

NOAA Coastal Services Center

COASTAL RESOURCE MANAGEMENT CUSTOMER SURVEY

2002 RESULTS



NOAA Coastal Services Center
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

Dear Coastal Resource Management Professional:

It's all about you!

The National Oceanic and Atmospheric Administration's Coastal Services Center was created to serve the needs of state coastal programs. The Center provides states with the additional tools, training, data, information, and expertise they need to resolve site-specific issues. Through these collaborative efforts, the nation moves that much closer to accomplishing its goals for coastal resource management.

For the Center to be effective, the specific needs of this customer community must be clearly defined. This information is discovered and collected using a variety of means, the most systematic of which is the Coastal Resource Management Customer Survey. Results from the most recent survey are contained in this document, while information from previous years can be found at www.csc.noaa.gov/survey/.

We will use the survey results to help us serve you better. Thank you for your participation in the survey and for your efforts to protect our nation's coastal resources.

Sincerely,



Margaret A. Davidson
Director, NOAA Coastal Services Center

To see the surveys and the results from 2002, 1999, and 1996, visit the Center's Web site:

www.csc.noaa.gov/survey/

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HIGHLIGHTS OF THE 2002 SURVEY RESULTS

The coastal management community is getting more comfortable with the use of technology.

- Respondents indicate that increased access to information and technology, applied use of data and technology, on-line information search tools, and visualization tools will become more important to them in the next three years.
- Geographic information systems (GIS) are becoming a more standard tool in the community. Ninety-two percent of the respondents indicate their offices use GIS and there is a continued growth in the number of staff using GIS.
- There has been a dramatic increase in the number of offices investing in remote sensing technology. In the last three years, the percentage of offices that have one to two staff members using remote sensing has nearly doubled.
- Nearly all respondents (99 percent) indicate their offices have Internet access, with most having a direct connection.
- Over 90 percent of respondents use Web sites to share new ideas and information.

Spatial data are used to address high priority issues.

- Offices currently use spatial data to address habitat restoration and monitoring, an issue identified by the respondents as being a high priority. Other high priority issues where spatial data are used include land use planning/growth management, watershed planning, water quality monitoring, and nonpoint source pollution.
- Three-quarters of the respondents indicate their offices use shoreline spatial data to specifically address these high priority issues.
- In the last three years, more offices are using spatial data to address protected area management issues.

Even in this information age, face-to-face communication is still important.

- Respondents indicate that partnerships or partnership building, and outreach and education will be a high priority for their offices in the next three years.
- Over 90 percent of the respondents report that talking with colleagues and friends, and attending professional meetings, conferences, workshops, and trainings are the most frequent ways they share new ideas and information. The majority of the respondents find talking with colleagues and friends to be the most useful.

Opportunities still exist in building capacity in the technology area.

- GIS provides an underutilized opportunity for outreach and education. Only a quarter of the education and outreach respondents know the details of their office's GIS use.
- Although 70 percent of the respondents believe that increased access to information and technology will be high priority in the next three years, nearly half of the respondents indicate that they never make spatial data available to the public or do not know if they make spatial data available.
- A third of the respondents classify themselves as unfamiliar with remote sensing and metadata.

There is a need to develop local and regional process skills training.

- A significant number of respondents are more likely to participate in training if it is offered regionally compared to being offered at the Center.

There is interest in training on specific coastal zone management issues and process skills.

- Respondents are more likely to participate in training on leadership in coastal management and performance measures, even if this training is only offered at the Center.

The social sciences are areas for future capacity building.

- Nearly half of the respondents classify themselves as being unfamiliar with the areas of needs assessment, surveying, interview and group data collection, resource valuation, and cultural, historic, and heritage resource management.

Coastal zone management is a dynamic field.

- Nearly half of the respondents have been in working in this field for over 15 years; however, more than 50 percent of them have been in their current positions for 5 years or less.

BACKGROUND

The National Oceanic and Atmospheric Administration's (NOAA) Coastal Services 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 issues and 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 inform development of common goals and partnerships across boundaries, programs, and agencies.

The 2002 Coastal Resource Management Customer Survey represented the third triennial survey administered by the Center. The first and second Center surveys were administered in 1996 and 1999. The 1996 survey targeted the information management and technology segment of the coastal management community. The 1999 survey targeted both the information technology and program/site management segments of the coastal management community, using two separate survey instruments. In 2002, the survey was once again administered as one instrument, in an attempt to better integrate technological information with natural resource management issues and priorities. The 2002 survey also targeted a broader array of coastal management staff. In addition to the program/site manager and lead staff for information technology (geographic information systems and/or remote sensing), lead staff responsible for education and outreach, research, natural resource management, permitting and regulatory enforcement, and planning were also asked to complete the survey.

METHODS

The 2002 survey was administered in the fall of 2002.¹ Survey packets were mailed to 223 offices representing state natural resource management and environmental protection agencies tasked with coastal management, state coastal zone management programs, Sea Grant College Programs and Sea Grant Extension Programs, National Estuarine Research Reserves, U.S. Environmental Protection Agency National Estuary Programs, and NOAA National Marine Sanctuaries. Each office received a survey packet addressed to the program/site manager. Each packet contained seven surveys and instructions that, if applicable, one survey was to be completed by each of the following lead staff in the office: program/site manager, education and outreach, research, natural resource management, planning, permitting and regulatory enforcement, and information technology. Survey questions pertained to coastal resource management issues, technology use, training needs, and coastal environmental professional characteristics.

