NOAA Coastal Services Center
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

Coastal Resource Management Customer Survey
Summary of Results from the Island Region

Background

The Coastal Management Resources Customer Survey, conducted in the summer of 1999, was delivered in two parts; part one was directed to the information manager and part two was directed to the program manager. This report summarizes responses from the US Island Region, encompassing island states, territories, and commonwealths in the Caribbean and Pacific. Throughout the island region, the number of program manager responses was higher than information manager responses due to fewer agencies having information managers on staff. Responses to part one, spatial data and technology, and part two, coastal management approaches, education, and resources wants are as follows:

Survey response statistics - part one and two

	Part 1	Part 2
Total surveys distributed	15	18
Returned unanswered	3 (20%)	0 (0%)
Returned completed	13 (87%)	18 (100%)
American Samoa	2	2
Commonwealth of the Northern Marianas Islands [CNMI]	2	2
Guam	4	4
Hawaii	6	6
Puerto Rico	3	3
Virgin Islands [USVI]	1	1

Only two-thirds of the offices that completed the survey had information managers able to complete part one. This alone is an indicator of the level of technical capability available in the Island region. The following summary of results draws some correlation between the two parts, therefore it is important to remember the difference in response throughout the report. Hawaii's response is higher than all others because we were able to identify more offices to target, including the state geographic information system (GIS) office and several divisions within the state government. The only Sea Grant program serving the Islands is located in Hawaii; the office, however, did not respond to the survey.

As a result of these differences in response from the Islands, we have a clearer picture of the needs, wants, and capabilities of some islands (Hawaii and Guam) more than others (Virgin Islands, American Samoa). Additionally, each set of Island responses includes a different mix of agency types, whose perspectives can be very different from each other. For example, American Samoa responses include the coastal program and a sanctuary while Hawaii includes the coastal program, state GIS office, sanctuary, Division of Aquatic Resources, Division of Boating and Ocean Recreation, Division of Conservation and Resources Enforcement, and the Land Management Division. It will be critical to consider these response characteristics when utilizing the survey data and other information to make decisions about resource allocations and new programs.

Since the survey was conducted, four of six coastal programs have new managers—only CNMI and American Samoa have retained the same leadership. In addition, both CNMI and Virgin Islands coastal programs have lost their only GIS staff. In Guam and Puerto Rico, the GIS managers have been promoted to manage the coastal program, effectively reducing their GIS staff. As a result, it is important to note that in less than one year the following results have changed significantly.

GIS Profile

Only one office claims not to use spatial data or GIS consistently, the American Samoa coastal program. Those that appear to be the most sophisticated in their spatial data and GIS use are Hawaii (which has a GIS office within the Office of Planning, the same office where the coastal program is housed), Puerto Rico, and Guam. CNMI made tremendous use of their GIS expertise before losing their only specialist. Puerto Rico's coastal program management has a good relationship with GIS technical staff and contractors. Both CNMI and Guam have developed user groups among agencies to share spatial data and develop GIS.

Of the 10 respondents that reported using GIS, 70% (7 of 10) use ArcView® and 50% (5 of 10) use ArcInfo®. ERDAS® is used by 20% (2 of 10), and MapObjects® and Genasys® by 10% (1 of 10) (Figure 1).

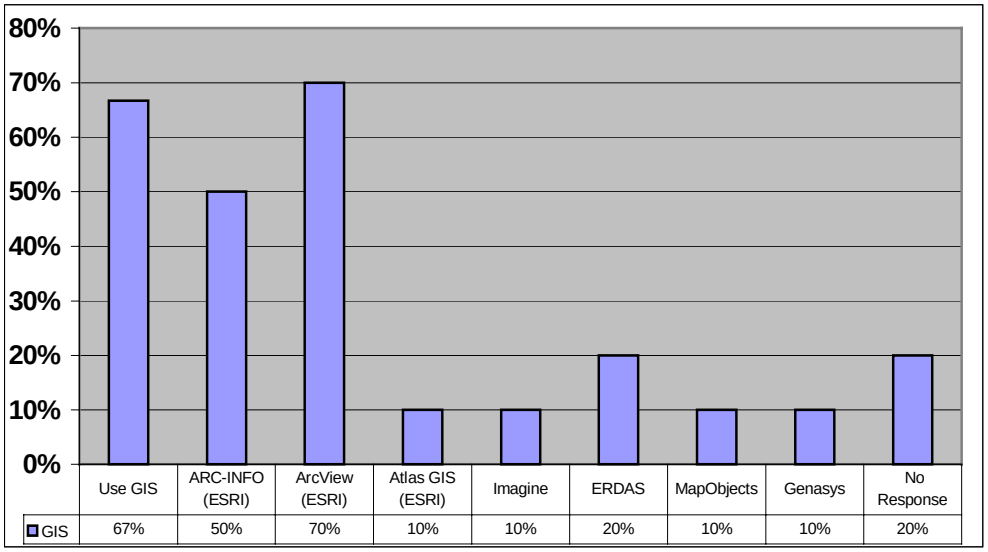


Figure 1. GIS Use by All Island Agencies and GIS Software Used by Island Agencies That Use GIS

