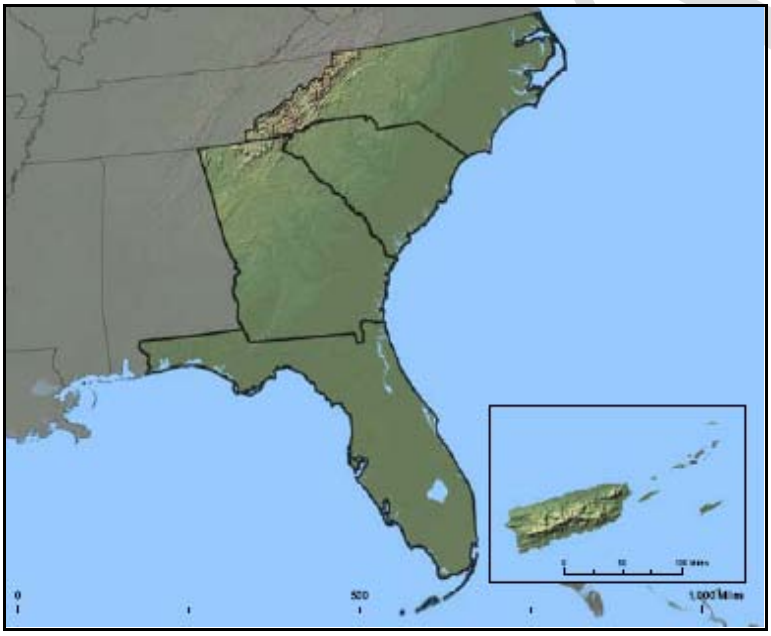
NOAA User Needs in the Southeast & Caribbean Region
(A Systematic Review of Existing Needs Assessments)

National Oceanic &
Atmospheric Administration

Southeast & Caribbean Regional Team



North Carolina, South Carolina, Georgia, Florida, Puerto Rico, U.S. Virgin Islands

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Executive Summary

Introduction

NOAA routinely conducts needs assessments of its partners and customers to identify characteristic factors, such as competencies, performance levels, and/or interest pertinent to a particular issue, organizational goal, and/or product and service. Cross-listing the present state with the requirements to achieve future objectives highlights the gaps that exist and the needs to be filled. Needs assessments improve NOAA's ability to collaborate with its partners and customers, help to justify the development and provision of services, and allow for effective distribution of resources to support these services.

A systematic review of existing needs assessments was conducted with the primary goal of summarizing the evidence for regional priorities for NOAA products and services among a broad and diverse range of partners and customers in the Southeast and Caribbean region (NC, SC, GA, FL, PR, USVI). As part of the review process, all relevant data were synthesized to define gaps in service to targets and to identify cross-cutting themes that would be addressed most effectively through regional collaboration.

Background

This activity was meant to serve as precursor to the NOAA Southeast & Caribbean Regional Team's effort to engage regional partners, stakeholders, and customers on NOAA's behalf to foster dialogue regarding products and services required to meet NOAA's mission goals.

The intent was to summarize knowledge of existing needs in order to prevent unnecessary data requests from and avoid undue burden to NOAA partners and stakeholders.

The original objectives of this activity were:

- To identify existing sources of information on priorities, needs, and information gaps in the Southeast and Caribbean Region
- To minimize data calls and requests from our stakeholders for information we should already have
- To develop a summary of regional priorities, needs, and gaps to direct NOAA planning and project identification, from the office level to PPBES
- To establish a baseline understanding of priorities, needs, and gaps to inform the design of future regional forums or stakeholder sessions

Outcomes

The final product will be a living document/database that can be expanded or updated, as needed.

Methodology

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Results

Review Statistics

Of the 118 original documents and other source material examined, 37 studies present data on priority needs for NOAA services and products of partners and customers in the Southeast and Caribbean region that fulfilled the inclusion criteria. The majority of the excluded works either did not meet the definition of a needs assessment or were not focused on NOAA-developed and delivered services and products. National studies that did not distinguish regional needs were included in the review if there was evidence of SECART region representation.

Description of the Studies

The predominant needs assessment / survey technique used in the reviewed studies was a web-based survey (Figure 1). Thirteen of the studies (41%) used multiple data collection methods. Seven of the 9 studies that conducted a literature review also applied additional methods. The two studies that were strictly literature reviews (CSC5) and (CSU) were also synthesis documents.

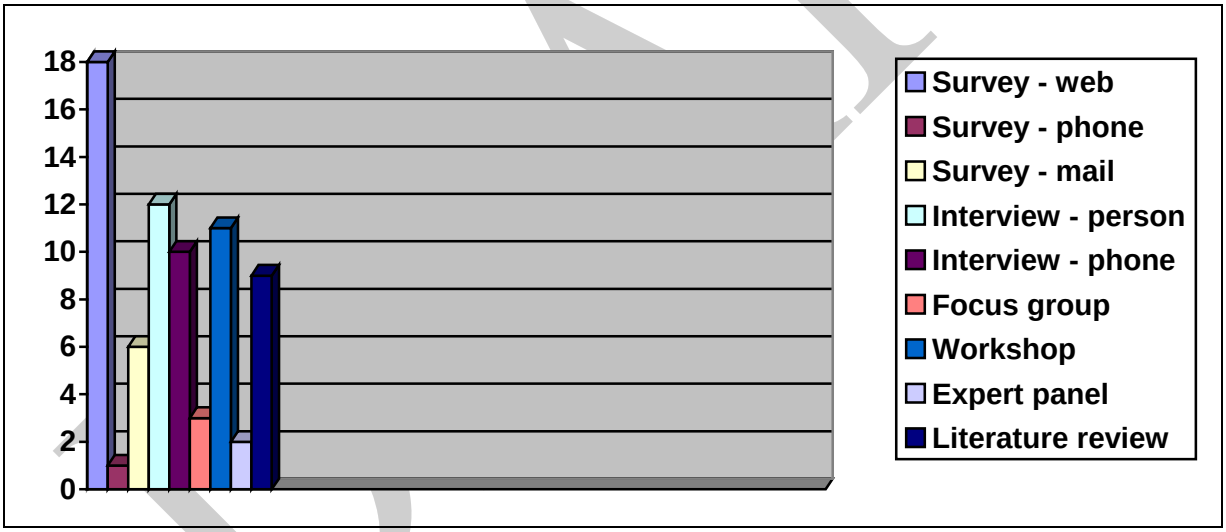

Figure 1: Needs assessment / survey techniques used in the reviewed studies

The reviewed studies included participants from 54 organizational- or user-types. These were aggregated into 10 sectors, which were based on organizational orientation and area of responsibilities and included the general public (Figure 2). The largest targeted customer types were coastal and fisheries managers. The smallest group was the unaffiliated general public. The individual assessments ranged from broad coverage of more than 10 customer types, such as most surveys of coastal managers by the Coastal Services Center, to those that narrowly focused on 1-2 types, such as the NERR's assessment of K-12 education needs (Appendix 4). Customer sample size in the studies ranged from a 10-person expert panel to 6,298 respondents to a web survey (note that a few studies did not specify the sample size). Sample size was not related to the range of participating customer types in an individual study. For example, two web-based

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surveys done by the CFI Group to develop customer satisfaction indices for NWS services and products had the largest sample sizes, but were relatively focused to specific customer types.