¹ Approved by the Office of Management and Budget (OBM# 0648-0308) in September 2002.

RESULTS

This section is based on the overall results for the 2002 Coastal Resource Management Customer Survey. Response category frequencies and percents are calculated from completed surveys returned by offices representing state coastal zone management programs, state natural resource management agencies, Sea Grant College Programs, Sea Grant Extension Programs, National Estuarine Research Reserves, National Estuary Programs, and National Marine Sanctuaries from across the continental United States, Alaska, the Caribbean, and the Pacific. For the results highlighted below, percentages shown are calculated independently for each question, item, and column to reflect accurate proportions of responses. Percentages for “Don’t know” answers and nonresponses are not presented here; therefore, totals may not equal 100 percent in all cases.

Response Rate

The total number of surveys returned was 679, with 442 completed and 237 returned marked “not applicable.” The completed surveys comprised responses from 165 offices for a response rate of 74 percent of the offices surveyed. The distribution of responses by program is shown in Table 1.

Table 1. 2002 Coastal Resource Management Customer Survey responses by program type

Program Type	Number of offices	Number of offices completing surveys	Percent of offices responding	Number of completed surveys
U.S. EPA National Estuary Programs	28	19	67.9%	34
National Estuarine Research Reserves	27	20	74.1%	54
NOAA National Marine Sanctuaries	12	10	83.3%	27
Sea Grant College Programs	32	23	71.9%	56
Sea Grant Extension Programs	32	21	65.6%	41
State Coastal Zone Management Programs	35	32	91.4%	137
State Natural Resource Management Agencies	57	40	70.2%	93
Total	223	165	74.0%	442

Priority of Natural Resource Management Tools and Techniques

Survey respondents were asked to indicate the importance of a variety of management tools and techniques to their office over the past three years and for the next three years. Table 2 shows the mean importance scores for 14 tools and techniques. Mean scores are shown in descending order of importance for the *next three years*. The two items with the highest mean importance scores were *partnerships or partnership building* and *increased access to information and technology* for the last three years and the next three years. The lowest mean score for both time periods was for *visualization tools*. The majority of tools and techniques had mean scores reflecting medium to high importance for both time periods.

Table 2. Past and future importance of management tools and techniques^a

Management Tools and Techniques	over the last 3 years	over the next 3 years
	Mean importance	Mean importance
Partnerships or partnership building	3.6	3.8
Increased access to information and technology	3.5	3.7
Applied uses of data and technology	3.3	3.7
Outreach and public relations	3.4	3.7
Technical training or professional development (e.g., content specific, process skills, technology tools)	3.3	3.5
Public involvement in coastal management	3.2	3.5
On-line information search tools (e.g., data, training, funding)	3.0	3.4
Topical coastal conferences/workshops	3.2	3.4
Environmental education	3.2	3.4
Fellowships, assistantships, internships, or mentoring programs	2.9	3.1
Regulation, zoning, permitting, or law enforcement	2.9	3.0
Capital improvements or equipment	2.9	3.0
Administrative or managerial training	2.6	2.9
Visualization tools (e.g., hurricane models, 3-D models)	2.4	2.8

^a Mean scores calculated on a scale from 1 to 4, where 1=Not at all, 2=Low, 3=Medium, and 4=High.

Top Natural Resource Management Issues for Near Future

Respondents were asked to list the priority management issues their offices would face over the next three years. The top issues listed by respondents to this question (n=364) were, in order, habitat protection and loss (29.9 percent), coastal development (26.6 percent), nonpoint source pollution and associated program development and implementation (25.8 percent), ecological restoration (21.2 percent), fisheries management (20.1 percent), water quality (19.8 percent), nonnative species (17.0 percent), marine protected areas (12.6 percent), management planning (11.8 percent), and education and outreach (11.0 percent).

Coastal Management Issue Priorities and Spatial Data Use

Respondents were asked about their office's current priority management issues and whether spatial data were used to address these issues. Table 3 presents 12 management issues that 50 percent or more of respondents indicated were a medium or high priority for their office. The highest priority issue was *nonpoint source pollution*, followed by *habitat restoration and monitoring*, *water quality monitoring*, and *watershed planning*, in descending order. The three issues with the lowest priority scores (not shown in Table 3) were *weather monitoring*, *air quality monitoring*, and *homeland security*. The three issues most frequently addressed using spatial data were *habitat restoration and monitoring*, *land use planning/growth management*, and *watershed planning*.

Table 3. Coastal management issue priorities and associated spatial data use

Issue Topic	Percent of respondents indicating issue as medium or high priority for their office	Percent of respondents indicating their office uses spatial data to address this issue
Nonpoint source pollution	78.5%	47.4%
Habitat restoration and monitoring	75.2%	61.8%
Water quality monitoring	71.6%	50.8%
Watershed planning	70.4%	56.7%
Protected area management	62.9%	53.2%
General environmental assessments	62.1%	48.1%
Public access	60.7%	44.6%
Land use planning/growth management	58.8%	59.6%
Invasive species management	57.9%	32.8%
Storm drainage/floodplain management	54.5%	44.0%
Dredging	52.4%	31.4%
Protected species management	51.2%	39.0%

Specific Spatial Data Use and Requirements

Respondents were asked to indicate whether their offices use specific spatial data layers. In the event that an office did not currently have access to a particular data layer, respondents were asked to indicate how useful such data *would be* for their office. Table 4 represents a subset of this initial list, including those data layers that were reported to have been used by 25 percent or more of respondents. The four data layers with the highest reported usage were *shoreline* (74.8 percent), *coastal land use* (65.6 percent), *protected areas* (63.5 percent), and *coastal land cover* (62.4 percent). The six data layers that respondents reported *would be* most useful included *public access*, *coastal land use*, *water quality*, *sea grass distribution*, *protected areas*, and *coastal population and demographics*. Additional data layers that are not currently available but that would be useful included *sea surface temperature*, *marine transportation*, and *coral/live bottom distribution*. The data layer with the lowest reported usage was *fiber-optic cable locations*, which also had the lowest reported “potential usefulness.”