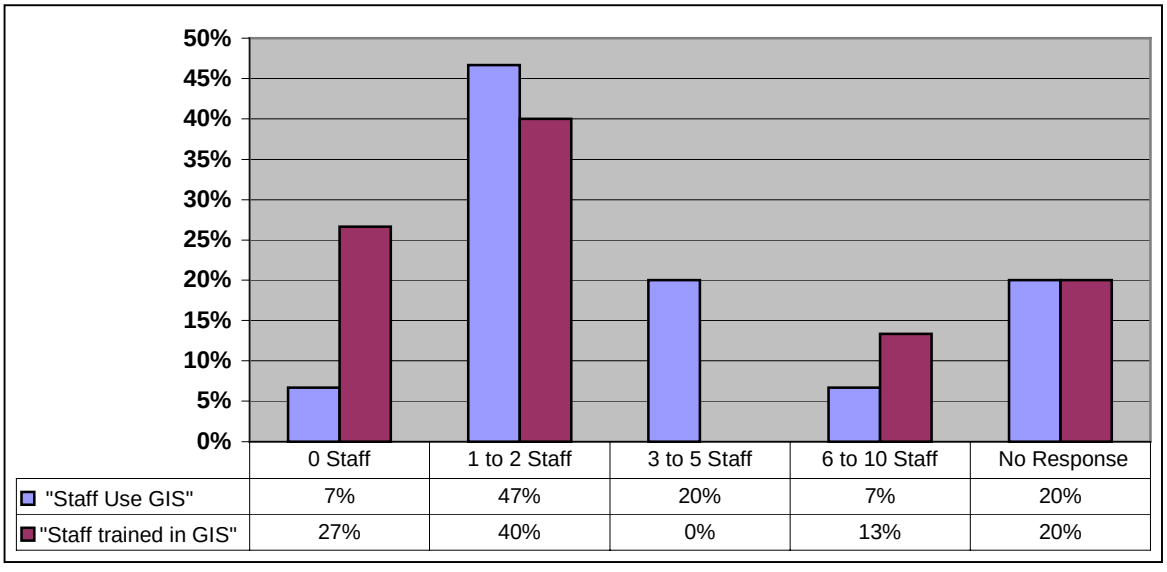


Figure 2. Number of Staff Per Island Agency That "Use GIS" and Are "Trained in GIS"

The number of respondents that reported they have staff "using GIS regularly" (11 respondents, see Figure 2) outnumbers those who have been trained (8 respondents indicated they have staff with GIS training). Therefore, seventy two percent of respondents with staff using GIS have staff trained in GIS.

Respondents rated their staff's GIS experience level "beginning" (40% - 6 of 15) and "intermediate" (47% - 7 of 15). Forty-seven percent (7 of 15) of respondents said their offices had 1 to 2 regular GIS users, while twenty percent (3 of 15) reported having 3 to 5 regular users—-those responses coming from Guam, Hawaii, and Puerto Rico. As mentioned previously, since the survey was conduction four Island coastal programs have had their only GIS staff member leave.

For the four main categories of GIS activities, the following table reports the percent of respondents with at least some of their GIS use targeting the respective activity.

Target of at least some GIS use by Island agencies

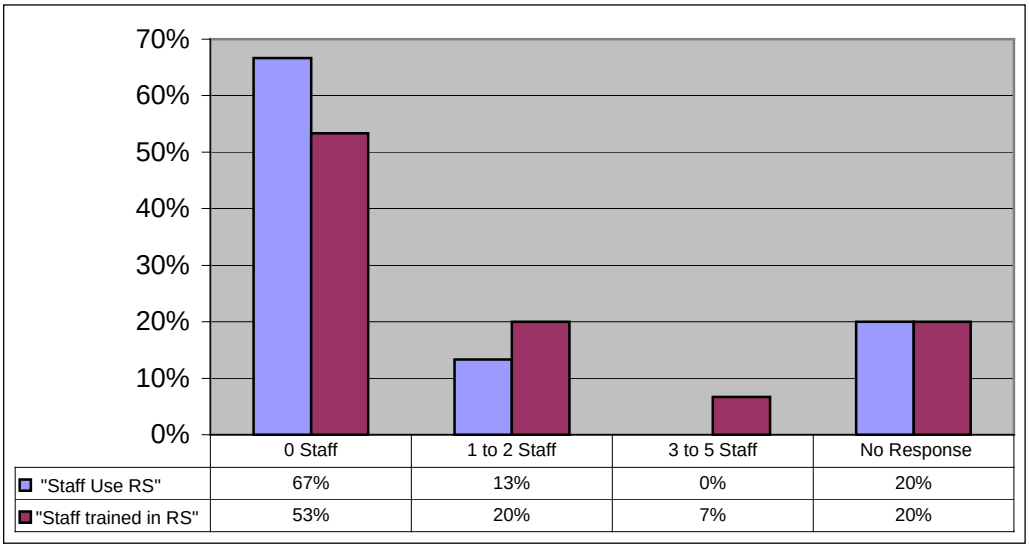
GIS activity	%*	%**
General and project specific mapping	66	100
Information management tool for spatial data	53	80
Tool for static modeling in a spatial context.	27	40
Supplying "state" of the system data sets to dynamic environmental process models.	27	40

