

Integrated Ocean Observing System Regional Association Boundaries and Federal Agency Relationships

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**Lauren Long, Geno Olmi, and Dave Easter
NOAA Coastal Services Center**

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Table of Contents

TABLES	2
FIGURES	3
INTRODUCTION AND STATEMENT OF PURPOSE	1
EXAMINING REGIONAL BOUNDARIES OF THE IOOS REGIONAL ASSOCIATIONS	2
ECOSYSTEM-BASED BOUNDARIES.....	5
<i>Large Marine Ecosystems</i>	5
<i>National Estuarine Research Reserve (NERR) Ecoregions</i>	5
<i>Fishery Management Councils</i>	6
<i>U.S. Fish and Wildlife Service</i>	7
<i>U.S. Army Corps of Engineers</i>	8
GEOGRAPHIC JURISDICTIONAL BOUNDARIES	8
<i>U.S. Environmental Protection Agency Regions</i>	8
<i>U.S. Geological Survey</i>	9
<i>U.S. Coast Guard</i>	9
<i>Ecosystem-Based and Geographic Jurisdictional Boundaries</i>	10
COASTAL POPULATION AND COASTLINE MILEAGE FACTORS.....	11
THE NATIONAL IOOS INITIATIVE: FEDERAL AGENCIES AND THE REGIONAL COMPONENT OF IOOS	14
COORDINATION AND DEVELOPMENT.....	14
FEDERAL INVOLVEMENT IN REGIONAL ASSOCIATION (RA) IMPLEMENTATION.....	16
PARTICIPATION OF FEDERAL AGENCIES	16
REFERENCES.....	20
APPENDIX A: FIGURES.....	22
APPENDIX B: GAPS IN DATA AND EXPLANATIONS OF POPULATION CALCULATIONS FOR CERTAIN REGIONAL ASSOCIATIONS.....	27
APPENDIX C: FEDERAL AGENCY PARTICIPATION IN IOOS REGIONAL ASSOCIATIONS.....	28
APPENDIX D: GLOBAL OCEAN OBSERVING SYSTEM (GOOS) REGIONAL ALLIANCES	35

Tables

TABLE 1: REGIONAL ASSOCIATION GEOGRAPHIC BOUNDARIES AND WEBSITES.....	3
TABLE 2: OVERLAP OF THE NATIONAL ESTUARINE RESEARCH RESERVE BIOGEOGRAPHIC REGIONS AND IOOS RA BOUNDARIES	6
TABLE 3: OVERLAP OF THE FISHERY MANAGEMENT COUNCILS AND IOOS RA BOUNDARIES	7
TABLE 4: OVERLAP OF U.S. FISH AND WILDLIFE SERVICE REGIONS AND IOOS RA BOUNDARIES.....	7
TABLE 5: OVERLAP OF U.S. ARMY CORPS OF ENGINEERS CIVIL DISTRICTS AND IOOS RA BOUNDARIES	8
TABLE 6: OVERLAP OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY AND IOOS RA BOUNDARIES	9
TABLE 7: OVERLAP OF U.S. GEOLOGICAL SURVEY REGIONS AND IOOS RA BOUNDARIES	9
TABLE 8: OVERLAP OF U.S. COAST GUARD DISTRICTS AND IOOS RA BOUNDARIES	10
TABLE 9: GEOGRAPHIC BOUNDARIES, APPROXIMATE COASTLINE MILEAGE, AND APPROXIMATE REGIONAL POPULATION.....	11
TABLE 10: FEDERAL AGENCY REPRESENTATION IN EACH REGIONAL ASSOCIATION OF IOOS	18

Figures

FIGURE 1: GLOBAL OBSERVING FRAMEWORK. SLIDE EXTRACTED FROM GENO OLMI'S	22
FIGURE 2: LARGE MARINE ECOSYSTEMS OF THE UNITED STATES: WWW.OCEAN.US/NODE/203	22
FIGURE 3: NATIONAL ESTUARINE RESEARCH RESERVE ECOREGIONS:.....	23
FIGURE 4: U.S. FISH AND WILDLIFE SERVICE REGIONAL BOUNDARIES: WWW.FWS.GOV/WHERE/	23
FIGURE 5: U.S. ARMY CORPS OF ENGINEERS CIVIL ENGINEER DIVISIONS AND DISTRICTS:	24
FIGURE 6: U.S. ENVIRONMENTAL PROTECTION AGENCY REGIONS:.....	24
FIGURE 7: U.S. GEOLOGICAL SURVEY REGIONS: HTTP://GEOGRAPHY.USGS.GOV/PLACES.PHP	25
FIGURE 8: U.S. COAST GUARD DISTRICTS: WWW.USCG.MIL/TOP/UNITS/	25
FIGURE 9: GLOBAL OCEAN OBSERVING SYSTEM REGIONAL ALLIANCES: WWW.IOC-GOOS.ORG	26

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Introduction and Statement of Purpose

IOOS is the Integrated Ocean Observing System, which is the U.S. contribution to the Global Ocean Observing System (GOOS) and the Global Earth Observation System of Systems (GEOSS) (see Figure 1; note that all figures are found in Appendix A). GEOSS is an “international effort designed to monitor Earth and transmit observations globally” (Ocean.US website). IOOS is a “coordinated network of people and technology that work together to generate and disseminate continuous data on our coastal waters, Great Lakes, and oceans” (Ocean.US website).

Priorities for detecting and predicting changes in marine and coastal ecosystems vary among regions in the U.S., and to address these variations, Regional Associations (RAs) were initiated. RAs represent partnerships among a variety of federal and state agencies and stakeholders with interests in information from coastal and ocean observations. RAs were established to address regional and local priorities and issues that could not be addressed by the federal government alone. They are responsible for identifying users and user needs, and developing products for these users within their regions through the development and operation of Regional Coastal Ocean Observing Systems (RCOOSs) (Ocean.US website).

Developing partnerships at the regional level benefits the nation’s coastal areas by providing opportunities to take full advantage of industry, academia, and nongovernmental entities, along with federal, state, and local government expertise, infrastructure, and resources (U.S. Commission on Ocean Policy, 2004). The RAs coordinate data sharing and development of products to meet user needs using data collected by partners. Sharing data and information with one another is essential to minimize replication and increase the efficient use of resources.

Constituent groups can use these information products to make informed decisions affecting the coastal environment and the public (Ocean.US website).