Spatial Data Software and Staff Use

This section of the survey focused on the office and staff use of geographic information systems (GIS) and remote sensing, including use of specific software packages, number of staff and frequency of use, and use and preferences for specific data products. Results from this section of the survey will be used to inform continued provision of products and services that match the geospatial technology needs and capabilities of the Center’s customers.

Table 4. Use and usefulness of spatial data layers

Spatial Data Layer	Percent of respondents indicating their office uses these data
Shoreline	74.8%
Coastal land use	65.6%
Protected areas	63.5%
Coastal land cover	62.4%
Water quality	59.4%
Elevation	59.1%
Public access	58.5%
Bathymetry (0 to 3 miles)	56.7%
Recreation areas	55.8%
Coastal population and demographics	55.0%
Estuarine and bay bathymetry	52.5%
Soils	52.0%
Historic shoreline	49.9%
Water use classification	46.4%
Cultural and historic resources	45.4%
Seagrass distribution	44.3%
FEMA flood maps/inundation zones	43.3%
Salinity	43.2%
Socioeconomic data	42.2%
Docks and piers	41.3%
Sediments	41.2%
Shellfish bed distribution	41.0%
Fish habitat distribution maps	40.1%
Benthic habitat maps	39.5%
Aquaculture sites	38.3%
Bathymetry (3 to 200 miles)	38.2%
Marine jurisdictional boundaries	36.2%
Suspended sediments	34.2%
No-take zones (i.e., no consumptive use)	32.0%
Artificial reef distribution	27.3%

Two key questions were asked of respondents with regard to their offices' use of GIS and remote sensing. A total of 429 respondents answered each of these key questions. The percent of respondents reporting that their offices use GIS and remote sensing was 84.7 percent and 77.7 percent, respectively. If respondents knew the details of their offices' use of GIS or remote sensing, they were instructed to continue through the normal sequence of questions, which asked about specific GIS and remote sensing use characteristics. Respondents who did not know the details of their offices' use of GIS or remote sensing were instructed to skip ahead to the next section (i.e., a particular question number). Of the 429 respondents who answered these

questions, the numbers of respondents who indicated that they did indeed know the details were 195 and 123 for the GIS and remote sensing questions, respectively. The distribution of respondents who knew the details of their offices' GIS and remote sensing use are displayed by program type and position type in Tables 5a and 5b.

Table 5a. Distribution of respondents by program type for detailed office GIS and remote sensing use questions

Program Type	Number of offices completing surveys	GIS Use Details		Remote Sensing Use Details	
		Number of offices responding	Percent of offices responding	Number of offices responding	Percent of offices responding
U.S. EPA National Estuary Programs	19	12	63.2%	6	31.6%
National Estuarine Research Reserves	20	12	60.0%	10	50.0%
NOAA National Marine Sanctuaries	10	9	90.0%	7	70.0%
Sea Grant College Programs	23	12	52.2%	9	39.1%
Sea Grant Extension Programs	21	15	71.4%	8	38.1%
State Coastal Zone Management Programs	32	27	84.4%	21	65.6%
State Natural Resource Management Agencies	40	27	67.5%	20	50.0%
Total	165	114	69.1%	81	49.1%

Table 5b. Distribution of respondents by position type for detailed office GIS and remote sensing use questions

Position Type	Number of respondents completing surveys	GIS Use Details		Remote Sensing Use Details	
		Number of individuals responding	Percent of survey respondents	Number of individuals responding	Percent of survey respondents
Information technology	31	30	96.8%	30	96.8%
Research	29	18	62.1%	18	62.1%
Natural resource management	48	25	52.1%	15	31.3%
Program/site administrators	119	52	43.7%	26	21.8%
Planning	27	11	40.7%	11	40.7%
Permitting and regulatory enforcement	41	14	34.1%	14	34.1%
Education and outreach	90	24	26.7%	8	8.9%
Others	15	7	46.7%	7	46.7%
Total	400	181	45.3%	129	32.3%

Results presented in the following four tables (i.e., Tables 6, 7, 8 and 9) and associated paragraphs reflect responses from respondents who knew the details about their offices' use of GIS and remote sensing. Table 6 presents the percent responses for GIS and remote sensing software packages used among offices in the coastal management community. The most widely used GIS software package is ESRI ArcView (84.6 percent), followed by additional ESRI software packages, ArcInfo (40.0 percent) and ArcGIS (39.5 percent). The three most widely used extensions for ESRI's ArcView and associated software packages were Spatial Analyst (53.3 percent), 3-D Analyst (25.6 percent), and Image Analysis (21.0 percent). The two most widely used remote sensing software packages were ESRI Image Analysis (31.7 percent) and ERDAS Imagine (25.2 percent). When asked about current use of ESRI ArcGIS, 37.4 percent of respondents reported that their offices already owned ArcGIS and another 10 percent anticipated converting to ArcGIS within one year.