***Percent of all 15 Island respondents.**
****Percent of the 10 Island offices whose staffs use GIS.**

For those who do not have in-house access to GIS, few outside GIS sources were identified. Twenty percent (3 of 15, 2 American Samoa and 1 Hawaii) reported partnering with another agency—although no state GIS offices and no academic institutions were reported to provide GIS information. Two (both from Guam) of the fifteen respondents (13%) reported to have no GIS access.

Eleven of the twelve responding offices were interested in training for introduction to GIS and ten interested in ArcView GIS (3 of which were interested only if available locally). Eight offices were interested in Avenue programming. Ten offices were interested in information management technologies for executives, four of which only were interested in courses offered locally. Interest in metadata training is just as high as interest in GIS training (11 offices), although respondents were not as interested in learning how to train others in metadata (7).

Remote Sensing Profile



	0 Staff	1 to 2 Staff	3 to 5 Staff	No Response
"Staff Use RS"	67%	13%	0%	20%
"Staff trained in RS"	53%	20%	7%	20%

Figure 3. Number of Staff per Agency That "Use Remote Sensing" and Are "Trained in Remote Sensing"

Only one of four respondents from Guam and two of three from Puerto Rico reported using remote sensing special purpose software (island-wide, only 3 of 15)—no other island reported using this software. Five out of fifteen offices (33%), however, have one or more sources of alternate access to remote sensing software. Both Guam and Puerto Rico have 1 to 2 people trained and using remote sensing regularly (Figure 3). Hawaii reports having 1 to 2 people trained but not using remote sensing regularly. Those who do use remote sensing are at a beginning level. Islands also either have little access (67%) to remote sensing capabilities or limited access to other agencies and no access to university sources.

Remote sensing use and expertise in the Islands is exceptionally low relative to the rest of the survey population, regardless of the survey-wide trend of lower remote sensing expertise than GIS expertise. The Islands are interested in training: 10 offices are interested in an introduction to coastal remote sensing and image processing techniques (4 of which only if available locally). Nine offices are interested in interpretation of aerial photography and 8 are interested in the procedures and protocols of the Coastal Change Analysis Program (C-CAP).

Spatial Data Use

Figures 4 and 5 represent how spatial data is used for habitat issues and management's role in addressing these issues. Spatial data use does not appear to be related to the role the office has in managing an issue. Most offices, at the least, have a coordinating role in managing all coastal issues. The potential exists to develop applications that would work differently depending upon agency roles and responsibilities.

Spatial data that is used by this region has been primarily collected, derived, and managed by others. Islands collect and derive spatial data for coastal development (22 to 50%) and resource management issues (18 to 40%). Habitat data and resource management data are those most commonly managed within GIS, particularly watershed planning (45% - 5 of 10) and habitat mapping (45%).