The purpose of this study is to examine present RA boundaries in relation to other functional boundaries of organizations and agencies with which the RAs have common interests. Examining these boundaries, along with regional coastline mileage and population, provides context for IOOS management and may provide insight into the challenges and the potential effectiveness and efficiency of the RAs with regard to

Seven Societal Goals of IOOS:

1. Improve predictions of climate change and weather and their effects on coastal communities and the nation.
2. Improve the safety and efficiency of maritime operations.
3. Mitigate the effects of natural hazards more effectively.
4. Improve national and homeland security.
5. Reduce public health risks.
6. Protect and restore healthy coastal ecosystems more effectively.
7. Enable the sustained use of ocean and coastal resources.

stakeholder interactions. In addition, the study examines current federal agency involvement in RAs and may provide information to improve communication, coordination, and collaboration between RAs and federal agencies. The study is intended to be an informative document that takes the initial step in analyzing communication issues of the regions.

Examining Regional Boundaries of the IOOS Regional Associations

The criteria for identifying the number and locations of RAs were addressed generally by Ocean.US, but the exact number and locations were not prescribed. It was thought that somewhere between 8 and 15 would be appropriate for the U.S., that the regional boundaries would be established as associations developed, and that the boundaries would evolve depending on national coordination and federal funding; also, the RAs would be established initially through federally funded pilot projects (Ocean.US, 2003). Identifying appropriate regional boundaries is a difficult task requiring oceanographic, ecological, and geographic jurisdictional boundaries to be taken into consideration. The estimates of 8 to 15 reflected recognized boundaries for Large Marine Ecosystems and Regional Marine Research Regions with some consideration of populations and political boundaries.

With many factors influencing the locations of RA boundaries, a suggestion coming from an Ocean.US Summit was that the boundaries “not be fixed, will often overlap, and are likely to be driven by funding considerations.” The suggestion of overlapping boundaries was thought to promote adjacent RAs working together and collaborating (Ocean.US, 2003), and in fact, the boundaries might differ for particular issues and products. The 2006 IOOS Development Plan stated that the number of RCOOSs would be fixed, with RAs being formed as governing structures of the RCOOSs. There would also be subregional observing systems incorporated within each RCOOS (Ocean.US, 2006).

RAs were initiated through a funding solicitation by the National Oceanic and Atmospheric Administration (NOAA) that called for their planning and organization, including engagement of stakeholders and development of an organizational structure. Seven grant proposals were submitted by regions in the 2003 fiscal year, beginning the establishment of 7 associations. Eight grant proposals followed the next fiscal year in 2004 and then 11 proposals from the 2005 through 2007 fiscal years. There are currently 11 RAs, from NOAA’s funding effort, building upon the National IOOS Initiative. The geography of each RA encompasses “the area from the inland extent of coastal watersheds to the offshore boundary of the Nation’s Exclusive Economic Zone” at a minimum.

The existing RA boundaries are examined below with other known boundaries, such as ecosystem-based and jurisdictional boundaries. The RA boundaries do not match exactly to any of the boundaries described, which may add to the difficulty of coordination and communication with other entities in the region. Such coordination is essential to the development of a nationally integrated observing system. The U.S. is moving toward

ecosystem-based management, so therefore RA boundaries should reflect both ecosystem processes and political jurisdictions for administrative purposes. While the present number and boundaries of RAs may not be the most efficient or effective for IOOS development, they do reflect a combination of ecological and geopolitical considerations, have been effective in engaging regional stakeholders, and can be altered if deemed appropriate as IOOS matures.

The present geographic boundaries of each RA are listed in the table below, followed by examination of other entities with ecosystem-based and geographic jurisdictional boundaries. Differences among the coastal population and mileage of RAs are also discussed.

Table 1: Regional Association Geographic Boundaries and Websites

IOOS Regional Associations	
Regional Association	Geographic Boundary and Website
GLOS Great Lakes Observing System	GLOS was formed as a Regional Association for a binational Great Lakes–St. Lawrence System. It encompasses the states that border the Great Lakes, including Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin, along with Ontario and Québec in Canada. <i>http://glos.us</i>
NERACOOS Northeast Regional Association of Coastal Ocean Observing Systems	“NERACOOS includes the marine waters of the Gulf of Maine Area, extending to and including the Bay of Fundy, Georges Bank, the Northeast Channel, and the Great South Channel, and the coastal waters south of Cape Cod and Rhode Island, including the area from Buzzard’s Bay to Block Island Sound. This area is adjacent to and connects with the northern portion of the mid-Atlantic region.” <i>www.neracoos.org</i>
MACOORA Mid-Atlantic Coastal Ocean Observing Regional Association	MACOORA extends from Cape Cod to Cape Hatteras, covering five sub-regions: Massachusetts and Rhode Island Bays, Long Island Sound, New York Bight, Delaware Bay, and Chesapeake Bay. <i>www.macoora.org</i>

<p>SECOORA Southeast Coastal Ocean Observing Regional Association</p>	<p>SECOORA includes the U.S. “coastal zone and Exclusive Economic Zone (EEZ) in the region from the North Carolina–Virginia border in the north to the Florida–Alabama coastal border. The region between the Straits of Florida and the Florida–Alabama border in the Gulf of Mexico is part of SECOORA and GCOOS. The joint designation reflects the absence of well-defined boundaries between regions. The coastal zone extends inland to the limit of direct tidal processes in estuaries.”</p> <p><i>www.secoora.org</i></p>
<p>GCOOS Gulf of Mexico Coastal Ocean Observing System</p>	<p>GCOOS includes the “U.S. coastal zone and the Exclusive Economic Zone (EEZ) in the Gulf of Mexico” and associated rivers and estuaries.</p> <p><i>http://ocean.tamu.edu/GCOOS/welcome.htm</i></p>
<p>CaRA Caribbean Regional Association</p>	<p>“The Caribbean region encompasses the waters of the U.S. Exclusive Economic Zones of Puerto Rico, the U.S. Virgin Islands and Navassa.”</p> <p><i>http://cara.uprm.edu</i></p>
<p>PacIOOS Pacific Islands Ocean Observing System</p>	<p>“The PacIOOS region is defined as the Commonwealth and Territories of the United States in the Pacific and the Freely Associated States in the Pacific.” PacIOOS encompasses the islands of the Pacific, including American Samoa, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, Guam, Hawaii, the Republic of the Marshall Islands, the Republic of Palau, and the possession islands of Baker, Howland, Jarvis, Johnston, Kingman Reef, Midway, and Palmyra.</p> <p><i>http://research.eastwestcenter.org/PacIOOS/</i></p>
<p>SCCOOS Southern California Coastal Ocean Observing System</p>	<p>SCCOOS extends from northern Baja California in Mexico to Morro Bay at the southern end of central California and out to the U.S. Exclusive Economic Zone.</p> <p><i>www.sccoos.org</i></p>
<p>CeNCOOS Central and Northern California Ocean Observing System</p>	<p>CeNCOOS extends from Point Conception north to the California–Oregon border and to the seaward extent of the U.S. Exclusive Economic Zone, including bays and estuaries. CeNCOOS overlaps with the regional associations to the north (NANOOS) and south (SCCOOS), which enables specific issues and functions to be addressed statewide instead of just regionally.</p> <p><i>www.cencoos.org</i></p>
<p>NANOOS Northwest Association of Networked Ocean Observing Systems</p>	<p>NANOOS is the Regional Association for the Pacific Northwest and “encompasses the waters from the U.S.–Canadian border in Washington to northern California and from the saltwater intrusion extent within bays and estuaries to the seaward extent of the U.S. Exclusive Economic Zone.”</p> <p><i>www.nanoos.org</i></p>