Table 6. GIS and remote sensing software use

GIS Software	Percent of respondents ^a	Remote Sensing Software	Percent of respondents ^b
ESRI ArcView	84.6%	ESRI Image Analysis	31.7%
ESRI ArcInfo	40.0%	ERDAS Imagine	25.2%
ESRI ArcGIS	39.5%	MicroImages TNTmips	4.1%
ESRI ArcExplorer	16.9%	RSI ENVI	2.4%
ESRI ArcIMS	16.4%	Clark Labs IDRISI	1.6%
ESRI ArcSDE	8.2%		
ESRI ArcPad	7.7%		
MapInfo	4.6%		
Geographic Resources Analysis Support System (GRASS)	2.6%		
Intergraph GeoMedia	1.5%		
ArcView/ArcGIS Extensions			
Spatial Analyst	53.3%		
3-D Analyst	25.6%		
Image Analysis	21.0%		
BASINS	8.2%		
Geostatistical Analyst	5.6%		

^a n=195; ^b n=123

Table 7 presents the numbers of current staff (i.e., permanent or temporary full-time equivalents) per office that use GIS or remote sensing regularly. Over 90 percent of respondents reported that their office has one or more staff that use GIS regularly, and 49.2 percent reported three or more. Also, 78.9 percent of respondents reported that one or more staff use remote sensing regularly, while 29.3 percent reported that three or more staff members use remote sensing regularly. When asked about their individual use characteristics, 68.9 percent and 36.6 percent of respondents reported that they use GIS or remote sensing, respectively. Frequency of individuals' GIS and remote sensing use is presented in Table 8.

Table 7. Number of current staff who use GIS or remote sensing

Number of staff per office who regularly use...	GIS	remote sensing
Zero	7.7%	20.6%
1 to 2	41.5%	49.6%
3 to 5	28.7%	19.5%
6 to 10	7.7%	4.9%
Over 10	12.8%	4.9%

Table 8. Individual GIS or remote sensing use

Frequency of use of...	GIS ^a	remote sensing ^b
Daily (every day)	34.8%	24.4%
Weekly (one or more times per week)	25.9%	26.7%
Monthly (one or more times per month)	19.3%	17.8%
Less than once per month	20.0%	26.7%

^a n=135; ^b n=45

In terms of the types or forms of remotely sensed data their offices use and prefer to use, over 90 percent of respondents reported that their offices use hard copy data, such as maps and photographs (Table 9). The second most widely used form of remotely sensed data used was *derived digital products* (e.g., land cover maps, chlorophyll concentrations, habitat delineations). More than half of the respondents reported a preference for this form of data. More than 77 percent of respondents reported that their offices use geo-rectified digital imagery, which was also the most preferred form of remotely sensed data.

Table 9. Use and preferences of remotely sensed data

Forms of remotely sensed data <u>your office</u> ...	uses	prefers to use
Analogue or hardcopy (e.g., aerial photographs, image maps)	91.9%	30.1%
Derived digital products (e.g., land cover maps, habitat delineations, elevation models, sea surface temperature, chlorophyll concentration)	82.1%	54.5%
Geo-rectified digital imagery	77.2%	59.3%
Explanatory documents (e.g., summaries, technical reports, tables, spreadsheets)	68.3%	26.8%
Unprocessed or “raw” digital data (e.g., satellite imagery, airborne imagery, LIDAR elevations)	44.7%	8.1%

Field Monitoring

Respondents were asked to list the biophysical attributes that their office monitors or would like to monitor remotely in the field. The most frequently mentioned attributes mentioned by the respondents to this question (n=225) were, in order, temperature (43.6 percent), salinity (32.9 percent), turbidity/suspended sediments (32.4 percent), dissolved oxygen (30.7 percent), current/water flow (19.6 percent), chlorophyll (16.9 percent), vegetative cover (15.1 percent), nutrients (12.0 percent), and pH (8.4 percent).

Information Exchange

Respondents were asked about access to the Internet, frequency of interaction with customers and colleagues, participation and preference for different information sharing opportunities, data and information sharing and cataloging practices, barriers to data sharing, and metadata. These results enable the Center to target key information sources and methods for Center-related information exchange and technology transfer.

Internet Access

Respondents were asked to indicate their Internet accessibility. Because these questions were included in previous Center surveys, response rates can be used to monitor changes in capacity over time. Results from this section depict the access speed and breadth of accessibility among different offices and staff types within the coastal management community, which have direct utility to the development of Center Web-based tools, Web site development, and information delivery. Internet access was reported by 99.1 percent of respondents; 94.9 percent have their own desktop access, and 4.2 percent share access with others in their office. Direct connections (e.g., cable modem, T1, DSL) were reported by 88.9 percent of respondents; 9.3 percent of respondents reported dial-up Internet access.

Interaction with Customers and Colleagues

Respondents were asked about frequency of interaction with their customers and fellow natural resource management colleagues (Table 10) and about participation in a variety of information exchange activities and opportunities (Table 11). Results from these questions aid the Center in further identifying information exchange pathways, venues, and methods of information exchange, and have direct relevance for planning and delivery of training and technical assistance. The vast majority of respondents (91.0 percent) indicated frequent—weekly (22.5 percent) and often daily (68.5 percent)—contact with their customers. A great portion of respondents (85.3 percent) interacts with colleagues outside of the office at least weekly.

