)

0% EPIC (USDA/NRCS)

3% SWAT (USDA/NRCS)

1% SWRBB-WQ (USDA/NRCS)

For Coastal Hazard Analysis Modeling

3% SLOSH (NOAA)

0% TAP (NOAA)

2% HAZUS (FEMA)

0% HurrEvac (NOAA)

23% No Response

15. Does your office have Internet access?

(Please circle appropriate letter.)

0% No access

89% Yes, please indicate dial-in speed: *(Circle all that apply.)*

1% 14.4 (Kb)

9% 28.8 (Kb)

10% 32 (Kb)

23% 56 (Kb)

4% ISDN (64 Kb)

4% ISDN (128 Kb)

48% Lease Line – connection speed (e.g., T1, 1.54 Mbs.)

16. What Web browser and version do you use:

(Please select all that apply.)

0% Lynx

32% Microsoft Internet Explorer

37% Netscape

17. Which of the following media does your office prefer to use to exchange data?

(Please select all that apply.)

- 56% 3 1/2-inch diskette
- 66% CD-ROM
- 16% Jaz disk
- 59% ZIP disk
- 8% 4 millimeter tape
- 18% 8 millimeter tape
- 65% File Transfer Protocol (FTP)
- 3% Digital Versatile Disk (DVD)
- 43% HTTP (Web browser)

18. If your office creates or edits metadata (descriptions of data), what format do you use?

(Please circle appropriate letter.)

- 34% Do not create metadata
- 37% Federal Geographic Data Committee (FGDC)
- 14% State standard
- 5% Academic institution standard
- 15% No Response

19. Do you want to establish an FGDC Clearinghouse Node for your metadata holdings?

The Clearinghouse is a decentralized database providing access to digital spatial data. Creating a node would allow your data to be used by groups outside your agency.

(Please circle appropriate letter.)

- 58% Need more information to decide
- 12% Already have an established FGDC node
- 7% We would like to establish a node
- 16% We would not like to establish a node
- 10% No Response

20. Would you or your staff participate in the following technology training if it were made available?

(Please circle one letter for each subject.)

Subject	Likely to Participate		
	Yes	No	Only If It Were Available Locally
Introduction to Coastal Remote Sensing	43%	16%	28%
Introduction to GIS	30%	19%	28%
ArcView GIS	44%	12%	31%
Avenue Programming for ArcView GIS	40%	17%	26%
Information Management Technologies for Coastal Executives	35%	22%	20%
Developing FGDC-Compliant Metadata	22%	28%	20%
How to Train Others in Developing FGDC-Compliant Metadata	10%	40%	15%
Image Processing Techniques	43%	21%	21%
Interpretation of Aerial Photography	40%	21%	27%
Procedures and Protocols of the Coastal Change Analysis Program	34%	24%	18%

21. Which of the following types of digital data would be useful to your office or agency?

(Please circle appropriate letter.)

Types of Data Sets	Usefulness of Data Sets				
	Not Useful	Already Have Data	Very Useful	Moderately Useful	Minimally Useful
Bathymetry or Topography Data Sets					
Estuarine and bay bathymetry	5%	18%	56%	11%	4%
Nearshore bathymetry (0 to 3 miles)	7%	10%	59%	14%	5%
Offshore bathymetry (3 to 200 miles)	24%	8%	20%	16%	21%
Shoreline	3%	30%	51%	9%	2%
Coastal topography	7%	17%	52%	14%	4%
Shoreline erosion or accretion rates	12%	7%	53%	18%	5%
Storm surge inundation zones	14%	7%	41%	17%	12%
Habitat and Resource Data Sets					
Benthic habitat maps in turbid waters	12%	3%	48%	18%	9%
Coral distribution maps	53%	2%	13%	3%	14%
Seagrass distribution maps	20%	15%	41%	13%	9%
Live bottom distribution maps	15%	2%	47%	18%	9%
Soft bottom distribution maps	14%	4%	46%	17%	9%
Shellfish bed distribution maps	11%	13%	50%	13%	8%
Coastal land cover and land use maps	5%	30%	46%	10%	7%
Coastal land cover change maps	6%	14%	54%	12%	7%
Wetland function	7%	12%	56%	13%	7%
Habitat suitability indices	7%	4%	53%	17%	7%
High resolution aerial photography	4%	16%	61%	12%	3%
Impervious surface maps	9%	2%	48%	17%	10%
Fish distributions	7%	8%	57%	17%	5%
Water Quality Data Sets					
Sea surface temperature	17%	5%	26%	23%	18%
Suspended sediments for ocean waters	28%	1%	16%	21%	22%
Primary productivity for ocean waters	26%	1%	21%	22%	18%
Salinity	20%	4%	30%	22%	11%
Human Use and Other Data Sets					
Marine boundaries (e.g., jurisdictional boundaries)	8%	16%	29%	23%	15%
Human demographics of coastal areas	5%	11%	41%	22%	9%
Water use classification	8%	13%	37%	28%	6%
Protected area boundaries	4%	22%	47%	17%	5%
Marine transportation	15%	6%	21%	25%	20%
Other(s), please specify			*	*	*

Appendix B: Part 2 Survey Results

Total* Respondents: 149

Including: State Agencies, State Sea Grant Extension programs, Coastal Zone Management programs, National Estuarine Programs, National Estuarine Research Reserves.