AOOS Alaska Ocean Observing System	AOOS was formed for the entire coastline and marine waters of Alaska. To monitor this large geographic area, regional observing systems had to be formed for the three large marine ecosystems of Alaska. These include the Gulf of Alaska, Bering Sea, Aleutian Islands, and Arctic. www.aos.org
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Ecosystem-Based Boundaries

Large Marine Ecosystems

Large marine ecosystems (LMEs) (see Figure 2) reflect ecosystem boundaries and a system developed by NOAA that encompasses regions of the world's oceans, with each LME having consistent hydrography, bathymetry, productivity, and trophic populations. They extend from river basins and estuaries to the seaward boundaries of continental shelves and ocean current systems (Sherman and Alexander, 1989). The National Ocean Policy Framework stated that the U.S. is moving to an ecosystem-based management approach and is focusing efforts on complete ecosystems instead of political boundaries that are arbitrary (U.S. Commission on Ocean Policy, 2004). LMEs would be an example of the ecosystem-based management approach to boundaries discussed in this framework.

An Ocean.US report stated that the regional boundaries should be permanent for administration, funding, and accountability purposes and variable for detecting and predicting phenomena that do not have fixed boundaries (Ocean.US, 2006). This approach should enable decision makers within regions to minimize replication and conflicts, maximize finite resources, and coordinate with each other on activities (U.S. Commission on Ocean Policy, 2004). Although there were no explicitly defined ideas of how many RAs were needed, RAs loosely follow the known marine ecoregions and capture the oceanic processes that are undefined by boundaries. Alaska is an exception to this and contains four well-defined LMEs, two of which are treated as one (Bering Sea and Aleutians).

National Estuarine Research Reserve (NERR) Ecoregions

With ecosystem-based management as a priority for the U.S., as stated by the U.S. Commission on Ocean Policy, determining the appropriate boundaries of the RAs requires biogeographic boundaries to be taken into consideration. A biogeographic region is a geographic area with similar dominant species and climate (NERRs). These boundaries are also referred to as ecoregions, which are thought to be a more effective way than political boundaries to fully incorporate the ecological diversity of specific ecosystems. Therefore, politically organized planning efforts must be formed to take these ecological boundaries into consideration, which can present challenges. Marine ecoregions have the same characteristics as land-based ecoregions, but they also take into account climate, ocean circulation, and coastal geomorphology and geology (Esselman,

2007). The NERRs were not initially established by ecoregions, but they adopted the ecoregions as an organizational framework. Eleven ecoregions were identified within the NERRs where protected areas would be located for long-term education, research, and stewardship through a partnership between NOAA and coastal states (see Figure 3). The RA locations for IOOS coincide very closely to the NERRs ecoregions, which may indicate that the RA boundaries are capturing the ecological diversity of specific ecosystems. The 11 ecoregions identified by the NERRs and the overlapping boundaries of the 11 RAs are listed in Table 2. With RA boundaries overlapping the NERR ecoregions, partnerships are forming with the RAs by utilizing the measurements already underway in the NERRs. The data being collected by the NERRs include water quality, biological, weather, and nutrients, all of which are being collected according to the IOOS Data Management and Communication (DMAC) standards.

Table 2: Overlap of National Estuarine Research Reserve (NERR) Biogeographic Regions and IOOS Regional Association Boundaries

Biogeographic Regions of the NERRs and IOOS Regional Associations	
Biogeographic Regions	Regional Associations
Great Lakes	GLOS
Acadian Region	NERACOOS
Virginian Region	NERACOOS/MACOORA
Carolinian Region	SECOORA
West Indian Region	SECOORA/CaRA/GCOOS
Louisianian Region	SECOORA/GCOOS
Insular	PacIOOS
Californian Region	SCCOOS/CeNCOOS
Columbian Region	CeNCOOS/NANOOS
Fjord Region	AOOS
Sub-Arctic	AOOS

Fishery Management Councils

The NOAA National Marine Fisheries Service (NMFS) includes eight Fishery Management Councils and promotes the stewardship of marine resources by working toward healthy ecosystems and science-based management and conservation. The Fishery Management Councils were formed through the Magnuson-Stevens Fishery Conservation and Management Act, enacted on April 13, 1976, and amended on October 11, 1996. The act established the U.S. Exclusive Economic Zone (EEZ) from 3 miles to 200 miles offshore, and the councils were established to manage the marine resources in the U.S. EEZ for the purposes stated above. The councils offer another partnership opportunity with an agency (NMFS) that is promoting goals similar to those of IOOS. The table below shows the overlap between the Fishery Management Councils and the RAs. There are similarities between the boundaries of the councils, NERR ecoregion boundaries, and

RA boundaries (except the larger Pacific region), although there is not a Fishery Management Council for the Great Lakes region.

Table 3: Overlap of the Fishery Management Councils and IOOS Regional Association Boundaries

Fishery Management Councils and IOOS Regional Associations	
Fishery Management Councils	Regional Associations
New England	NERACOOS
Mid-Atlantic	MACOORA
South Atlantic	SECOORA
Gulf of Mexico	GCOOS/SECOORA
Caribbean	CaRA
Western Pacific	PacIOOS
Pacific	SCCOOS/CeNCOOS/NANOOS
North Pacific	AOOS

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has a coastal program with the primary goal of maintaining the current populations of Federal Trust marine species and potentially increase their populations. USFWS has regional boundaries to help carry out its priorities and engage regional partners (USFWS website). The table below lists the USFWS regional boundaries and how they overlap with the RA boundaries. The USFWS regions are large (7 regions encompass all U.S. states and territories) and typically encompass multiple RAs, although GLOS and GCOOS are each split by USFWS regions. The Mountain–Prairie Region 6 is not listed because it is inland and does not overlap any RA boundaries. See Figure 4 for a map illustration of the regional boundaries.