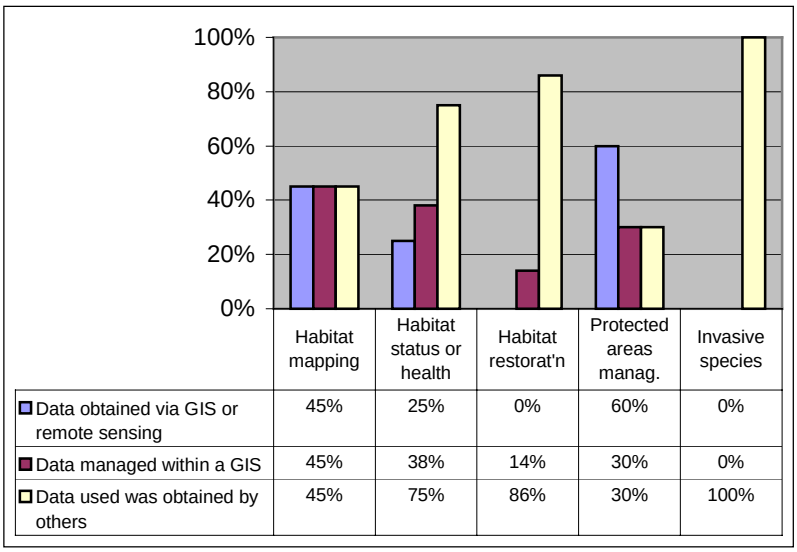


Figure 4. Data Use for Habitat Issues

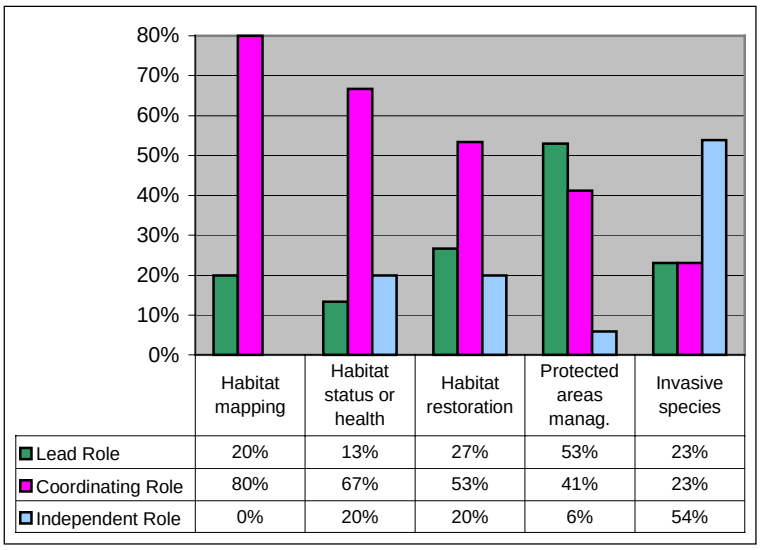


Figure 5. Role in Addressing Habitat Issues

Models and Data Exchange

Thirty-three percent of respondents use environmental models (offices in Guam, Puerto Rico and Virgin Islands). SLOSH for hazards modeling, and BASINS and WASP for water quality modeling were the only models reported in use (see table below).

Model	Guam	Puerto Rico	USVI	ALL
SLOSH	1 of 4	0 of 3	0 of 1	1 of 15 (7%)
BASINS	0 of 4	2 of 3	0 of 1	2 of 15 (13%)
WASP	1 of 4	0 of 3	0 of 1	1 of 15 (7%)
TR55	0 of 4	0 of 3	1 of 1	1 of 15 (7%)

All island agencies that responded have Internet access, although the speed of their access is lower on average than all offices surveyed nationwide. Netscape and Internet Explorer are used equally although not exclusively. Due to a glitch in the electronic version of the survey, we captured only two-thirds of the responses to this question. As a result, we can not rely on these results to draw conclusions on the use of Web browsers.

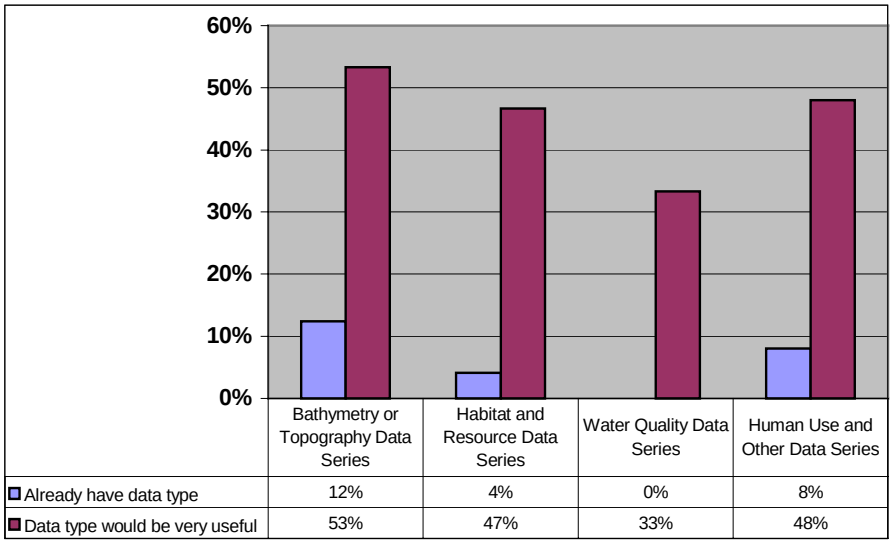
Zip disks (73%) and FTP (53%) are most frequently used for data exchange. Floppy disks (3½"), however, are still used in the Islands more than other regions for the exchange of data (60%). CD-ROMs are not used as often in the Islands for data exchange as in other regions—perhaps due to older computer systems without CD-ROM writers.