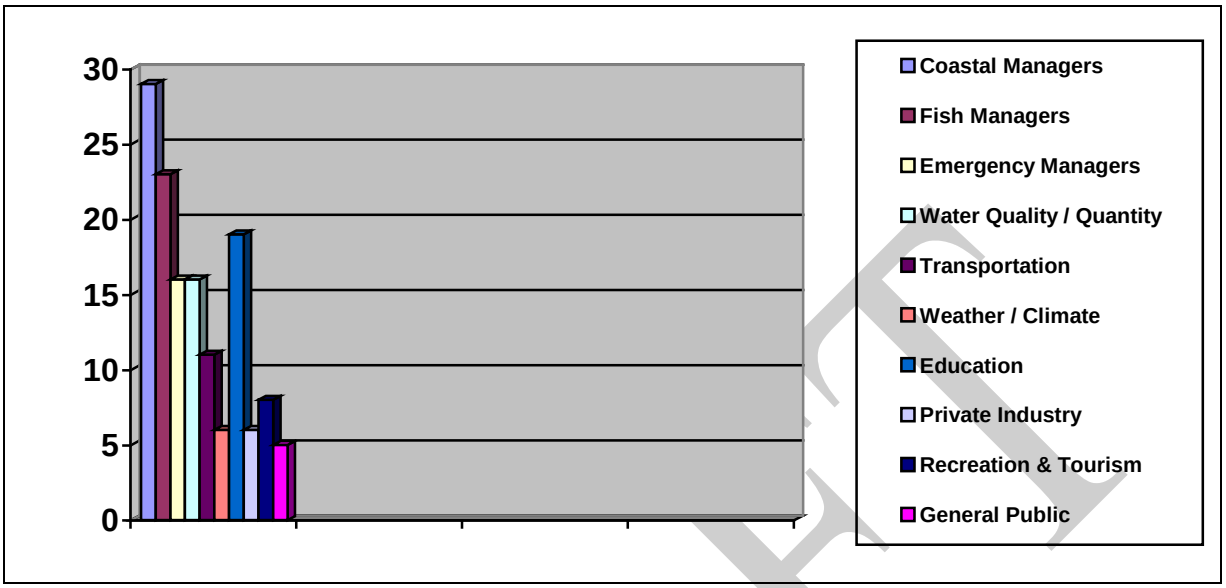

Figure 2: Customer type participation in the reviewed studies

Review Outcomes

Due to the heterogeneity of the studies, constructing hierarchies of evidence for ranking customer needs is clearly problematic. The broad purpose of each assessment included in the review was to identify priority customers' needs for NOAA information products and services. However, each assessment had its individual context, methodology, and purpose. The content analysis identified over 100 distinct "priority" needs from the individual reports (Appendix 5). The most frequently cited needs across all of the reports could be aggregated into 11 major themes (Table 1). Of these, the most citations were for information and services to support land use and habitat change analysis. However, it is important to note that frequency-counting aspects of content analysis may mean these results do not reflect the highest ranked needs, i.e., "most cited" does not necessarily mean "most important." Therefore, the themes and respective needs are presented in alphabetical order.

Table 1: Most frequently cited products, services, and data needs

	Needs				
Issue	Products	Services	Data	Technology	Other Federal Partners
Climate	Sea level rise scenarios; GIS and hard copy SLR vulnerability maps	Forecasts of ecological and infrastructural impacts of climate & SLR	Baseline mapping data	Visualization tools for SLR impacts	US Climate Change Program (13 Federal agencies)
Fire Weather	Risk assessment maps	Specific (spot) and trends forecasts	Spatial data on land cover and assets	Geospatial, remote sensing	USDA/FS, DOI/BLM, NASA, EPA, DoD
Fisheries	Predictions of spawning stock size,	GIS mapping essential fish	Stock composition, size, location; fishing	GIS tools for ecosystem-based	DOI, USCG, USDA

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	Needs				
Issue	Products	Services	Data	Technology	Other Federal Partners
	recruitment, and sustainable yield	habitat	patterns	fisheries management; improved survey methods	
Habitat	Characterization; Change / trends analysis	GIS mapping spatial extent and condition	Topography/ bathymetry; land cover; species	High resolution remote sensing; GIS	DOI, EPA
Hazards	Risk and vulnerability assessment maps	Improved forecast accuracy (flooding, storm tracks)	Topography/ bathymetry	Storm surge models	USGS, USACE, FEMA,
Invasive (Non-indigenous) Species	Species inventory, profiles	On-line, one-stop regional nonindigenous species information source	Spatial/temporal distribution	Early detection and rapid response	F&WS, EPA, USDA, DOD
Land Use	Land use change analysis, models	Training: Land use change data interpretation	Affordable remote sensing data	High resolution remote sensing; GIS	FEMA, USACE, DOI
Marine Weather	Electronic gridded forecast charts	On-line, one-stop for regional observations and forecasts; Improved forecast accuracy	Real-time winds (speed, direction, gusts), waves and currents, SST	Surface and satellite sensors	USN, USCG
Ocean Observations	Wide range – hazards, ecosystems, fisheries, marine operations, weather and climate	Improved weather (storm), climate forecasts	Real-time nearshore waves and currents, SST, and salinity	Bio-sensors, climate variables	USN, USACE, USGS, NSF (17 total)
Shoreline Management	Shoreline change (erosion and accretion) analysis	GIS (digital) shoreline base maps	Water level; topography/ bathymetry (shoreline position); erosion rates	Mapping technology using LIDAR and satellite imagery; nonstructural shoreline protection	USGS, USACE, FEMA
Water (coastal) Quality	Accurate estimates of water quality constituents	Real-time water quality monitoring and forecasting	Nutrients, chemicals, suspended solids, HABs, pathogens (indicators)	Inexpensive real-time sensors and monitoring instruments	EPA, USGS

NOAA shares interest and responsibilities in all of these issues with a range of other Federal agency partners. NOAA's unique responsibilities are best determined by a review of relevant statutes and Executive Orders, which is beyond the scope of this review. The review also identified 7 documents consisting of external reviews and evaluations of NOAA's practices and services (Appendix 6). Each of these reviews was program- and activity-specific, and it was not feasible to aggregate the recommendations for enhancements and improvements.