Table 4: Overlap of U.S. Fish and Wildlife Service Regions and IOOS Regional Association Boundaries

U.S. Fish and Wildlife Service (USFWS) Regional Boundaries and IOOS Regional Associations	
USFWS Regional Boundaries	Regional Associations
Pacific (Region 1)	PacIOOS/SCCOOS/CeNCOOS/NANOOS
Southwest (Region 2)	GCOOS
Great Lakes–Big Rivers Region (Region 3)	GLOS
Southeast (Region 4)	GCOOS/CaRA/SECOORA
Northeast (Region 5)	MACOORA/NERACOOS/GLOS
Alaska (Region 7)	AOOS

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) consists of civilian and military scientists, engineers, and other specialists that work together to provide environmental and engineering services to the nation. The intent of the civil program is to use a watershed approach to managing the nation’s public water resources, which allows for the integration of physical, biological, and chemical processes. In this program, USACE is responsible for navigation, recreation, flood control, infrastructure, stewardship of the environment, and emergency response, which are some of the priorities of IOOS (USACE website). The mission of USACE could benefit from engagement with RAs that are located within their civil districts. The eight USACE civil districts that overlap the RA boundaries are listed in the table below. Figure 5 also illustrates the USACE regional districts on a map.

Table 5: Overlap of U.S. Army Corps of Engineers (USACE) Civil Districts and IOOS Regional Association Boundaries

USACE Civil Districts and IOOS Regional Associations	
USACE Civil Districts	Regional Associations
Great Lakes and Ohio River Division	GLOS
North Atlantic Division	NERACOOS/MACOORA
South Atlantic Division	MACOORA/SECOORA/GCOOS/CaRA
Mississippi Division	GCOOS
Southwestern Division	GCOOS
South Pacific Division	SCCOOS/CeNCOOS
Northwestern Division	NANOOS
Pacific Ocean Division	AOOS/PacIOOS

Geographic Jurisdictional Boundaries

U.S. Environmental Protection Agency Regions

The designated regions for the U.S. Environmental Protection Agency (USEPA) are examples of jurisdictional overlap with the RA boundaries (see Figure 6). The 10 USEPA regions and the 11 RAs are listed in the table below. USEPA Regions VII and VIII were not listed because they do not include any coastal states. The USEPA regions were adopted by the Environmental Health Services 10 Standard Federal Regions, which were suggested by the Office of Management and Budget (OMB). This was done to facilitate coordination between federal agencies and state and local governments (Williams, 1993). The USEPA regions and RA boundaries do not align well, and this could present challenges in developing partnerships.

Table 6: Overlap of the U.S. Environmental Protection Agency (USEPA) and IOOS Regional Association Boundaries

USEPA Regions and IOOS Regional Associations (Only USEPA regions containing coastal states are listed)	
USEPA Coastal Regions	Regional Associations
EPA Region I	NERACOOS/MACOORA
EPA Region II	NERACOOS/MACOORA/CaRA/GLOS
EPA Region III	MACOORA/GLOS
EPA Region IV	SECOORA/GCOOS
EPA Region V	GLOS
EPA Region VI	GCOOS
EPA Region IX	SCCOOS/CeNCOOS/PacIOOS
EPA Region X	NANOOS/AOOS

U.S. Geological Survey

The U.S. Geological Survey (USGS) was established as “an independent fact-finding agency that collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems” (USGS website). The USGS has three major regions that overlap with the IOOS RAs boundaries (see Figure 7). With the jurisdictional boundaries of the USGS overlapping extensively with the RA boundaries, monitoring efforts underway by the USGS can be utilized by the RAs to support the National Backbone measurements. Below is a table of USGS regions and IOOS RAs.

Table 7: Overlap of U.S. Geological Survey Regions (USGS) and IOOS Regional Association Boundaries

USGS Regions and IOOS Regional Associations	
USGS Regions	Regional Associations
Eastern Region	GLOS/NERACOOS/MACOORA/ SECOORA/GCOOS
Central Region	GCOOS
Western Region	AOOS/NANOOS/CeNCOOS/SCCOOS/ PacIOOS

U.S. Coast Guard

The roles of the U.S. Coast Guard (USCG) cover a broad spectrum and include law enforcement, homeland security, search and rescue, response to marine environmental pollution, and maintenance of aids to navigation including river, intracoastal, and offshore. The USCG is generally an end-user of IOOS and the table below shows how its

regional boundaries overlap with RA boundaries (USCG website). Figure 8 shows a map of the regional boundaries for the USCG.

Table 8: Overlap of U.S. Coast Guard Districts (USCG) and IOOS Regional Association Boundaries

U.S. Coast Guard Districts and IOOS Regional Associations	
U.S. Coast Guard Districts	Regional Associations
District 1	NERACOOS/MACOORA
District 5	MACOORA/SECOORA
District 7	SECOORA/GCOOS
District 8	GCOOS/SECOORA
District 9	GLOS
District 11	SCCOOS/CeNCOOS
District 13	NANOOS
District 14	PacIOOS
District 17	AOOS

Ecosystem-Based and Geographic Jurisdictional Boundaries

All the ecosystem-based and geographic jurisdictional boundaries described above contain at least one Regional Association (RA). Some have a larger scale and contain two or three, while some boundaries match almost exactly with the RAs at a smaller scale. The ecosystem-based boundaries, especially the National Estuarine Research Reserve ecoregions and the Fishery Management Councils, seem to correspond well with the RA boundaries. Again, this may indicate that the RAs are capturing the ecological diversity of specific ecosystems in their regions. Another observation is that there are 11 RA boundaries established for IOOS and fewer regional boundaries or districts established for the federal agencies examined. The RAs are still young and it is unclear what the most efficient and effective “size” is for an RA. The RAs were established to provide a close connection with the user groups; however, alignment with other ecosystem-based and geographic jurisdictional boundaries may encourage more engagement in the region. Both types of boundaries are important, and the ecosystem approach cannot be the only approach used, since the administrative realities of the region also need to be taken into consideration. The box to the right illustrates similar boundary issues, outside of IOOS, associated with the Global Ocean Observing System, or GOOS.

Scale differences in the alignment of these boundaries with RA boundaries could indicate that coastal population and mileage was an important factor in developing the IOOS regional component. An example of this can be seen in large marine ecosystem (LME) boundaries, where AOOS is the only RA located within three LMEs (Gulf of Alaska, Bering Sea, and Arctic), whereas NANOOS, CeNCOOS, and SCCOOS are three RAs

located within a single LME (California Current). Two areas of RA boundary overlap are particularly evident and increase the complexity of alignment with other ecosystem-based and geographic jurisdictional boundaries—the overlap with NERACOOS and MACOORA in the region between Cape Cod and Long Island Sound and between SECOORA and GCOOS on the West Florida shelf.