Note: Added percentages may be greater than 100 because each question can have multiple answers. Percentages calculated using n = 149.

* Indicates essay response.

1. What role does your office play in addressing the following coastal issues?

(This question will help the Center and others understand the issues of importance to your office. If your office does not address the issue at this time, please circle "a" for not applicable. If your office has the lead role in the state or territory for addressing the issue, circle "b." If your office coordinates this issue with another office or agency, circle "c." Circle "d" if your office has no formal responsibility for the activity, yet it has some interest in tracking this issue.)

Coastal Issues	Role Played by Your Office			
	Not Applicable	Lead Role	Coordinating Role	Independent Role
Habitat Issues				
Habitat mapping	18%	23%	42%	18%
Habitat status or health (characterization)	15%	21%	45%	17%
Habitat restoration	13%	20%	44%	21%
Protected area management	19%	30%	36%	14%
Invasive species	18%	17%	38%	25%
Coastal Development Issues				
Growth management	22%	9%	38%	30%
Land use or changes in land use	18%	15%	44%	23%
Dredging or port issues	15%	17%	49%	19%
Waterfront planning or development	17%	14%	40%	28%
Public access to coast	19%	24%	41%	15%
Cumulative impacts	15%	18%	46%	19%
Tourism or recreation	27%	7%	43%	21%
Hazard Issues				
Natural hazards	26%	11%	40%	21%
Coastal erosion or accretion	23%	19%	36%	21%
Beach nourishment	32%	12%	28%	24%
Hazardous material spill planning or response	23%	10%	36%	29%
Oil spill planning or response	24%	11%	40%	24%
Water Quality Issues				
Nonpoint source pollution	12%	24%	49%	15%
Point source pollution	20%	12%	44%	22%
Air deposition of nutrients	35%	10%	25%	30%
Eutrophication or hypoxia	22%	11%	41%	24%
Harmful algal blooms or <i>Pfiesteria</i>	27%	11%	36%	26%
Resource Management and Other Issues				
Watershed management planning or assessment	8%	25%	54%	13%
Ocean management	40%	13%	28%	19%
Shoreline management planning	15%	20%	44%	21%
Land or property management	28%	16%	31%	23%
Protected, threatened, or endangered species	12%	18%	53%	15%
Fish and shellfish stocks	21%	23%	33%	23%
Aquaculture	34%	16%	34%	16%
Cultural resources	36%	6%	38%	20%

Groundwater sources	32%	11%	32%	25%
Surface water	21%	10%	50%	17%
Level of public awareness	6%	23%	38%	6%
Public participation	6%	22%	40%	5%
Competing uses of coastal waters	18%	24%	42%	15%

2. What role does your office play in addressing management issues listed in Question 1 by using or developing the following management techniques?

(This question examines the ways in which your office addresses coastal management issues. If your office does not address issues with the technique at this time, please circle “a” for not applicable. If your office has the lead role in the state or territory for addressing the management technique, circle “b.” If your office coordinates this management technique with another office or agency, circle “c.” Circle “d” if your office has no formal responsibility for the activity, yet uses or aids in developing this management technique.)

Management Techniques	Role Played by Your Office			
	Not Applicable	Lead Role	Coordinating Role	Independent Role
Regulation or permitting	20%	41%	26%	13%
Enforcement	29%	32%	26%	11%
Resource management planning	5%	44%	44%	9%
Public outreach and education	4%	48%	45%	6%
Demonstration and pilot projects	9%	43%	44%	7%
Land acquisition	32%	19%	34%	15%
Leasing public trust lands and resources	50%	11%	21%	15%
Land use planning	19%	13%	49%	17%
Critical area delineation and management	19%	23%	43%	14%
Research	6%	38%	44%	13%
Environmental monitoring	9%	41%	42%	9%
Mapping (land use and resource characterization)	13%	34%	44%	12%
Geographic information systems (GIS)	8%	32%	50%	14%
Technical assistance (provide advice to resource users)	5%	52%	39%	5%
Interagency coordination/clearinghouse	7%	34%	49%	7%
Federal consistency	25%	26%	30%	13%
Other(s), please specify		*	*	*

3. Your office takes which approach(es) when managing coastal resources?

(This question examines the ways in which your office specifically manages or addresses habitat types. Please circle any letters that apply.)