Highlight gaps in customers or NOAA missions and goals

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Discussion

The rigor of systematic review methodology does not obviate judgment and balance. They are just made explicit. Despite the attempt to achieve objectivity in reviewing the documents, subjective judgment was required about the choice of priority need, how the information was combined, and data quality. The findings should to be discussed to put them in context, and to address such issues as the quality and heterogeneity of the included studies and the likely impact of bias and chance, and the applicability of the findings to prioritizing resource allocation. This synthesis is most valuable for summarizing the existing data, for helping to identify discrepancies in the available evidence, for informing of the relatively small number of consistent studies, and in helping to define future needs assessment strategies.

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Appendix 1: Systematic Review Methodology

The process of systematic review has its origins in the medical sciences, but it is now increasingly being employed by a range of applied disciplines in order to address the problems of accessing reliable scientific evidence to support practice and policy decision-making. In contrast to a traditional review, which may be narrative, subjective and susceptible to bias, systematic review attempts to be systematic in the identification and evaluation of studies, objective in its interpretation, and reproducible in its conclusions. A systematic review follows a rigorous, structured, and transparent procedure, striving to obtain all relevant literature on the topic of interest, including unpublished gray literature and study findings, as well as published peer-reviewed journal articles. The process of study inclusion into the review is clear, open, and thoroughly documented, which helps to make the process replicable and open to additional review. Systematic review therefore allows critical appraisal, summary, and dissemination of results from a large volume of documentation and can support decision-making by providing an objective, independent, and unbiased assessment of the best available evidence. Where evidence is unavailable, the systematic review process highlights areas requiring further assessment.

A systematic review involves requires a number of discrete steps:

- Framing questions (objectives) for the review.
- Searching the literature for relevant work.
- Selecting the studies for inclusion in the review.
- Study quality assessment.
- Data extraction and synthesis.
- Reporting the findings.

Usually the first milestone of any review is the development and approval of a review protocol before proceeding with the review itself. A review protocol outlines the methods that will be used to undertake the systematic review. One reason for preparing a protocol first is to guard against bias during compilation of the review. For example, without a protocol, it is possible that the selection of individual studies or the analysis may be driven by reviewers' expectations. In medicine, review protocols are usually submitted to peer review. Another reason to prepare a protocol is that it will, in principle, have a longer 'shelf-life' than the initial product arising from it. In order to continue to be 'current best evidence', systematic reviews need regular updating. The protocol continues to serve as the template for future revisions of the review.

Review Objectives

The questions for a systematic review provide a clear, unambiguous statement of the objectives.

Primary objectives

The primary objective of the review is to systematically inventory and synthesize published and unpublished mission-relevant needs assessments conducted by NOAA and others to determine:

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- What are the priority needs for NOAA services and products of partners and customers in the Southeast and Caribbean region?
- What are the regionally-specific cross-cutting challenges and opportunities that would be addressed most effectively through regional coordination and collaboration?
- What are the priority needs that are unique to NOAA services and products?

For the purpose of this review, "needs assessment" is defined as a systematic set of procedures undertaken for the purpose of setting priorities and making decisions about program or organizational improvements and allocation of resources. The priorities are based on identified needs to satisfy specific audiences. A "need" is the discrepancy between current and desired results or consequences, in this case the development and provision of services and products. "Specific audiences" are NOAA's partners who have a direct relationship with the service/product and core customers who are frequent, conscious users of specific data and information, often in the form of targeted, value-added products.

Secondary objectives

What are NOAA's needs to provide desired services and products?

Search Strategy

Critical to any systematic review is a thorough literature search. The aim of the search is to generate as comprehensive a list as possible of relevant published and unpublished studies. The thoroughness of the literature search is one factor that distinguishes systematic reviews from traditional reviews. The search must use a variety of search methods and cover a range of sources in order to minimize bias and to ensure adequate coverage of the literature.

For this review, each SECART line office was requested to identify, gather, and prioritize existing resources and documents that target the priorities, needs, and information gaps of their key external partners and constituents. A total of 118 sources were identified in this initial search, including existing surveys, published journal articles, National Research Council reports, workshop proceedings, NOAA program reviews, and other open source material, such as websites. A preliminary examination of the documents eliminated duplicate material and references to planned activities for which there was no documentation, e.g., an NCDC data users conference. The remaining documents formed the basis for the systematic review.

Assessment Selection: Inclusion and Exclusion Criteria

It is important that the selection of articles is free from biases, which occur when the decision to include or exclude certain studies may be affected by pre-formed opinions. Both inclusion and exclusion criteria followed logically from the review objectives. Inclusion and exclusion criteria included relevance to the review objectives, study designs and level of evidence, and participant characteristics (Table 2). Study selection was a multi-stage process. Initially, the selection criteria were applied liberally to the citations located by the search. Unless they could be definitely excluded (e.g., duplicate citations), full reports of potentially relevant citations were retrieved and, those studies that met a majority of the inclusion criteria and none of the exclusion

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criteria were included in the review. Of the 118 original sources, 37 studies met the inclusion criteria (Appendix 2). As the inclusion criteria ultimately determine which studies will be included in the review, it is inevitable that debate and discussion will take place as to how broad or narrow these criteria should be.

Topic relevance

To be judged as relevant for this review, a study must have met the definition of a needs assessment and be focused on NOAA-developed and delivered services and products. Program evaluations, planning documents, and research needs assessment did not meet this criterion. Assessments of organizational needs (versus user needs) were excluded from the systematic review. However, a compilation of documents focused on NOAA's needs was developed separate from the main review.