Coastal Population and Coastline Mileage Factors

The goals of IOOS are societal in nature, and therefore coastal populations may be a factor to consider when designating the boundaries of the RAs. The miles of coastline may also be a significant factor in the location of the RAs, since the longer the coastline, the more observing efforts that are needed to fulfill the IOOS goals.

Table 9 illustrates the geographic area encompassed by each RA, approximate coastline mileage of the region, and the approximate regional population. In cases where RA boundaries overlap, the table includes the mileage and population in the “overlap” area in both RAs. These data were obtained from the Office of Ocean and Coastal Resource Management, NOAA, the U.S. Census Bureau, and analysis using a geographic information system (GIS).

Table 9: Geographic Boundaries, Approximate Coastline Mileage, and Approximate Regional Population*

Regional Association (RA)		Mileage Of Coastline	Regional Population
GLOS (Great Lakes coastal states from Minnesota to New York, including Ontario and Quebec in Canada)	Great Lakes Observing System	11,538 miles	29,737,056
NERACOOS (Maine to Rhode Island)	Northeast Regional Association of Coastal Ocean Observing Systems	5,512 miles	7,165,925
NERACOOS–MACOORA Overlap (Massachusetts and Rhode Island)		1,903 miles** (Overlap mileage is included in total RA mileage)	5,831,486** (Overlap population is included in total RA population)
MACOORA (Massachusetts to Virginia)	Mid-Atlantic Coastal Ocean Observing Regional Association	13,049 miles	32,040,487

SECOORA (North Carolina to the Florida–Alabama border)	Southeast Coastal Ocean Observing Regional Association	17,031 miles	18,328,204
SECOORA/GCOOS Overlap (Florida’s West Coast)		5,095 miles** (Overlap mileage is included in total RA mileage)	4,916,678** (Overlap population is included in total RA population)
CaRA (Puerto Rico, U.S. Virgin Islands, and Navassa)	Caribbean Regional Association	880 miles	2,794,495
GCOOS (Southern Florida to Texas)	Gulf of Mexico Coastal Ocean Observing System	17,151 miles	13,076,848
PacIOOS (Hawaii, Guam, Federated States of Micronesia, Republic of Palau, Republic of Marshall Islands, American Samoa, the Commonwealth of the Northern Mariana Islands)	Pacific Islands Ocean Observing System	9,539 miles	1,743,792
SCCOOS (Morro Bay in southern end of Central California to northern Baja California in Mexico)	Southern California Coastal Ocean Observing System	1,521 miles	17,091,638
CeNCOOS (California–Oregon border to Point Conception in California)	Central and Northern California Coastal Ocean Observing System	3,668 miles	5,476,805
NANOOS (Oregon–Northern California border to the Washington–Canada border)	Northwest Association of Networked Ocean Observing Systems	4,436 miles	5,396,587
AOOS (Alaska)	Alaska Ocean Observing System	44,000 miles	625,000

* See Appendix B for gaps in data and explanations of certain RA population calculations.

** Highlighted coastline mileage and populations indicate RA overlap areas.

Data sources:

Ocean and Coastal Resources Management (OCRM) website – <http://coastalmanagement.noaa.gov>

NOAA – http://chartmaker.noaa.gov/staff/Coastline_of_the_US_1975.pdf

U.S. Census Bureau – www.census.gov

Geographic information system (GIS) analysis

Coastal Populations – based on coastal counties that have frontage on the coast and the 2000 U.S. Census Bureau population data.

Mileage of Coastline – includes tidal shoreline miles, which is the most extensive and includes major bays and estuaries.

Not unexpectedly, coastal mileage and population differs among the 11 RAs. These differences help explain why RA boundaries do not exactly follow LME boundaries. It is unlikely that there will be a simple formula for the creation of effective or efficient delivery of regional services. A combination of factors such as length of coastline, population, marine ecosystems, and jurisdictional boundaries are all considered in RA development and operational success.

NERACOOS has a relatively small coastal population and mileage, and two of the states located in this RA, Massachusetts and Rhode Island, are also located in MACOORA. The coastal population and mileage of this overlap is indicated in Table 9. From an ecosystem perspective, southern Massachusetts, Rhode Island, and Connecticut probably “fit” better in MACOORA; however, the Northeast Regional Ocean Council includes these states with those north of Cape Cod. This illustrates the “balancing act” between geopolitical and ecosystem boundaries to which RAs must be attentive. SECOORA has a large coastal population and mileage but overlaps with GCOOS on the west coast of Florida. This overlap may not be necessary, and locating the west coast of Florida only in GCOOS would even out the coastal population and mileage of the two RAs and better synchronize boundaries with federal agency and ecosystem boundaries. GLOS is the RA for all the Great Lakes, and this makes sense with the area being composed of freshwater ecosystems. It also has a high coastal population similar to MACOORA. AOOS has a very long coastline but a much smaller coastal population compared to other RAs. The smaller population may justify the need for only one RA in Alaska to fulfill the RA administrative and coordination functions, but one RA may not be sufficient for observing activities to cover the length of the coastline. NANOOS has a fairly small coastline mileage and population. CeNCOOS and SCCOOS overlap slightly in two counties, which may or may not be necessary. SCCOOS has a much smaller coastline but a significantly higher coastal population than CeNCOOS. PacIOOS and CaRA are geographically isolated from all other RAs and most likely benefit from being single RAs. The PacIOOS region is geographically large, stretching from Hawaii to island territories of Midway, Johnston, and Kingston islands.

The IOOS RA regions vary in the population they serve and the length of coast, reflecting the regional differences they were established to address for IOOS. Using this information along with the ecosystem-based and geographic jurisdictional boundaries may provide insight into their operational success. To date, the focus of the RAs has been

on establishing themselves within the regions. As IOOS matures and the RAs grow, relationships between neighboring RAs will need to be enhanced. The second portion of this document looks at federal agency relationships with the RAs, which may provide more information on the issues of communication and coordination that potentially exist because of RA boundaries.

The National IOOS Initiative: Federal Agencies and the Regional Component of IOOS

The preceding discussion of RA boundaries in relation to federal agency boundaries highlights an issue of potential communication challenges among RAs and federal agencies. Federal agency boundaries differ and overlap with RA boundaries in varying ways, causing confusion about which RAs the agencies should be involved with, or which districts RAs should engage. Overlapping boundaries may affect federal agency relationships and involvement with an RA. This portion of the document examines the current relationships between RAs and federal agencies and the challenges of coordination and communication, along with potential recommendations to address these challenges. This section will also provide background on several nongovernmental organizations that play an essential role in RA development.