Metadata

Sixty-seven percent (10 of 15) of Island respondents do not create metadata. The Islands do have a correspondingly high degree of interest in metadata issues (67% would like more information about establishing an FGDC node and metadata training). One respondent commented separately that they have been trying to introduce the practice of metadata locally without much success.

Data Wants

As expected, most spatial data sets were ranked as “very useful” by over half the islands—particularly the bathymetry and topography series (53%; see Figure 6). Among the other series, those data sets that ranked high included coral distribution maps (67%), habitat suitability (60%), and aerial photography (60%). Sea surface temperature and other offshore water quality data sets ranked lowest among all categories.

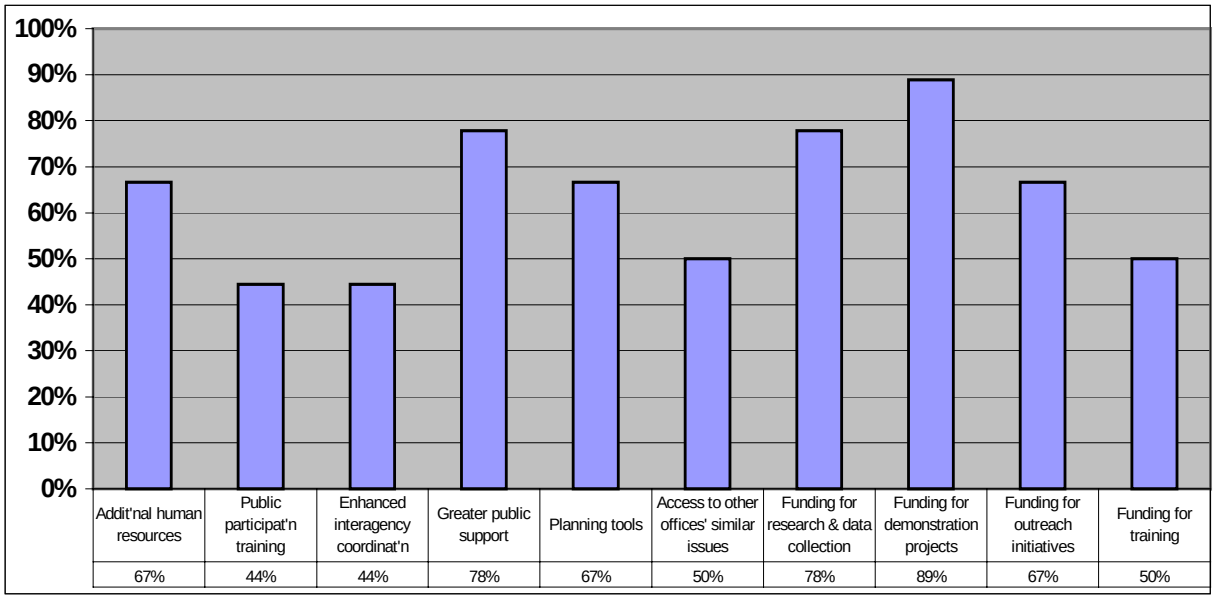


	Bathymetry or Topography Data Series	Habitat and Resource Data Series	Water Quality Data Series	Human Use and Other Data Series
Already have data type	12%	4%	0%	8%
Data type would be very useful	53%	47%	33%	48%

Figure 6. Data Series Averages for - "Have Data" and "Data Would be Very Useful" Responses

Resource Wants

Funding for demonstration projects (89%), research (78%), and outreach (67%) ranked among the most beneficial non-technical resources for the Islands (Figure 7). Funding issues notwithstanding, greater public support ranked highest among beneficial non-technical resources (78% or 14 of 18). Islands are also interested in planning tools (67% or 12 of 18) and access to other offices for information on management techniques (although only among other Island programs).



Addit'nal human resources	Public participat'n training	Enhanced interagency coordinat'n	Greater public support	Planning tools	Access to other offices' similar issues	Funding for research & data collection	Funding for demonstration projects	Funding for outreach initiatives	Funding for training
67%	44%	44%	78%	67%	50%	78%	89%	67%	50%

Figure 7. Non-Technical Resources Ranked "Highly Beneficial" by 40% or More of Respondents

Resource inventories and environmental monitoring ranked highest among beneficial technical resources. GIS, mapping capability, and ability to use spatial data in decision making all were ranked as beneficial by 50% or 9 of 18 respondents (Figure 8). The fact that basic inventories and monitoring rank higher than some of the technical applications may indicate that Island programs need more assistance developing basic capabilities before branching out to the more technical capabilities. This may be truer for some of the islands than others.