Table 2: Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Relevance to Objective	• Focus on NOAA-provided services & products	• Focus on research • Program evaluations • Planning documents • Non-NOAA providers
Assessment Design / Tools	• Telephone, mail, and/or web-based survey • User interviews (individual or groups) • Focus groups • Stakeholder meetings and workshops • Expert panels and advisory groups • Literature review	• No direct involvement of users • Restricted to internal staff & external professionals*
Level of evidence	• Primary survey data directly applicable to the target population • Extrapolation of survey data, but directly applicable to the target population	• Extrapolated evidence from studies not directly applicable to the target population
Geographic	• SECART State, Puerto Rico, U.S. Virgin Islands • SECART region (e.g., multi-state) • National scope with SECART regional breakdown • National scope, no regional breakdown, but participation from SECART region users (requires extrapolation of	• National scope, no regional breakdown or evidence of involvement from SECART region users • Outside region

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Criteria	Inclusion	Exclusion
	national to regional needs)	
Timeframe	• 2000 - present	• Prior to 2000
User characteristics	• Primary (core) users – interact directly with NOAA • Secondary users - not intended to interact directly with NOAA but are intended consumers of the product/service, often in the form of output from targeted, value-added products • Affected - not direct users but may be affected by use	• Negligible - occasional or low-priority users
Miscellaneous		No source or unattainable documentation
* Internal NOAA studies conducted by NOAA staff were included to identify NOAA-specific needs.		

Assessment design and level of evidence

Perhaps the most important criterion relates to study design and level of evidence, which comes from the goal to base the review on the highest quality evidence. There are a number of accepted needs assessment / survey techniques:

- Literature review;
- Direct observation;
- Expert panels or advisory groups consisting of leaders in a field whose responses can be assumed to apply generally to others in that field.
- Stakeholder meetings and workshops;
- Focus groups;
- Face-to-face and telephone interviews;
- Mail and web-based surveys; and
- Telephone surveys.

Although different design types are better suited to answer different types of questions, there also is general agreement over design hierarchies, based on the ability of particular study designs to minimize bias and be representative of the target population. Although there was no formal design hierarchy applied to the needs assessment documents, all of the qualifying studies for the review had data directly attributable to the target population or extrapolated evidence from original studies (Appendix 3). Almost one-third of the studies used multiple methods of data collection. Some methods have higher risks of bias, e.g., focus groups and workshops, since data cannot be generalized to the entire population unless extreme care is taken when recruiting participants. For example, notes from a NOAA national stakeholder forum held in Washington,

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DC, in 2007 was not included in the review in part because over 98% of the participants were from the DC area. The most frequently-used exclusion criteria were studies which did not directly involve the users.

Geographical coverage

SECART is most interested in user needs from the Southeast US and Caribbean region. Therefore, the systematic review only included assessments which had some level of evidence of participation of users from this region. Over 60% of these assessments were either specific to the region or national in scope but with identifiable regional needs. The remaining studies were national assessments which did not distinguish regional needs but included direct involvement of users from the SECART region. Assessments from other regions and national assessments without SECART users were excluded from the systematic review.

Timing of assessments

The literature search included studies published from 1994 onwards. It seemed reasonable to establish a cut-off point, such that only studies published since 2000 were included in the review. Only six studies were excluded based on this criterion, and these either did not meet the definition of a needs assessment or there were more recent studies on the same issues. None of the coastal management surveys reviewed by the Coastal Services Center were prior to 2000.

User characteristics

The studies selected for review included participants that were specified by the SECART team as partners who have a direct relationship with NOAA and are most vital to mission success; core customers who may be high-volume customers, customers from selected sectors, or customer's deemed most likely to benefit from NOAA's products and services; and end users, who are conscious consumer of specific data and information, often in the form or targeted, value-added products.

Study Quality Assessment

Study quality assessment is relevant to every step of a review. Objective formulation (2.1) and study selection criteria (2.3) describe the minimum acceptable level for eligibility for inclusion in the review. In addition, it is generally considered important to subject the selected studies to a more refined quality assessment to:

- provide still more detailed inclusion/exclusion criteria;
- determine whether quality differences provide an explanation if the are differences in study results;
- rank or weight the importance of individual studies when results are being synthesized; and
- guide the interpretation of findings and determine the strength of inferences.

Detailed quality assessments are usually based on "quality instruments," which are checklists of factors derived from potential biases that need to be assessed for each study. Often quality items within a checklist are assigned numerical scales to obtain quantitative assessments of quality.

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Variation in the quality of evidence was not assessed beyond the inclusion / exclusion criteria for this review. One difficulty was that there was no pre-determined definition of study "quality." The most important factor in variation in study quality is bias if it cannot be confirmed that a representative population was sampled in the assessment. Rather than attempting a complex standardized system for recording design flaws, all selected studies were considered equal for the purposes of data synthesis.

Data Extraction and Synthesis

All documents that met the relevance criteria were retained for the data extraction phase of the review process. The data extracted included information directly linked to the review questions and the planned analysis, and included assessment methodology, type and number of participants, and expressed needs. This information also re-verified study eligibility. The data extraction often required some subjective judgment with respect to expressed needs. The data were reported a number of different formats in the reports, from tables with the original raw data to summary tables to narrative text. Therefore, maintaining consistency in data extraction was extremely important. Generally, in surveys, a "priority need" was a topic expressed by greater than 50% of the respondents. In workshops and expert panels, "priorities" were taken from the recommendations sections of the reports. One study was simply a list of constituent comments recorded verbatim at various fisheries council meetings without any attempt at synthesis (MerrellKatsouros, 2003). In this case, those comments which related to a specific product, service, or data need were included as a priority. The data sources were carefully checked to avoid including multiple publications based on the same data. The report "CSC Strategic Planning FY05 - Synthesis of Customer Needs" (CSC5) includes data from 11 reports included in this review. The CSC synthesis is valuable for comparison purposes, but the results were not included in the final tabulation of priorities for this review.

Data synthesis followed a modified content analysis approach consisting of comparing and contrasting of priority themes and needs from one study to the next, categorizing the data based on NOAA mission goals, and within each goal, by NOAA program. Placement of specific services, products, and/or data needs within a particular goal/program was guided by descriptions taken from the NOAA goal websites and the NOAA 2006-2001 Strategic Plan. Each study's outcomes were tabulated to identify systematically the main, recurrent themes across the multiple studies and to highlight the frequency of an expressed priority. Since the source material was highly diverse and methodologically very mixed, no attempt was made to weight and rank the studies on a hierarchical scale based on type of data collection, sample size, or range of participant types.