The relationships that exist between the RAs and the national IOOS initiative occur on many levels. The involvement and responsibilities of federal agencies participating in this initiative vary broadly and include implementing operational observing programs, conducting research, being both primary users and providers of information and IOOS data, integrating data, and providing funding opportunities. Each federal agency participating in IOOS is considered one that “contributes to, takes part in, or partners with other agencies or organizations in funding, implementing, operating, and/or improving elements of the IOOS” (Ocean.US, 2006). NOAA has been designated the lead federal agency for IOOS. With the involvement of federal agencies in the national IOOS initiative comes the challenge of coordination. Interagency involvement is necessary to meet this challenge, and managing interagency coordination of IOOS is the role of the Interagency Working Group on Ocean Observations (IWGOO) and Ocean.US, the National Office for Integrated and Sustained Ocean Observations. With 11 RAs, it is also important to have a means for all RAs to communicate with federal agencies. In many cases, there are strong connections between the RAs and federal agencies at the regional level. The National Federation of Regional Associations (NFRA) also provides a collective body under which the regions can communicate with federal agencies (Ocean.US, 2006).

Coordination and Development

The roles that NOAA, IWGOO, Ocean.US, and NFRA play in relationship to the RAs differ, but they are all associated with coordination and development. NOAA is the lead

federal agency involved in IOOS and is responsible for funding, implementation, operation, assessment, and advancement of specified elements of the IOOS (Ocean.US, 2006). The NOAA IOOS Program Office and the NOAA Coastal Services Center lead regional efforts to develop IOOS by reviewing and funding grant proposals submitted by the RAs, organizing regional workshops, reviewing progress reports, supporting data management efforts, and continuing to aid the RAs as they move forward with their development. NOAA, along with other federal agencies, also provides the main infrastructure for regional ocean observations contributing to IOOS and is responsible for the implementation and operation of the national backbone of observations and data management (Ocean.US, 2003).

NOAA's mission is "to understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our nation's economic, social, and environmental needs." IOOS and the RAs support NOAA's mission by improving and expanding the ability to collect, deliver, and use ocean data and disseminating the information in the correct format and at the right time to managers, scientists, governments, businesses, and the public (Ocean.US website). The link between the goals of NOAA and IOOS are obvious, and the RAs are necessary to make this a successful initiative at the regional level. To meet the needs of the nation, regional and local stakeholder needs also have to be met. Thus, the role of the RAs is important by addressing needs and priorities at local and regional levels and by having direct involvement and participation by local and regional stakeholders. This enables the federal government to implement federal programs nationally that address the priorities of regional institutions (Ocean.US, 2003).

As mentioned previously, interagency coordination is provided by the IWGOO and Ocean.US to ensure that coordinated development of IOOS occurs. The IWGOO was designated for this task by the Joint Subcommittee on Ocean Science and Technology (JSOST) and acts as the executive committee for Ocean.US. Ocean.US was established through the National Oceanographic Partnership Program (NOPP) by Congress in 1997 (Ocean.US, 2006). The role of this interagency program office is to coordinate the efforts of RAs with federal agencies participating in IOOS and global ocean observing efforts (GOOS and GEOSS) to develop a plan for an integrated ocean observing system. This includes collaborating with the IWGOO and the Ocean Research and Resources Advisory Panel (ORRAP) on activities relating to ocean observing systems and coordinating these activities with international, nonfederal, and federal partners (Ocean.US, 2002). ORRAP recently established a subpanel on ocean observing. The IWGOO includes federal agency representatives identified as IOOS-relevant and has responsibilities for funding, personnel, budgets, and programs of Ocean.US. The role of IWGOO is to manage interagency coordination of IOOS, develop and update plans for an interagency-sustained IOOS, integrate efforts of the U.S. IOOS with international programs, and coordinate ocean observing activities in the U.S. (Ocean.US website). ORRAP provides scientific expertise and includes representatives from government, academia, industry, resource management, and various other organizations (Ocean.US website). The Office of Naval Research (ONR), which is represented on the IWGOO, has also provided critical support

for the development of subregional observing systems and technologies that advance IOOS.

The National Federation of Regional Associations (NFRA) is a nonprofit organization established to represent the interests and needs of the RAs, as defined by the IOOS Implementation Plan, and will design, operate, and improve regional coastal ocean observing systems (RCOOS's) on behalf of users of the coastal waters and Great Lakes of the U.S., including freely associated states and territories. NFRA was also established to serve as a single voice for the regions and to foster communication among regions on best practices, lessons learned, and other information.

Federal Involvement in Regional Association (RA) Implementation

Federal agency involvement in RA implementation has mainly been through NOAA in its funding of specific observing system projects in regions, along with cooperative agreements that focus on the development of the RA organizations themselves. Under guidance by Ocean.US (Ocean.US, 2007) and NOAA (through the funding opportunity), each RA has engaged stakeholders, developed an organizational structure for the association, developed a business plan, and determined regional priorities for observations. This is challenging for federal agencies because the development of RAs is not a top-down endeavor; however, collaboration is still needed to ensure that both RA and federal agency priorities are being met. Recently, RAs submitted conceptual designs to NOAA and Ocean.US to serve as a discussion point of the future needs of the regions and how they interface with federal agency development plans (NOAA Coastal Services Center, 2007).

Participation of Federal Agencies

Defining federal participation, communication, and coordination within the IOOS program has been complicated. The 11 RAs that make up the regional component of the national IOOS initiative are developing as partnerships among state managers, universities, private companies, and federal agencies. These coordinating bodies allow all those who are interested in the region to come together to discuss the needs and issues of the region. One impediment to this collaboration has been the restriction of federal employees to participate on the RA board. Legislation now pending in both the House and the Senate includes language that would clarify if federal employees can participate in RAs.

At the federal level, the relationship between the RAs and the federal agencies is hard to define. Ocean.US, along with the IWGOO, is charged with coordinating interagency involvement, but some agencies have not engaged in the IOOS initiative. The IWGOO includes representatives of many participatory agencies, some of which are highly involved in IOOS RAs (Ocean.US website). However, further engagement by additional agencies sitting on IWGOO is needed. Unfortunately, participation is somewhat inhibited

by agency policy concerning potential conflict of interests in RA activities. Many federal agencies contribute to partnerships with RAs as value-added users by adding to the data collection and monitoring, while at the same time being end-users of the observing systems. The federal agencies generally provide the national backbone of the coastal ocean observing systems. Some federal agencies are considered “super users,” such as those involved in search and rescue and weather and ocean forecasts. The term “super users” refers to users that do not require highly processed products, but instead can use raw or barely processed data (NERACOOS, 2005). Table 10 illustrates the federal agencies of IWGOO that are represented on various committees or groups or provide data for each RA (Malone and RA website analysis).