Table 10. Frequency of interaction with customers and colleagues

Frequency of interaction with...	“customers”	colleagues outside of your office
Daily (every day)	68.5%	48.2%
Weekly (one or more times per week)	22.5%	37.1%
Monthly (one or more times per month)	4.2%	10.6%
Less than once per month	3.0%	4.1%

Respondents were asked to indicate their preferred formats or mechanisms for information exchange. These can be classified as active (e.g., talking with colleagues, workshops, e-mail discussions) or passive (e.g., reading reports, journals, newsletters). The three most frequently used methods for information exchange were *talking with colleagues and friends*, *professional meetings and conferences*, and *workshops and trainings*, all with participation over 90 percent. The least frequently used mechanism was *Web-based discussion groups*. Still, 43.9 percent of respondents indicated participation in this activity. The three most frequently used passive formats of information exchange were *Web sites* (91.4 percent), *newsletters* (83.9 percent), and *technical documents, government reports, proceedings* (80.8 percent). The least frequently used passive format was *electronic journals and magazines* (50 percent).

Table 11. Sharing new ideas and information

Activity/Opportunity	Percent participation	Percent indicating medium or high usefulness
Talking with colleagues and friends	98.0%	98.1%
Professional meetings and conferences	94.1%	89.8%
Web sites	91.4%	87.0%
Workshops and trainings	94.1%	85.4%
Technical documents, government reports, proceedings	80.8%	75.7%
Scientific journals	71.5%	69.2%
Books	71.0%	63.2%
Newsletters	83.9%	61.6%
E-mail discussion groups (list servers)	74.4%	56.3%
Magazines	63.3%	55.4%
CDs	64.0%	47.4%
Electronic journals (E-journals) and electronic magazines (E-zines)	52.3%	43.6%
Trade publications or corporate reports	60.9%	41.8%
Web-based discussion groups	43.9%	15.8%

Sharing Digital Data

Over 28 percent of respondents indicated that their offices share data via a clearinghouse, and 35.1 percent share data using some form of digital media (e.g., CDs). Respondents were asked to indicate past difficulties associated with the distribution of spatial data. Based on the results, the lack of human resources presents the greatest barrier to sharing spatial data (Table 12). Barriers related to lack of expertise, lack of software or hardware, and restrictive licensing or research data-sharing protocols were less prevalent—selected by 20 percent or fewer respondents.

Table 12. Difficulties with sharing spatial data

Difficulties <u>your office</u> experiences when trying to make digital data readily available to the general public	Percent of respondents
We lack the human resources necessary for distributing spatial data.	32.4%
We lack the necessary expertise for distributing spatial data.	20.1%
We have no difficulties distributing spatial data.	17.6%
We lack the necessary software for distributing spatial data.	14.7%
We lack the necessary hardware for distributing spatial data.	13.1%
Licensing or research restrictions preclude or delay distribution of the data.	6.3%

Metadata

The Center is committed to implementing the federal metadata standard developed by the Federal Geographic Data Committee (FGDC). The Center provides training and technical assistance for the development of FGDC-compliant metadata. In order to gauge capacity in this area and focus metadata-related training and technical assistance toward the needs of the CZM community, respondents were asked about the format their offices used to create or edit metadata. Metadata use varied widely across the coastal management community, with 31.4

percent of respondents indicating that their offices do not create or edit metadata, 21.3 percent indicating that their offices create or edit metadata using the FGDC standard, 7.2 percent using another unspecified format, and 36.9 percent indicating that they *don't know* if their office creates or edits metadata. Of those offices that create FGDC metadata, 29.8 percent contribute metadata to the FGDC clearinghouse system, while only 1.1 percent host an FGDC metadata node.

Training and Professional Development

The 2002 Center survey contained questions about opportunities that offices take advantage of for professional development, participation in and interest for training, and experience and expertise on coastal management topics. Responses to these questions contribute to the assessment of experience and expertise within the coastal management community pertaining to a variety of coastal management tools, techniques, skills, and subject areas. The Center uses these results to provide training, technical assistance, products, and services that are well suited to the audience, by considering differences in technical ability within each segment of the coastal resource management community (e.g., education and outreach program leaders, site/program managers).

Training Participation and Needs

The 2002 Center survey continued ongoing efforts to assess training interests and needs. Results from these questions allow the Center to plan for, develop, and coordinate training for coastal resource management professionals both at the Center in Charleston and off-site, either for regional or site-specific delivery. When asked if their offices would support either local or out-of-state training during the next three years, 83.9 percent of respondents stated that they would have support for in-state training and 63.6 percent stated support for out-of-state training. Questions related to past participation in content-specific trainings allow staff within the Center to gauge overall capacity relative to each subject area. The Center places a strong focus on evaluating and meeting needs expressed within the coastal management community; therefore, the “likelihood to participate” element is important to identify constraints related to travel or preferences for a particular delivery mechanism.

Training topics were arranged into three categories (Table 13), *Coastal Zone Management Issues*, *Process Skills*, and *Technology Training* (i.e., *Working with Spatial Data and Metadata*). The topics with the highest past participation frequency were *land use planning* (19.2 percent), *conflict management* (31.9 percent), and *Introduction to ArcView 3.2* (22.9 percent) in the coastal management, process skills, and technology categories, respectively. Overall, respondents' likelihood to participate in training was highest if trainings were offered regionally or on-line. Within each category, the topics with the highest likelihood for participations when offered at the Center were *leadership in coastal management* (20.4 percent), *performance measures* (16.5 percent), and *identifying and mapping coastal habitats* (22.2 percent). The most popular topics for potential on-line courses were *Coastal Zone Management Act* (25.6 percent), *grant proposal writing* (21.3 percent), and *identifying and mapping coastal habitats* (26.2 percent). Options for regional delivery were restricted to the coastal zone management and process skills categories. Within these two areas, respondents indicated that they would be most likely to participate in regional workshops for *leadership in coastal management* (29.6 percent), *integrated coastal management* (29.6 percent), and *performance measures* (28.1 percent).