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Appendix 2: Surveys and Needs Assessments Cited

Abbreviation	Study Title	Date	Author / Sponsor
ACT	Targeting the Technical Monitoring Needs of Coastal Scientists and Environmental Resource Agencies	2000	Alliance for Coastal Technologies
AGT	Geospatial Technology in Wildland Fire: FIRES Final Needs Assessment Report	2003	Institute for the Application of Geospatial Technology
CFI1	American Customer Satisfaction Index, Report on the National Oceanic and Atmospheric Administration National Weather Service Marine/Tropical Customer Satisfaction Study	2003	CFI Group
CFI2	American Customer Satisfaction Index, Report on the National Oceanic and Atmospheric Administration National Weather Service Emergency Managers Customer Satisfaction Study	2003	CFI Group
CFI3	National Weather Service Customer Satisfaction Survey, Hydrologic Services Program	2004	CFI Group
CFI4	National Weather Service National Fire Weather Program, Customer Satisfaction Results	2006	CFI Group
CICEET	Land Use Planning Tools Survey	2006	CICEET
COP	Planning for the Impacts of Sea Level Rise and Climate Change, workshop report	2007	NOAA Coastal Ocean Program
CRCP1	Report on the Status of Marine Protected Areas in Coral Reef Ecosystems of the United States Volume 1: Marine Protected Areas Managed by U.S. States, Territories, and	2007	NOAA Coral Reef Conservation Program

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Abbreviation	Study Title	Date	Author / Sponsor
	Commonwealths		
CRCP2	Report on the Status of Local Action Strategies to Conserve and Protect Coral Reefs For Years 2002-2006: Report to the U.S. Coral Reef Task Force from the Task Force Steering Committee	2008	NOAA Coral Reef Conservation Program
CSC1	Marine Protected Areas Needs Assessment	2002	NOAA Coastal Services Center
CSC2	Addressing Habitat Issues with Remote Sensing in the National Estuarine Research Reserve System	2002	NOAA Coastal Services Center
CSC3	Marine Protected Areas Technology Needs Assessment	2003	CSC / MPA Center
CSC4	Planning for Coastal Climatologies in the Southeastern United States	2004	NOAA Coastal Services Center
CSC5	CSC Strategic Planning FY05 - Synthesis of Customer Needs	2005	NOAA Coastal Services Center
CSC6	Coastal Resource Management Customer Survey	2006	NOAA Coastal Services Center
CSC7	Summary Report for the Coastal Ecosystem-Based Management Course Needs Assessment	2008	NOAA Coastal Services Center
CSO1	State Coastal Observations and Monitoring Needs: Results of a Survey to Assess Coastal Management Needs	2004	Coastal States Organization
CSO2	Improving Links between Science and Coastal Management: Results of a Survey to Assess Science and Technology Needs	2004	Coastal States Organization
CSO3	Meeting the Needs of SE Coastal Resource Managers through Coastal Ocean Observing Systems	2006	SECORRA / CSO

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Abbreviation	Study Title	Date	Author / Sponsor
CSU	Trends Analysis of NERRs Coastal Training Programs	2004	Cleveland State University
FCMP	Assessment and Strategy of the Florida Coastal Management Program: FY 2006 - 2010	2006	Florida Coastal Management Program
GCMP	Georgia Coastal Management Program CZMA Section 309 Enhancement Program Assessment and Strategy for 2006-2010	2006	Georgia Coastal Management Program
HEINZ1	Innovation by Design: Improving Learning Networks in Coastal Management Report	2004	The Heinz Center
HEINZ2	Filling the Gaps: Priority Data Needs and Key Management Challenges for National Reporting on Ecosystem Condition	2006	The Heinz Center
JAG/NWFWNA	National Wildland Fire Weather: A Summary of User Needs and Issues	2007	Joint Action Group (JAG) for the National Wildland Fire Weather Needs Assessment
MK	Constituent Views on Improving Federal Fisheries Management	2003	MerrellKatsouros LLP
NCCMP	Assessment and Strategy of the North Carolina Coastal Management Program	2006	North Carolina Division of Coastal Management
NERRS1	The State of Estuarine Education: K-12 Needs Assessment - Executive Summary	2007	TERC / NERRS
NPSG	The Federal Wildland National Predictive Services User Needs Assessment: Final Report	2007	National Predictive Services Group
NRC1	A Geospatial Framework for the Coastal Zone: National Needs for Coastal Mapping and Charting	2004	National Research Council

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Abbreviation	Study Title	Date	Author / Sponsor
PRDNR	Section 309 Assessment and Strategy	2007	Puerto Rico DNER NRA Division of Coastal Zone Management
SAIC	Requirements of the U.S. Recreation & Tourism Industry for Climate, Weather, & Ocean Information	2002	Science Applications International Corporation
SCDHEC-OCRM	South Carolina Coastal Zone Management Program Section 309 Assessment and Strategy 2006-2010	2007	SCDHEC-OCRM
SEACOOS1	SEACOOS Users Need Workshop for Georgia	2004	SEACOOS
SEACOOS2	Ocean Observations User Characterization Summary	2006	SEACOOS
UNCW	Coastal Conference on Ecosystem-Based Approaches to Management in the Southeast Region	2006	University of North Carolina Wilmington

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Appendix 3: Survey Methods

Abbr	Survey			Interviews		Focus Groups	Workshops	Expert Panel	Literature Review
	Web-based	Telephone	Mail	Face-to-face	Telephone				
ACT							X		
AGT				X					X
CFI1	X								
CFI2	X								
CFI3	X								
CFI4	X								
CICEET				X					
COP							X		
CRCP1	X			X	X				
CRCP2		X			X				
CSC1					X	X			X
CSC2					X				
CSC3					X				X
CSC4							X		
CSC5									X
CSC6	X								
CSC7	X								
CSO1	X								
CSO2	X								
CSO3				X					X
CSU									X
FCMP	X		X	X	X		X		
GCMP	X		X	X	X		X		
HEINZ1				X			X		X

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Abbr	**Survey**			**Interviews**		**Focus Groups**	**Workshops**	**Expert Panel**	**Literature Review**
	Web-based	Telephone	Mail	Face-to-face	Telephone				
HEINZ2	X							X	
JAG			X						
MK	X					X			
NCCMP	X		X	X	X		X		
NERRS1	X								
NPSG	X								
NRC1							X	X	X
PRDNR	X		X	X	X		X		
SAIC				X					X
SCDHEC	X		X	X	X		X		
SEACOOS1							X		
SEACOOS2				X					
UNCW						X			
Total	**18**	**1**	**6**	**12**	**10**	**3**	**11**	**2**	**9**

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Appendix 4: Target Populations and Sample Sizes