Overlapping jurisdictional and RA boundaries also present challenges, and all agencies at a high level need to assign a representative to each region to reduce confusion and to encourage federal involvement in the RAs. Identifying common priorities between agencies and RAs and how RAs can benefit agency missions is potentially an effective way to obtain further engagement. The governance structure of many RAs encourages federal agencies to become partners, and most RAs feel that federal participation is necessary for an RA to be successful. It is important to have federal agency representatives when decisions are being made to improve communication and coordination between RAs and federal agencies. This will allow the RAs to meet the needs of federal agencies and garner greater participation and support.

Table 10: Federal Agency Representation in Each Regional Association of IOOS*

Federal Agency Representation in Regional Associations											
Federal Agencies	GLOS	NERACOOS	MACOORA	SECOORA	CaRA	GCOOS	PacIOOS	SCCOOS	CeNCOOS	NANOOS	AOOS
Arctic											X
Department of Energy (DOE)											
Department of Transportation (DOT)			X				X				
Department of Education			X			X					
Health and Human Services (HHS)						X	X	X			
Marine Mammal Commission (MMC)											
Minerals Management Service (MMS)			X			X		X			X
NASA			X			X	X	X		X	X
Navy		X	X	X		X	X	X	X	X	
NOAA	X	X	X	X	X	X	X	X	X	X	X
National Park Service (NPS)	X		X	X	X		X	X	X		
National Science Foundation (NSF)	X	X	X	X		X	X	X			X
State											
U.S. Army Corps of Engineers (USACE)	X	X	X	X	X	X	X	X	X	X	X
U.S. Coast Guard (USCG)	X	X	X	X	X		X	X	X		X
U.S. Department of Agriculture (USDA)											
U.S. Environmental Protection Agency (USEPA)	X	X	X	X	X	X	X	X		X	X
U.S. Fish and Wildlife Service (USFWS)	X		X				X				X
U.S. Geological Survey (USGS)	X	X	X	X	X	X	X	X	X	X	X

* Highlighted agencies represent federal agencies that sit on the IWGOO. Information compiled through input from RAs (provided by T. Malone) and website analysis. Federal agencies with several offices participating in the RAs were combined under one agency name.

The federal agencies listed in Table 10 were identified through RA input, gathered by Tom Malone of Ocean.US, and identified through RA website analysis. Website analysis included all partners, members, and committee members listed on RA websites, but these listings may not be the most current representation. This federal agency participation information was not submitted to the RAs for review and may contain some discrepancies. See Appendix C for more detailed information on federal agency involvement in each RA. The agencies listed include members of the IWGOO as well as other participating agencies. These agencies could have a variety of roles in the RAs, which could include using data being collected by ocean observing systems, collecting data that could contribute to the national backbone, and providing stakeholder input for identifying priorities from the agency outreach efforts. Many of these agencies have missions that would benefit from greater collaboration with the RAs and would contribute to enhanced communication and coordination between federal agencies and the regions. Agencies benefiting from the data being collected by the RAs or who could contribute to data collection should be represented in the regions. Agencies using the data collected to accomplish their mission should also help provide funding support to the RAs. The RAs are in need of additional federal agency partnerships to aid in their development of operational ocean observing systems.

The RAs act as a central node or access point for partners to obtain and share data with one another in the region. Each RA is extremely beneficial to its constituents by gathering regional data, enhancing the data by adding real-time data, and accomplishing a fully operational system to access at one site and use to make more informed decisions. Every partner adds an important piece to the operational system that will benefit the U.S. for years to come. Engaging other federal agencies with the RAs could be a logical and beneficial partnership for those involved. In some cases, this connection has not yet been made but could maximize the use of these resources by incorporating additional users and providers. An example of alternative uses of assets includes, for instance, using the same sensors employed in detecting submarines in U.S. waters to listening to right whales (participant observation – Mary Altalo). This is just a simple example of how RAs and other federal agencies can identify ways to become more engaged with one another and increase efficiency. Engaging federal agencies could also open doors to additional funding agents for the RAs to increase their capacity.

Federal agency participation is an essential component in the success of the regional component of IOOS. This analysis raises questions when evaluating agency and RA boundaries of the communication and coordination difficulties that may come from unaligned boundaries. The RAs are still in development phases and could benefit from federal agency input to ensure that the goals of the regions are aligned with federal agency goals. This opportunity will also allow additional collaboration and guidance by federal agencies in the planning of the RAs. The national IOOS initiative will only become stronger by building the RA and federal relationship.

References

Coastal Zone Management Program. (no date.) "Coastal Zone Management Program Strategic Plan: Improving Management in the Nation's Coastal Areas: FY 2007 – 2012." NOAA Office of Ocean and Coastal Resource Management. On-line: http://coastalmanagement.noaa.gov/success/media/CZM_stratplan_final_FY07.pdf.

Esselman, Rebecca. 2007. "Ecoregional Assessments: Standard 6". On-line: http://conserveonline.org/workspaces/cbdgateway/era/standards/std_6.

Murawski, Steve. 2007. "Putting the 'Integrated' in NOAA's Integrated Ecosystem Assessment (IEA)." NOAA National Oceanographic Data Center Seminar.

National Estuarine Research Reserve System (NERRS). On-line: <http://nerrs.noaa.gov>.

National Oceanic and Atmospheric Administration (NOAA). On-line: http://chartmaker.noaa.gov/staff/Coastline_of_the_US_1975.pdf.

National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center. 2007. "Second Integrated Ocean Observing System (IOOS) Regional Coordination Workshop." Summary Report. Tradewinds Island Resort, St. Petersburg, FL, October 23 to 25, 2007.

National Oceanic and Atmospheric Administration (NOAA) Office of Ocean and Coastal Resource Management. On-line: <http://coastalmanagement.noaa.gov>.

NERACOOS (Northeastern Regional Association of Coastal Ocean Observing Systems). 2005. "A Proposal to Facilitate Creation of a Northeastern Regional Association of Coastal Ocean Observing Systems." NERACOOS Regional Association Proposal. March 21, 2005. On-line: www.neracoos.org/documents/proposal/.

Ocean.US. 2002. "Building Consensus: Toward and Integrated and Sustained Ocean Observing System." Ocean.US. Arlington, VA. 175pp. On-line: www.ocean.us.

Ocean.US. 2003. "Regional Ocean Observing Systems: An Ocean.US SUMMIT." March 31 to April 1, 2003, Ronald Reagan Building, Washington, D.C. On-line: www.ocean.us/documents/docs/Summit-Synthesis-Final1.doc.