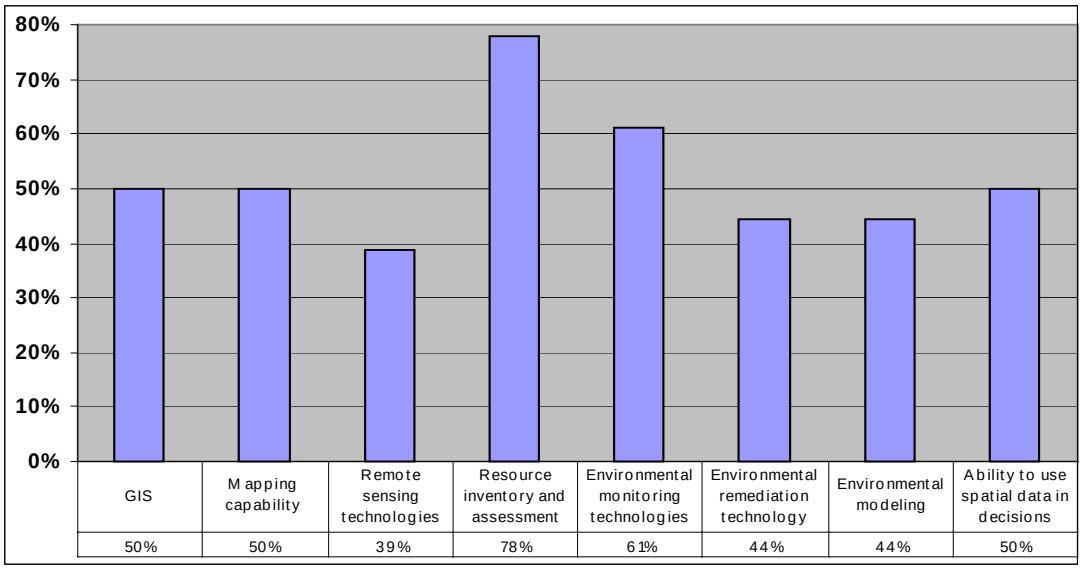


Figure 8. Technical Resources Ranked "Highly Beneficial" by 40% or More of Respondents

The following additional resource needs were written in separately:

- Training in: time management, managing diverse cultures, communication skills, public participation, education, GIS, desktop publishing
- Off-island travel funding
- Create NOAA research and demonstration projects for the Islands
- Links to island-specific data
- Natural processes in island environments, including modeling (SLOSH)
- Habitat classifications
- Hydrologic calculations
- Resource ecology
- Information on boating facilities
- Economic valuation studies of the coast and habitats for the Caribbean and Pacific Islands

Management Approaches

Over half of the respondents in this region have a lead role in the following management approaches, indicating that it is in their direct purview to develop programs or plans to enhance the following:

Management Approach	
Outreach/education	72% (13 of 18)
Regulation/permit	67% (12 of 18)
Technical assistance to constituents	56% (10 of 18)
Research	50% (9 of 19)

In addition, the following management approaches are applied in coordination with other offices:

Management Approach	
Resource management planning	67% (12 of 18)
Enforcement	61% (11 of 18)
Mapping	50% (9 of 18)

Managing Habitats

Islands manage spatial data about habitat issues within a GIS more than for any other issue (see Figure 4). However, most of this GIS use is directed towards general project mapping. Public education and interagency coordination are used to manage important habitats such as coral reefs, wetlands, beaches and coastal waters.

	Habitat Type			
Management Technique	Coral Reefs	Coastal Water	Beaches	Wetlands
Public education	61%	61%	44%	44%
Restoration	44%	33%	22%	22%
Land use planning	28%	33%	22%	17%
Permit	56%	44%	33%	39%
Interagency coordination	83%	94%	78%	72%

Public Education and Involvement

Given the cumulative Island response that public education is an important management approach, it would be expected that the Islands have developed several education programs (Figure 9). For general awareness, there are agency staff and teacher workshops, wildlife fliers, and coloring and activity books. General awareness is also raised through CoastWeeks celebrations and beach sweeps, and Guam hosts a monthly TV series on relevant local issues. Boaters are targeted with Hawaii Boater Basics and a hurricane safety manual. Children are offered summer camps and different islands develop curricula to support all grades from kindergarten through high school.