Abbr	Sample Size	COASTAL MANAGEMENT										FISHERIES MANAGEMENT						
		OCRM	Other NOS	NERRs	MPAs	Ras / Reg OOS	State CZ	Other State Mar. Res	Co. / Muni planners	NGO	Other Fed Land Mgmt	NMFS	USFWS	Mgmt. Councils	State Fish. Mgrs	Comm Fish.	Charter Fish.	Rec Fish
ACT	**31**				X		X								X			
AGT	**ND**								X	X	X		X					
CFI1	**6,298**															X	X	
CFI2	**479**																	
CFI3	**2,352**																	
CFI4	**1,290**								X		X							
CICEET	**23**								X									
COP	**53**		X		X		X	X	X	X		X	X	X				
CRCP1	**ND**				X		X	X		X					X			
CRCP2	**ND**						X	X		X					X			
CSC1	**77**	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X
CSC2	**25**			X														
CSC3	**53**				X		X	X				X		X	X			
CSC4	**45**							X										
CSC5	**ND**																	
CSC6	**434**	X	X	X	X	X	X	X	X	X	X		X		X			
CSC7	**254**	X		X	X		X	X						X	X			
CSO1	**230**			X	X		X	X						X	X			
CSO2	**230**			X	X		X	X						X	X			
CSO3	**13**																	
CSU	**ND**																	
FCMP	**ND**	X		X	X		X	X	X	X					X			
GCMP	**ND**	X		X			X	X	X	X					X			
HEINZ1	**64**		X	X	X		X	X		X								
HEINZ2	**278**	X	X	X	X		X	X		X		X	X		X			
JAG	**745**								X	X			X					
MK	**>400**							X		X				X	X	X	X	X
NCCMP	**ND**	X		X			X	X	X	X					X			
NERRS1	**966**																	

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Abbr	Sample Size	COASTAL MANAGEMENT										FISHERIES MANAGEMENT						
		OCRM	Other NOS	NERRs	MPAs	Ras / Reg OOS	State CZ	Other State Mar. Res	Co. / Muni planners	NGO	Other Fed Land Mgmt	NMFS	USFWS	Mgmt. Councils	State Fish. Mgrs	Comm Fish.	Charter Fish.	Rec Fish
NPSG	**1,383**							X	X		X		X		X			
NRC1	**10**						X											
PRDNR	**ND**	X		X			X	X	X	X		X	X					
SAIC	**85**																	
SCDHEC	**19**	X		X			X	X	X	X					X			
SEACOOS1	**ND**				X	X	X	X		X								
SEACOOS2	**ND**	X	X	X		X	X	X						X	X			X
UNCW	**200**		X	X	X	X	X	X		X		X			X	X		

Abbr	Sample Size	EMERGENCY MANAGEMENT			WATER QUALITY & QUANTITY							
		FEMA	State Floodplain Mgrs	State / Co. / Local EM Mgrs	River Forecast Ctr	USGS	EPA	State Hydro	Water District Mgrs	State PH Mgrs	State Water Quality Mgrs	Water Utilities & Municipal Treatment
ACT	**31**										X	
AGT	**ND**			X								
CFI1	**6,298**											
CFI2	**479**	X		X								
CFI3	**2,352**		X	X				X	X		X	
CFI4	**1,290**	X	X	X				X	X			
CICEET	**23**											
COP	**53**			X							X	
CRCP1	**ND**											
CRCP2	**ND**						X				X	
CSC1	**77**											
CSC2	**25**											
CSC3	**53**											
CSC4	**45**			X								
CSC5	**ND**											
CSC6	**434**		X	X					X	X	X	
CSC7	**254**		X								X	
CSO1	**230**		X								X	

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Abbr	Sample Size	EMERGENCY MANAGEMENT			WATER QUALITY & QUANTITY							
		FEMA	State Floodplain Mgrs	State / Co. / Local EM Mgrs	River Forecast Ctr	USGS	EPA	State Hydro	Water District Mgrs	State PH Mgrs	State Water Quality Mgrs	Water Utilities & Municipal Treatment
CSO2	**230**		**X**								**X**	
CSO3	**13**											
CSU	**ND**											
FCMP	**ND**		**X**	**X**				**X**	**X**	**X**	**X**	**X**
GCMP	**ND**		**X**	**X**								
HEINZ1	**64**					**X**				**X**		
HEINZ2	**278**					**X**		**X**		**X**		
JAG	**745**	**X**				**X**						
MK	**>400**											
NCCMP	**ND**		**X**	**X**								
NERRS1	**966**											
NPSG	**1,383**			**X**							**X**	
NRC1	**10**											
PRDNR	**ND**											
SAIC	**85**											
SCDHEC	**19**											
SEACOOS1	**ND**											
SEACOOS2	**ND**	**X**	**X**	**X**						**X**	**X**	
UNCW	**200**								**X**		**X**	

Abbr	Sample Size	TRANSPORTATION							WEATHER & CLIMATE			EDUCATION			PRIVATE SECTOR			
		USCG	FAA	USACE	State DOTs	Ports	Comm. shipping	Aviation	NWS WFOs	SE Regional Climate Ctr	State Climate Off	University	Sea Grant	K-12	Marine Tech	Energy	Insurance / re-ins	Local weather services
ACT	**31**											**X**	**X**		**X**			
AGT	**ND**								**X**							**X**	**X**	
CFI1	**6,298**						**X**											
CFI2	**479**	**X**																
CFI3	**2,352**																	
CFI4	**1,290**				**X**													
CICEET	**23**											**X**			**X**			
COP	**53**				**X**							**X**						

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Abbr	Sample Size	TRANSPORTATION							WEATHER & CLIMATE			EDUCATION			PRIVATE SECTOR			
		USCG	FAA	USACE	State DOTs	Ports	Comm. shipping	Aviation	NWS WFOs	SE Regional Climate Ctr	State Climate Off	University	Sea Grant	K-12	Marine Tech	Energy	Insurance / re-ins	Local weather services
CRCP1	**ND**																	
CRCP2	**ND**																	
CSC1	**77**																	
CSC2	**25**																	
CSC3	**53**																	
CSC4	**45**								**X**	**X**	**X**	**X**	**X**			**X**		
CSC5	**ND**																	
CSC6	**434**			**X**									**X**					
CSC7	**254**											**X**	**X**					
CSO1	**230**																	
CSO2	**230**																	
CSO3	**13**											**X**	**X**					
CSU	**ND**																	
FCMP	**ND**											**X**	**X**					
GCMP	**ND**											**X**	**X**					
HEINZ1	**64**											**X**	**X**					
HEINZ2	**278**											**X**	**X**					
JAG	**745**		**X**		**X**				**X**									
MK	**>400**																	
NCCMP	**ND**											**X**	**X**					
NERRS1	**966**													**X**				
NPSG	**1,383**				**X**				**X**			**X**						
NRC1	**10**																	
PRDNR	**ND**			**X**								**X**	**X**					
SAIC	**85**		**X**			**X**		**X**	**X**								**X**	
SCDHEC	**19**											**X**						
SEACOOS1	**ND**											**X**	**X**					
SEACOOS2	**ND**					**X**						**X**	**X**		**X**	**X**		**X**
UNCW	**200**			**X**					**X**			**X**						