Table 13. Past participation and likelihood to participate in training

Topic	Past participant at training sponsored by...		Likelihood to participate...		
	NOAA Coastal Services Center	other training facility/school	at NOAA Coastal Services Center	if offered on-line	if offered regionally (i.e., within 4 hours)
<i>Coastal Zone Management Issues</i>					
Leadership in coastal management	--	7.5%	20.4%	22.4%	29.6%
Integrated coastal management	5.0%	10.2%	17.6%	24.7%	29.6%
Smart growth	2.3%	15.8%	15.2%	22.4%	28.7%
Coastal Zone Management Act	6.1%	10.9%	13.3%	25.6%	26.0%
Land use planning	--	19.2%	12.4%	21.5%	25.6%
Public Trust Doctrine	2.0%	9.0%	9.5%	16.1%	16.1%
Risk-vulnerability assessment	2.9%	5.9%	9.5%	15.6%	19.2%
Recreation resource management	--	7.5%	9.5%	13.3%	19.2%
Tourism development planning	--	7.7%	9.3%	15.2%	16.7%
Cultural and historic resource management	--	6.6%	7.5%	12.7%	14.7%
Sustainable port development	--	3.2%	7.5%	10.6%	13.8%
<i>Process Skills</i>					
Performance measures	--	14.7%	16.5%	20.4%	28.1%
Conflict management	6.3%	31.9%	10.0%	17.4%	27.4%
Evaluation (e.g., program, product, service)	2.0%	12.0%	13.1%	17.9%	27.1%
Outreach planning	--	9.5%	11.3%	21.0%	27.1%
Public issue education	2.9%	12.7%	10.4%	19.0%	26.9%
Grant proposal writing	--	12.9%	10.4%	21.3%	25.1%
Collaborative processes	5.4%	17.4%	9.0%	17.2%	24.7%
Needs assessment	9.3%	9.7%	9.7%	17.0%	24.2%
Facilitation/meeting management	5.9%	22.9%	8.8%	14.9%	22.9%
Effective communication skills	--	23.5%	8.6%	15.2%	22.6%
Program design	--	7.9%	11.8%	14.7%	21.7%
Media relations	--	14.9%	7.9%	16.5%	21.5%
Managing multiple perspectives	1.4%	10.2%	7.7%	12.2%	17.2%

Table 13. Past participation and likelihood to participate in training (continued)

Topic	Past participant at training sponsored by...		Likelihood to participate...	
	NOAA Coastal Services Center	other training facility/school	at NOAA Coastal Services Center	if offered on-line
<i>Technology Training</i>				
<i>Working with Spatial Data</i>				
Identifying and mapping coastal habitats	--	4.1%	22.2%	26.2%
Habitat assessment methods	--	6.1%	20.6%	25.1%
Information technology for coastal managers	2.3%	2.5%	15.8%	23.3%
GIS for managers	3.6%	4.3%	14.9%	26.0%
Introduction to coastal remote sensing	2.5%	5.2%	14.3%	20.8%
Photo interpretation	--	10.4%	13.6%	19.5%
ArcGIS	--	7.5%	13.6%	17.2%
Intermediate remote sensing (image processing and interpretation techniques)	--	3.8%	12.0%	13.8%
Spatial data management	--	2.9%	10.6%	13.8%
Remote sensing for spatial analysts	1.8%	3.8%	10.6%	13.6%
Introduction to GPS	1.8%	12.0%	9.7%	18.1%
Introduction to ArcView GIS 3.2	9.5%	22.9%	9.5%	17.9%
Visual Basic and ArcObjects	--	2.0%	8.6%	12.4%
Intermediate ArcView GIS 3.2	7.0%	10.4%	7.9%	14.7%
<i>Metadata</i>				
Metadata training workshops	5.0%	7.2%	10.0%	15.6%
How to train others in developing FGDC-compliant metadata	0.2%	1.4%	3.8%	7.2%

Coastal Management Professional Characteristics

The next series of questions asked respondents to describe their position in terms of their field of expertise, years of experience, and familiarity with a variety of coastal management-related topics and professional skills. The majority of respondents (69.1 percent) had more than 10 years of experience (Table 14). The number of years in a position varied widely, but 51.3percent of respondents had been in their current positions fewer than five years.

Table 14. Respondents’ years of experience and years in current position

Time	Percent working in this field	Percent working in current position
Less than 1 year	0.2%	9.3%
1 to 5 years	15.8%	42.0%
5 to 10 years	14.8%	19.7%
10 to 15 years	19.7%	15.7%
More than 15 years	49.4%	13.3%

In order to further characterize participation in the survey, respondents were asked to identify their position based on seven targeted categories (Table 15). Program administrators exhibited the highest participation (30.9 percent), while 23.4 percent of respondents identified themselves as education and outreach staff. *Planning, research, and information technology* categories had the fewest participants overall. It is important to note that a substantial number of respondents (n=42) failed to indicate their position title. These nonresponses, when combined with the “Others” category (n=15), represent nearly 15 percent of total respondents. These missing or nonspecific data can limit the depth of analysis and assessment of customer needs.