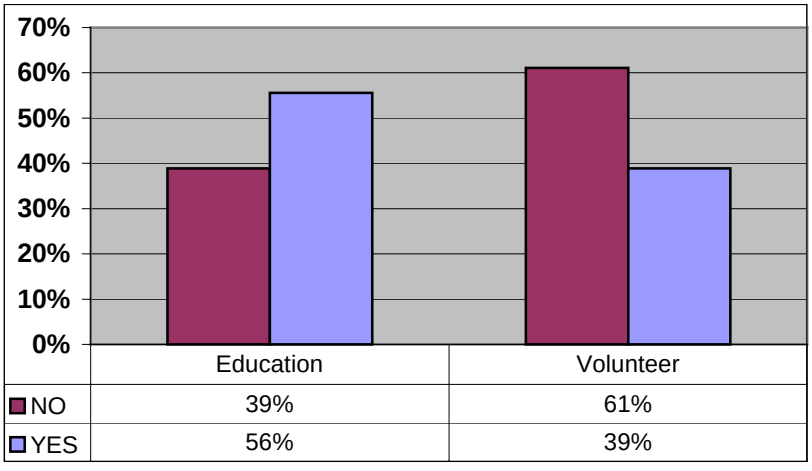
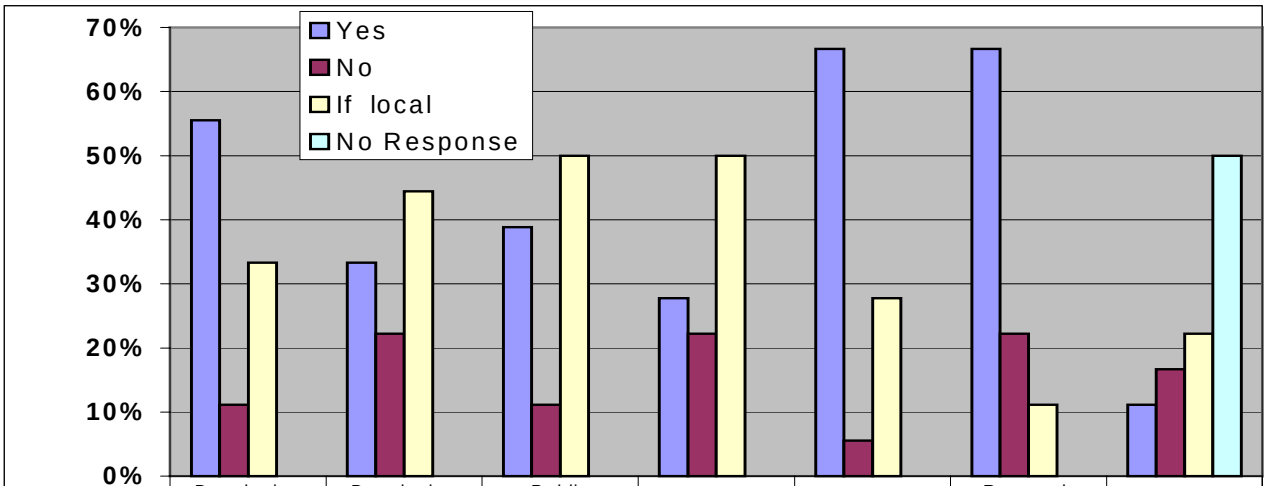


Figure 9. Number of Programs That Develop Educational Curricula and Operate Volunteer Programs

Several programs use high school students to help with the testing of water quality, beach cleanups, and the staffing of visitor centers. Citizens get involved through the "Adopt-a-Harbor" program, docent programs, and other community activities.

Non-Technical Training Wants

The highest level of interest in staff training is for public outreach and research methods (67% or 12 of 18). When combined with the "if local" response, this number increases to 95% (17 of 18, see Figure 10). These results are consistent with their interest in increased public awareness and resource inventory and monitoring strategies identified in the "resource wants" section (Figure 7).



	Developing management plans	Developing communication plans	Public involvement processes	Conflict resolution	Public outreach plans	Research methods for CZM	Introduction to CZM
Yes	56%	33%	39%	28%	67%	67%	11%
No	11%	22%	11%	22%	6%	22%	17%
If local	33%	44%	50%	50%	28%	11%	22%
No Response	0%	0%	0%	0%	0%	0%	50%

Figure 10. Interest in Training Programs

Interest in training for developing communication plans, public involvement processes, and conflict resolution is dependent on where they are developed (77 to 89% interest combined with the "if local" response). There is also a relatively high interest in training to develop management plans (56% or 89% if local).

Due to a glitch in the electronic version of this survey, only half of the Island responses to introduction to coastal management were reported. We cannot rely on these results to draw conclusions on the interest in an introduction to coastal management course. However, several of the training topics written into the "resource wants" section relate to modules of this training. Based on these results and comments made at the end of the survey, we know that differences in the cultures and management approaches of the Islands (and costs of travel) require training sessions to be developed and delivered within this context.