Abbr	Sample Size	RECREATION & TOURISM	PUBLIC

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		State / Local Tourism	Cruise Lines	Hosp. Ind.	Boaters	Surfers	Divers	Tourist	Aviators	Residents / Citizens
ACT	**31**		**X**				**X**			
AGT	**ND**									**X**
CFI1	**6,298**				**X**			**X**		
CFI2	**479**									
CFI3	**2,352**									
CFI4	**1,290**									
CICEET	**23**									
COP	**53**									
CRCP1	**ND**									
CRCP2	**ND**	**X**								
CSC1	**77**									
CSC2	**25**									
CSC3	**53**									
CSC4	**45**	**X**				**X**				
CSC5	**ND**									
CSC6	**434**									
CSC7	**254**									
CSO1	**230**									
CSO2	**230**									
CSO3	**13**									
CSU	**ND**									
FCMP	**ND**									
GCMP	**ND**	**X**								**X**
HEINZ1	**64**									
HEINZ2	**278**									
JAG	**745**									
MK	**>400**									
NCCMP	**ND**									**X**
NERRS1	**966**									
NPSG	**1,383**									
NRC1	**10**									
PRDNR	**ND**									**X**
SAIC	**85**	**X**	**X**	**X**					**X**	
SCDHEC	**19**									**X**

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Abbr	Sample Size	RECREATION & TOURISM								PUBLIC
		State / Local Tourism	Cruise Lines	Hosp. Ind.	Boaters	Surfers	Divers	Tourist	Aviators	Residents / Citizens
SEACOOS1	**ND**									
SEACOOS2	**ND**				**X**	**X**	**X**			
UNCW	**200**	**X**								

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Appendix 5: Priority Issues and Product / Services / Needs by NOAA Mission Goal and Program

Table 5-1: Ecosystem Goal – Priority Issues and Needs

NOAA Program	Theme	Priority Service / Product /Data	# Citations	Documents
Aquaculture			4	FCMP, GCMP, MK, SCDHEC
Coastal & Marine Resources	Land use planning / growth management	Land use change models and analysis	12	CICEET, CSC2, CSC6, CSO1, CSO2, CSU, FCMP, HEINZ2, JAG, NRC1, SCDHEC, SEACOOS1
		Tools (demo projects)to evaluate land use planning approaches	4	CICEET, CSC2, CSC6, CSO2
		Energy facility siting	1	SCDHEC
		Affordable remote sensing data	5	CICEET, CSO1, CSO2, NEINZ2, NRC1
		Consistent spatial framework	1	NRC1
	Cumulative and secondary impacts	Methodologies for assessment and evaluation	3	NCCMP, PRDNR, SCDHEC
		Data and monitoring	3	NCCMP, PRDNR, SCDHEC
		Technical assistance and education for local communities	2	GCMP, SCDHEC
	Watershed planning		2	CSC6, SCDHEC
	Shoreline management	Mapping	3	CSC2, CSC6, CSO2
		Shoreline change & erosion	7	CSC2, CSC6, CSO1, CSO3, FCMP, NRC1, SCDHEC
		Adaptation technologies	1	CSO2
	Wetland management and protection	Updated and more detailed wetland maps	1	NCCMP
		Tools for monitoring, tracking, and/or mitigating	3	FCMP, NCCMP, SCDHEC
		Education and outreach	2	NCCMP, PRDNR
		Law enforcement	2	GCMP, PRDNR

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NOAA Program	Theme	Priority Service / Product /Data	# Citations	Documents
	Coral reef protection	Capacity building	2	CRCP1, CRCP2
		Funding/resources	2	CRCP1, CRCP2
		Intergovernmental coordination	2	CRCP1, CRCP2
		Public outreach	2	CRCP1, CRCP2
		Monitoring	2	CRCP1, CRCP2
		Enforcement	2	CRCP1, CRCP2
	Marine debris	Law enforcement and regulation	2	NCCMP, PRDNR
		Education and outreach	2	FCMP, GCMP
		Removal funding	1	SCDHEC
	Public access		6	CSC6, FCMP, GCMP, NCCMP, PRDNR, SCDHEC,
	Ocean management and planning	Increased state and regional coordination at all levels	2	NCCMP, SCDHEC
		Regional ecosystem based assessment methodologies	1	FCMP
	Energy resources and facility siting	Inventory of offshore resources	1	SCDHEC
	Recreation & tourism planning	Impact	2	CSC3, FCMP
	Public outreach (general)		6	CICEET, COP, CSC1, CSC2, CSC3, FCMP
	CZ manager training	Wed-based compendium of best coastal and ocean management practices	4	CICEET, CSC1, CSC6, HEINZ1
		Training program on learning networks	1	HEINZ1
		Communication technology for real-time, distributed learning	1	HEINZ1
		Technology training	3	ACT, CSC3, HEINZ3
		Growth / environmental health trade-offs	3	CICEET, CSC3, CSC6
		Land use change data interpretation	4	CICEET, CSC2, CSC6, FCMP
		Incorporate ecosystem processes into EBM	1	CSC7