Habitat Types	Approach Taken by Your Office						
	Not Applicable	Permit Actions	Land Use Planning	Interagency Coordination	Restoration	Public Education	No Response
Estuarine waters	13%	38%	29%	66%	40%	63%	5%
Coastal waters	11%	39%	25%	73%	32%	64%	4%
Freshwater wetlands	19%	30%	28%	62%	36%	52%	3%
Submerged aquatic vegetation	16%	28%	23%	59%	31%	52%	4%
Tidal wetlands/marsh	16%	34%	28%	64%	41%	52%	3%
Shellfish habitat	23%	28%	21%	60%	28%	50%	5%
Benthic habitat	16%	28%	17%	62%	25%	51%	5%
Marine outcrops/hard bottoms	46%	16%	5%	34%	11%	26%	7%
Coral reefs	76%	9%	5%	15%	7%	11%	6%

Kelp beds	78%	5%	3%	12%	3%	10%	7%
Rocky shorelines	50%	17%	11%	30%	8%	23%	9%
Beaches and dunes	17%	26%	26%	61%	26%	54%	7%
Maritime forest	46%	14%	15%	33%	15%	28%	10%
Upland forest	38%	10%	19%	40%	20%	32%	11%
Other(s), please specify		*	*	*	*	*	*

4. What non-technical resources or improvements would help your office address its responsibilities?

(Please indicate the expected benefit of the following resources by circling the appropriate letter.)

Non-Technical Resources or Improvements	Expected Benefit			
	None	Low	Medium	High
Additional human resources	3%	5%	24%	67%
Conflict resolution training for staff	9%	24%	44%	20%
Public participation training	6%	26%	40%	24%
Enhanced interagency coordination	2%	19%	46%	32%
Clearer authorities	14%	44%	26%	13%
Stricter enforcement mechanisms	19%	33%	21%	23%
Greater public support	3%	9%	32%	54%
Planning tools	3%	24%	42%	28%
Summary of case studies or Best Management Practices (BMP)	4%	27%	43%	25%
Access to information about how other offices have addressed similar issues, management options	3%	13%	47%	33%
Funding for research or data collection	3%	4%	20%	70%
Funding for demonstration/pilot projects	3%	10%	22%	63%
Funding for outreach initiatives	3%	9%	28%	58%
Funding for training, please specify	7%	17%	25%	32%

5. What information or technical resources would help your office better address its responsibilities?

(Please indicate the expected benefit of the following resources by circling the appropriate letter.)

Information or Technical Resources	Expected Benefit			
	None	Low	Medium	High
Faster computer systems	7%	33%	40%	18%
Geographic information systems (GIS)	6%	11%	37%	43%
Mapping capability	7%	16%	36%	38%
Remote sensing technologies	8%	26%	39%	26%
Resource inventory and assessment	3%	11%	35%	50%
Environmental monitoring technologies	4%	13%	38%	43%
Environmental remediation technologies	10%	23%	44%	23%
Environmental modeling	9%	24%	40%	26%
Enhanced ability to interpret and apply spatial data and imagery for decision making	4%	17%	30%	45%
Software applications, please specify	13%	20%	12%	14%
Access to data sources, please specify	9%	14%	13%	14%
Technical training, please specify	9%	9%	21%	21%
Access to information about how other offices have applied information and technology solutions, please specify	9%	17%	22%	19%

6. If your office has responsibility for public outreach or education, what is your target audience?

(Please circle all letters that apply.)

- 12% Not responsible for education. **Skip to Question 8.**
- 56% Kindergarten to 8th grade school children
- 56% 9th to 12th grade high school students
- 60% Teachers
- 79% Local government
- 68% State legislature
- 60% State executive branch and/or governor’s office
- 85% General public
- 61% Businesses
- 56% Industry
- 66% Resource managers

7. Has your office developed education curricula or programs for any of its audiences?

- 40% No
- 58% Yes

8. Does your office operate volunteer programs to accomplish education, monitoring, stewardship, or research goals?

- 47% No
- 52% Yes

9. Would you or your staff participate in any of the following training subjects if they were made available?
(Please circle one letter for each subject.)

Subject	Likely to Participate		
	Yes	No	Only if Available Locally
Developing management plans	42%	32%	26%
Developing communication plans	30%	31%	38%
Public involvement processes	34%	23%	41%
Conflict resolution	37%	28%	34%
Public outreach plans	40%	23%	33%
Research methods for coastal management	45%	30%	22%
Introduction to coastal zone management	16%	26%	22%

10. Would your interest in any of the training topics listed in Question 9 change if such training were delivered via the World Wide Web or other distance education technologies (such as public television and video conferencing)?

- 65% Would increase
- 13% Would decrease