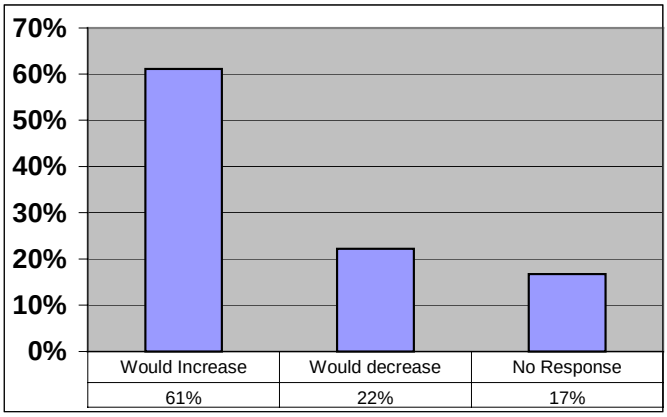


Figure 11. Interest in Training Programs if Delivered Via Distance Education

Overall, interest in training increases if delivered through distance education methods (Figure 11). Some of the following responses indicate why this may be the case.

- Travel is difficult and expensive
- The training would be accessible to all staff
- It would be convenient and comfortable
- Provided it was tailored to the Islands

However, some respondents indicated they would not be interested in training through distance education methods for the following reasons:

- Training is best in group settings with hands on experience, loss of interest
- Interest in training is based on local values, needs and processes
- English is a second language—more difficult to make understandable
- Web is not supported—it creates a habit of not communicating directly with people

Other Comments on Capabilities and Needs

The following are written comments from survey respondents that supplement trends discussed throughout this report. These citations express facets of the unique nature of Island issues and perspectives that are unable to be reported, per se, in the survey instrument.

- "There are different levels and magnitudes of coordination between our office and the rest of the DNER offices, other agencies and institutions depending on subject."
- "I strongly think that it is very important that the Islands are addressed locally. Much more people could participate and benefit from your training programs if they are done on the Islands. Eventually, NOAA programs must move to the Islands. Right now few can travel to meetings but not for training. It would be wiser to have a few from NOAA come to Puerto Rico to reach a wider audience."
- "Guam is far removed from the norm of the US. Our resources and needs are very different."
- "DWR Land Division is moving into new areas such as shoreline management and beach restoration/protection. Also, will begin developing strategies to improve the management of public lands—economic use/asset management with development towards most appropriate use of land—whether commercial, residential, industrial, agriculture. We need to better understand/inventory the public lands we have statewide and also develop management plans for the use of the lands. One unique aspect of our land management function is our recent ability to generate revenues from public lands to be used for investigations. As we are just getting started, we would be interested in what

resources CSC [NOAA Coastal Services Center] can provide in the form of technical capacity building, information and objectives. Also what about developing a center in Hawaii?"

- "We have GIS equipment donated by ESRI and NOS in the office, but do not have anyone trained to operate it. We plan to send a staff member to the training in December."
- "Guam's Department of Agriculture, Division of Aquatic and Wildlife Resources does not use GIS or remote sensing to any extent. There is a single project that deals with an endangered bird that has done a little GIS work and that is it. There could be some real benefits from this technology but they are cost prohibitive at this time."
- "Our coastal [management] program administers the Land Use Permitting System in American Samoa. This places a great need for our agency to learn about GIS. We've had some temporary (contract) personnel who worked on creating a GIS based system; unfortunately, they are all gone. We have other few personnel with GIS knowledge but are not directly involved with our work. There is also an interagency committee which is inactive and has been for a few years now. Our program keeps its database using Windows 95/98 applications. We also have floodplain maps. These data would be helpful in creating our own GIS to serve our cause. We are interested in any training opportunity to enable us to develop a GIS for our use and better our service."
- "I would really like to work with you on developing a permit tracking system. I have written a small script for the entry of data but would like to get together with an expert before I get too far."
- "The Virgin Islands are in great need of island-specific economic valuation data to show the economic value of tourism to help decision makers and the public understand the importance of coastal management. We're dealing in economies of scale and can't use any data from mainland states. We are also in competition with other Caribbean Islands for tourism, especially eco-tourism."

Summary Statements

The emphases of these programs appear to be on education and coordination. Non-technical resource needs rank generally higher than technical resource needs. Basic resource information like monitoring, inventories, and maps are still needed. There is a high level of interest in process training and technical training, mostly if delivered locally. Education programs are in development although the number one issue needing to be resolved (except for funding) is greater public awareness. Based on sheer numbers, the Islands appear to have proportionally similar GIS expertise to other regions and programs. However, they also appear to be technologically behind in terms of data access and management (data transfer mechanisms, slow modem connections), and there are indications of lack of access to data. Based on the response to the first question, the Islands appear to have more spatial data than they manage within GIS framework. Use and application of spatial data in a GIS framework within the Islands appears to be at a beginning level.