Table 15. Distribution of respondents by position title

Position Title	Number of respondents	Percent of respondents ^a
Program/site administrators	119	30.9%
Education and outreach	90	23.4%
Natural resource management	48	12.5%
Permitting and regulatory enforcement	41	10.6%
Information technology (GIS or remote sensing)	31	8.1%
Research	29	7.5%
Planning	27	7.0%
Others	15	3.9%

Familiarity with Coastal Management Topics and Professional Skill Areas

Respondents were asked to indicate their familiarity with a variety of topics and professional skill areas (Table 16). Topics and skills were listed in five categories, including *program management and planning, natural resource management, social sciences, public participation, and technology*. Table 16 displays the percent of respondents for each of the four familiarity categories (i.e., *unfamiliar, familiar, working knowledge, and expertise*). The topics and skill areas with the highest level of familiarity in terms of reported *expertise* in each of the five categories were *program administration* (28.4 percent), *natural resource planning* (20.3 percent), *educational design and program development* (10.6 percent), *facilitation/meeting management* (21.9 percent), and *geographic information systems* (10.2 percent). The topics and skill areas with the lowest reported familiarity (i.e., *unfamiliar*) in each of the five categories were *information management* (32.6 percent), *environmental impact statements* (33.3 percent), *cultural, historic, and heritage resource management* (51.6 percent), *volunteer coordination and management* (19.4 percent), and *metadata* (39.8 percent).

Table 16. Familiarity of respondents with coastal resource management-related topics and associated professional skills

Topics/Professional Skill Areas	Unfamiliar	Familiar	Working knowledge	Expertise
<i>Program Management and Planning</i>				
Program administration	9.4%	24.1%	38.1%	28.4%
Urban and regional planning	20.2%	46.4%	26.4%	7.0%
Information management	32.6%	38.1%	20.1%	9.2%
<i>Natural Resource Management</i>				
Natural resource planning	10.9%	27.1%	41.8%	20.3%
Ecosystem management	13.0%	35.7%	36.0%	15.2%
Landscape and restoration ecology	14.8%	34.7%	38.1%	12.4%
Watershed management	14.1%	36.7%	38.1%	11.2%
Wildlife management	15.7%	41.3%	35.5%	7.5%
Fisheries management	25.0%	41.5%	22.8%	10.7%
Environmental policy and law	26.4%	42.4%	24.6%	6.7%
Property rights and multi-jurisdictional management	27.8%	47.3%	19.5%	5.4%
Environmental impact statements	33.3%	38.7%	22.2%	5.9%
<i>Social Sciences</i>				
Social impact analysis	25.6%	41.9%	27.0%	5.5%
Educational design and program development	30.7%	37.3%	21.4%	10.6%
Recreation resource management	25.4%	43.0%	27.9%	3.7%
Ecotourism management	30.5%	35.5%	28.3%	5.7%
Program evaluation or product and service evaluation	39.6%	41.5%	15.2%	3.7%
Needs assessment	41.8%	43.5%	12.0%	2.7%
Survey, interview, and group data collection	45.3%	39.1%	12.1%	3.5%
Resource valuation	49.1%	39.8%	9.1%	2.0%
Cultural, historic, and heritage resource management	51.6%	37.6%	9.6%	1.2%
<i>Public Participation</i>				
Facilitation/meeting management	8.4%	22.4%	47.2%	21.9%
Partnership building	9.2%	22.4%	49.6%	18.8%
Grant writing and fundraising	11.8%	25.6%	42.8%	19.8%
Stakeholder involvement	14.7%	25.2%	39.9%	20.2%
Public relations/working with the media	11.3%	36.4%	42.2%	10.1%
Volunteer coordination and management	19.4%	42.2%	28.4%	10.0%
<i>Technology</i>				
Geographic information systems (GIS)	15.3%	53.4%	21.1%	10.2%
Global Positioning System (GPS)	19.2%	51.5%	23.1%	6.3%
Remote sensing	30.5%	48.0%	18.5%	2.9%
Metadata	39.8%	42.7%	14.6%	2.9%

DISCUSSION

The purpose of the survey was to assess management priorities, technology use, training needs, information exchange, and professional characteristics across the U.S. coastal resource management community. Respondents were asked to answer questions about their offices and, in some cases, their individual position-related practices and skills. The results represent information from a diverse suite of staff positions, agency and program types, coastal management settings, and geographic locations.

Management tools and techniques related to talking to customers and colleagues (e.g., partnerships/partnership building, public involvement, outreach, environmental education), technical training and professional development, and increased access to and application of data and technology were reported as more important over the last three years and for the next three years than direct management methods (e.g., enforcement, regulations, zoning), capital improvements, and managerial training. These results suggest a growing emphasis on increased collaboration with partners and constituents, increased communication between agencies and affected parties (e.g., user communities), and increased time- and cost-efficiency by using tools and gaining new skills, and they reflect decreased budgets, staff, and time available for field-based management actions and capital improvements.

The majority of the coastal management community uses spatial data and spatial data analysis and management tools to aid its efforts in managing coastal natural resources. High priority coastal management issues fell generally into four categories: environmental assessment and monitoring; land-use and landscape-level planning; biological conservation and ecosystem management; and control, mitigation, and restoration of existing human impacts. In relationship to the Center's four strategic theme areas—smart coastal growth, habitat, hazards, and the coastal national spatial data infrastructure (NSDI)—the issues and the corresponding use of spatial data are directly related to the Center's efforts and focus. The high value of using spatial data to address these coastal management issues is apparent from the reported high frequency use of spatial data and the specific spatial layers that respondents indicated their offices using. The results also indicate use and preferences for data products. Respondents indicated that the least popular format for receiving remotely sensed data is in their raw form, and indicate a preference for applied (or at least preprocessed) imagery and data.