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NOAA Program	Theme	Priority Service / Product /Data	# Citations	Documents
		EBM methods	2	CSC7, CSO2
		Marine debris	1	CSO2
Ecosystem Observations	Indicators	Land cover data	4	CSC1, CSC2, CSC3, UNCW
	Socio-economic	Impact data	4	CICEET, CSC1, CSC3, UNCW
		Cultural values data	2	CSC3, UNCW
	Data diversity	Tools to combine diverse data sets	2	CICEET, CSC3
	Ecosystem Health	HABs monitoring	3	CSC3, FCMP, UNCW
		Environmental contamination remediation & removal	1	CSO2
		Nutrient enrichment bmp	1	CSO2
	Ecosystem forecasts		2	CSC6, SEACOOS1
Enforcement	Violations	Real-time monitoring	2	CSC3, MK
		Training	1	CSC3
Fisheries Management	Stock assessments	Data & forecasts	2	MK, UNCW
	Bycatch	Gear modification	1	MK
	Effects of MPAs		2	CSC3, MK
	Essential fish habitat		4	CSC3, FCMP, MK, UNCW
	EBM techniques		1	MK
	Fisheries - Climate	Forecast tools	1	CSC4
	Fishing effort	Data	1	CSC3
Habitat	Characterization	Benthic habitat data	6	CSC1, CSC2, CSC3, CSC6, CSO2, NRC1
		Species inventories and monitoring	6	CSC1, CSC2, CSC3, CSC6, CSC7, SEACOOS1
	Change	Impact	4	CSC1, CSC2, CSC3, CSO3
		Trends	6	CSO2, CSO3, CSU, FCMP, NRC1, UNCW
	Mapping	Topography/bathymetry data	7	CSC1, CSC2, CSC3, CSO1, CSO3, HEINZ2, NRC1,
		Spatial boundaries	4	CSC1, CSC3, CSC6, NRC1
	Restoration		5	CSC2, CSC6, CSO2, GCMP, SCDHEC
	Sediment management	Transport & fate models	1	CSO2
	Invasive species	Detection & monitoring	8	CSC1, CSC2, CSC6, CSO1, CSO2, CSO3,

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NOAA Program	Theme	Priority Service / Product /Data	# Citations	Documents
				CSU, HEINZ2
Protected species			1	CSC6

Table 5-2: Climate Goal – Priority Issues and Needs

NOAA Program	Theme	Priority Service / Product /Data	# Citations	Documents
Climate Observations & Monitoring	Real-time data	Sea level	1	CSO1
Climate Research & Modeling	Forecast ecological impacts of climate & SLR	GIS and hard copy map layers	3	COP, CSC2, CSC6
	Forecast infrastructure impacts of climate & SLR	GIS and hard copy map layers	2	COP, CSC6
	Forecast economic risk	Incorporate models into HAZUS	2	COP, CSC4
		Pest forecasting for agriculture products	1	CSC4
Climate Service Development	Forecast dissemination	Library of Scenarios	1	COP
		Public outreach & education	2	CSC4, JAG
	Incorporate SLR into CZ planning	Vulnerability maps	1	COP
		SLR timeline	1	COP
	Training		1	CSC4
	K-12 education	Curriculum development	2	CSC4, NERRS1
		Curriculum materials	1	NERRS1
		Teacher development	1	NERRS1

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Table 5-3: Weather and Water Goal – Priority Issues and Needs

NOAA Program	Theme	Priority Service / Product /Data	# Citations	Documents
Air quality			1	JAG
Coasts, Estuaries, & Oceans	IOOS	Bio-sensors	2	ACT, SEACOOS1
		Physical oceanographic sensors	1	SEACOOS1
		Nutrient sensors	2	CSO1, CSO2
		Real-time near-shore wave, current, and wind data	5	CSC4, CSC6, CSO1, FCMP, SEACOOS1
		Real-time SST, salinity data	2	CSO1, FCMP
	Water quality monitoring		7	CSC2, CSC6, CSO1, CSO3, FCMP, HEINZ2, UNCW
	Coastal hazards	Inundation models & forecasts	5	COP, CSC2, CSC6, CSO2, SCDHEC
		Risk and vulnerability assessments	2	CSC6, PRDNR
		Product delivery mechanisms	2	CFI2, NCCMP
		Data acquisition	2	NCCMP, SCDHEC
		Technical assistance	4	FCMP, GCMP, PRDNR, SCDHEC
		Education and outreach	2	GCMP, PRDNR
Hydrology	Water supply		2	CFI3, UNCW
	River flow	Forecasts	1	CFI3
		Inland flooding	2	CFI2, CFI3
		River stage graphics	1	CFI3
		Seasonal predictions	2	CFI3, CSC4
	Reservoir management		1	CSC4
	Precipitation	Forecast accuracy	1	CFI3
Local Forecasts & Warnings	Coastal/Offshore/High Seas Forecasts	General forecast accuracy & verification	3	CFI1, CSC4, SAIC
		Wind forecast accuracy	2	CFI1, CSC4
		Wave forecast accuracy	2	CFI1, CSC4
		Storm tracks	3	CFI1, CSC4, SAIC
		Integrating across consistent temporal	1	CSC4

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		and spatial resolutions		
	Fire-weather	Forecasts (trend & specific) & accuracy	5	AGT, CFI2, CFI4, JAG, NPSG
		Standardized GI	1	CFI2
		High resolution spatial data	3	CFI2, JAG, NPSG
		Risk assessment maps	2	CFI2, NPSG
		Coupled fire- atmosphere models	1	JAG
		One-stop shop for fire weather user	1	JAG
	Training	Forecast products	1	JAG
		Best practices	1	JAG
		Public education	1	JAG
Science, Technology, & Infusion	New sensor development	Sensor testbed	1	ACT
		One-stop shop on uses, capabilities, and e1pectations of sensor/sensor support technologies.	1	ACT
		Sensor workshops	1	ACT

Table 5-4: Commerce and Transportation Goal – Priority Issues and Needs

NOAA Program	Theme	Priority Service / Product /Data	# Citations	Documents
Aviation Weather	Air safety	Ensemble modeling and probabilistic forecasts	1	SAIC
Marine Transportation Systems			0	
Marine Weather			2	CFI1, SAIC

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Appendix 6: Internal NOAA Needs Assessments

Abbreviation	Study Title	Date	Author / Sponsor
TFIFSA	The National Stock Assessment Improvement Plan	2001	National Task Force for Improving Fish Stock Assessments
PRT	NOAA Program Review	2002	NOAA Program Review Team
CCMA-BT	The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2005	2006	NOAA Center for Coastal Monitoring and Assessment's Biogeography Team
NRC2	Completing the Forecast: Characterizing and Communication Uncertainty for Better Decisions Using Weather and Climate Forecasts	2006	National Research Council
eETT	Evolving an Ecosystem Approach to Science and Management Throughout NOAA and its Partners	2006	NOAA Science Advisory Board External Ecosystem Task Team
MRII	Review of Recreational Fisheries Survey Methods	2006	Executive Steering Committee, Marine Recreational Information Initiative
NERRS2	National Estuarine Research Reserve System Research and Monitoring Plan (2006-2011)	2007	NOAA Estuarine Reserves Division

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