Results of the GIS and remote sensing questions indicated a high prevalence of GIS and remote sensing use among the survey population. More than 84 and 77 percent of respondents indicated their offices using GIS and remote sensing, respectively. When responses are measured in terms of percent of offices using GIS and remote sensing, this translates to 92 and 86 percent of the 165 offices responding using GIS and remote sensing, respectively. Respondents in *information technology*, *research*, and *natural resource management* position types had a higher frequency of response for detailed questions about their offices' use of GIS and remote sensing, than respondents from the other listed position categories. This distribution of respondents to the GIS and remote sensing questions suggests that education and outreach, and permitting are two areas in which GIS and remote sensing may be underutilized within the CZM community.

Effective communication and sharing of information and data with customers, colleagues, and the general public is an important facet of natural resource management. The mechanisms available to the coastal management community for passively and actively sharing and receiving information are numerous. Barriers to sharing and receiving information can prevent not only effective communication, but access to critical data for decision making and public education. The survey addressed several aspects of information exchange. Results indicated that more than 99 percent of the coastal management community has access to the Internet. This is an increase from the 1999 survey, where 89 percent of respondents reported Internet access. The percent of respondents with direct connections has increased substantially since 1999, with only 9 percent now reporting dial-up access. This increased access and speed of access affords opportunities for information exchange not possible before.

With a U.S. population that is more connected to the Internet, the demand for information from the public sector (e.g., natural resource management agencies) has increased, and barriers to data and information exchange can become a great hindrance. However, aside from lack of staff, other barriers to sharing spatial data (e.g., expertise, hardware, software) were reported by 20 percent or fewer respondents. The results also show an increase in the creation of metadata since the 1999 survey; however, this is an area that needs attention. More than 30 percent of respondents indicated that their offices either did not create metadata or they did not know if their offices created metadata. Additionally, metadata was one of the topics that respondents reported that they were least familiar with. The Center's commitment to the use of the Federal Geographic Data Committee standard for geospatial metadata is bolstered by its provision of metadata workshops, Web-based materials, and technical assistance. The survey results indicate a need for continued efforts in this arena.

Weekly or more frequent contact with customers and colleagues was reported by the vast majority of respondents. As mentioned earlier in this section, activities related to information exchange (e.g., outreach, environmental education, public involvement) were ranked highly in terms of importance over the last and next three years. Everyday conversations with colleagues, professional meetings and conferences, workshops, and trainings were reported as the most frequent and most useful information-sharing activities.

For all coastal management, process skill, and technology training topics, likeliness to participate in training was higher for training *if offered on-line* than for training offered at the Center. Likeliness to participate was higher for training *if offered regionally* for all coastal management and process skill training topics than for either on-line or Center-based training. The majority of respondents indicated that they would have support for training, both in-state and out-of-state, over the next three years. However, in an environment of reduced budgets and increased travel restrictions, the possibility of participating in training within one's region (i.e., within four hours) and the flexibility often available with on-line training might make these two options more appealing and feasible for coastal management professionals.

The results related to coastal management professional characteristics depicted an experienced group of individuals, with nearly 70 percent of respondents reporting more than 10 years of experience and nearly half of respondents reporting 5 or more years in their present positions. The percent distribution of respondents across the seven listed position types suggests familiarity with a broad array of topics and professional skills. The results also indicate topic and professional skill areas where the level of familiarity may not match the apparent need as identified in other sections of the survey. This information can aid the Center's efforts to design training and information transfer mechanisms and develop decision-support tools to address gaps in the knowledge and understanding of key coastal management-related topics and skill areas.

The 2002 Coastal Resource Management Customer Survey results provide a wealth of information about the state of coastal resource management in the U.S. and the priorities, needs, and practices of the offices and individuals that comprise the coastal management community. More specifically, the results provide the NOAA Coastal Services Center with valuable information about its customers' resource management priorities, use of spatial technology, training needs, information exchange practices, and professional characteristics. This information, in turn, aids the Center in planning for projects, products, and services that best meet the needs of those customers.

The results of the survey indicate that the Center's past and present efforts and commitment to providing access to spatial data, development of new products, and delivery of training and technical assistance are in line with, and are carried out in response to, the needs of its customers. The Center's periodic administration of the coastal management survey—every three years—has been essential in assessing customer needs, evaluating Center projects, and gauging its future efforts. Certainly, the willing participation of the coastal resource management community in these surveys has been invaluable in helping the Center fulfill its mission.

The NOAA Coastal Services Center

The mission of the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center is to support the environmental, social, and economic well being of the coast by linking people, information, and technology.

The nation's state coastal resource management programs are the primary recipients of the Center's efforts, which include bringing new tools, information, and expertise to resolve site-specific coastal management issues. The resulting new tools and approaches often can be applied nationwide. The Center also develops products and services for the broad coastal management community. These include training, a national database of land cover data, and a variety of systems designed to get useful data to coastal managers.

To learn more about these efforts, visit the Center's Web site at www.csc.noaa.gov or call the Center and request a copy of the *Project Inventory*, a free publication that summarizes many of the Center's projects undertaken during the last nine years.

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