Ocean.US. 2006. "The First Annual Integrated Ocean Observing System (IOOS) Development Plan: A Report of the National Ocean Research Leadership Council Prepared by Ocean.US." Ocean.US Publication No. 9. On-line: www.ocean.us/documents/docs/IOOSPlan_FIN_low-res.pdf.

Ocean.US. 2007. "The National Office for Integrated and Sustained Ocean Observations: Roles and Responsibilities." Approved by the Interagency Working Group on Ocean

Observations (IWGOO). 26 July 2007. On-line:
www.ocean.us/system/files/Final_Ocean.US_RR_7262007.pdf.

Sherman, K., and L.M. Alexander, editors. 1989. *Biomass Yields and Geography of Large Marine Ecosystems*. AAAS Selected Symposia Series. Number 111. Boulder, CO: Westview Press.

United Nations Educational, Scientific, and Cultural Organization (UNESCO). 2003. "The Integrated Strategic Design Plan for the Coastal Ocean Observations Model of the Global Ocean Observing System." GOOS Report No. 125; IOC Information Documents Series N 1183; UNESCO 2003. On-line: <http://ioc.unesco.org/GOOS/COOP-3/COOP-DESIGN-TCs.htm>.

U.S. Administration. 2005 "U.S. Ocean Action Plan: The Bush Administration's Response to the Commission on Ocean Policy." On-line:
<http://ocean.ceq.gov/actionplan.pdf>. Accessed September 4, 2007.

U.S. Army Corps of Engineers. On-line: www.usace.army.mil. Accessed September 4, 2007.

U.S. Census Bureau. On-line: www.census.gov.

U.S. Coast Guard. On-line: www.uscg.mil. Accessed September 5, 2007.

U.S. Commission on Ocean Policy. 2004. *An Ocean Blueprint for the 21st Century*. Final Report of the U.S. Commission on Ocean Policy. On-line: www.oceancommission.gov.

U.S. Fish and Wildlife Service. On-line:
<http://ecos.fws.gov/coastal/viewContent.do?viewPage=home>. Accessed September 5, 2007.

U.S. Geological Survey. On-line: www.usgs.gov. Accessed September 4, 2007.

Williams, Dennis C. 1993. "EPA Regional Facilities: A Historical Perspective on Siting." On-line: www.epa.gov/history/org/regions/01.htm. Accessed December 2007

Appendix A: Figures

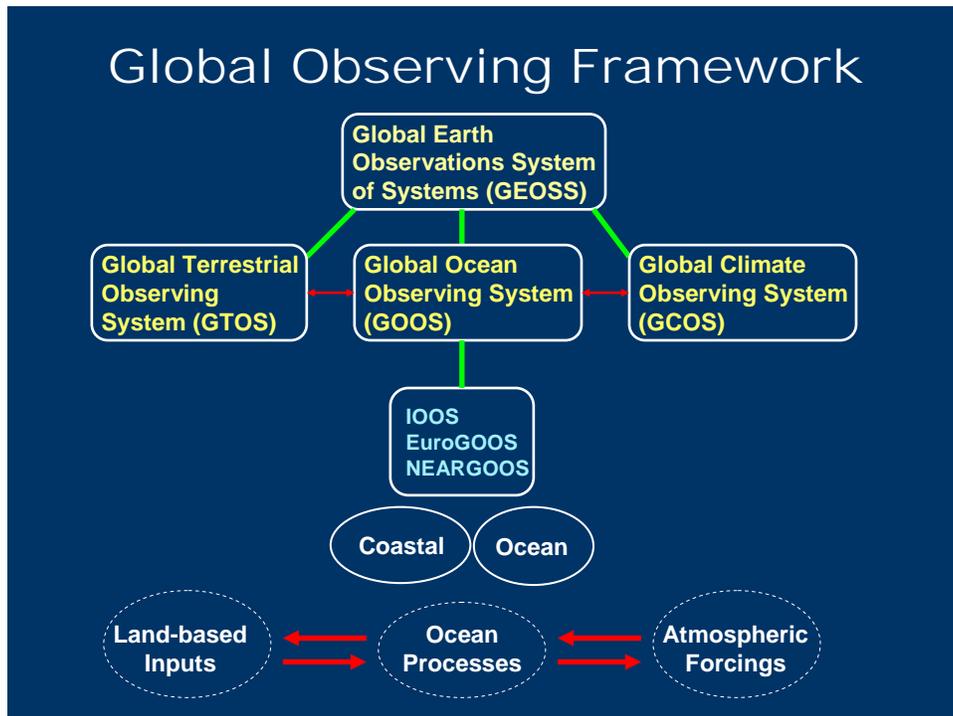


Figure 1: Global Observing Framework. Slide extracted from Geno Olmi's presentation for the Estuarine Research Federation Conference.

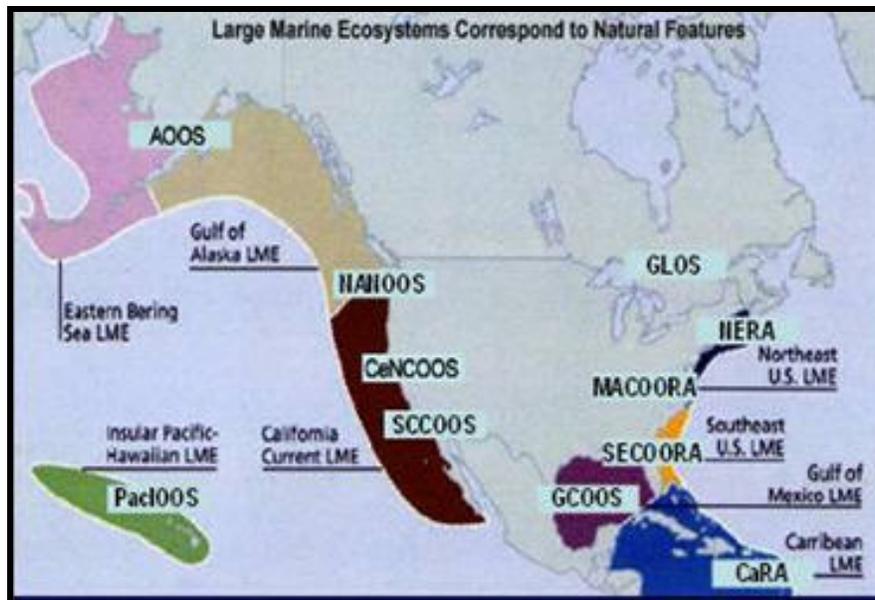


Figure 2: Large Marine Ecosystems of the United States: www.ocean.us/node/203

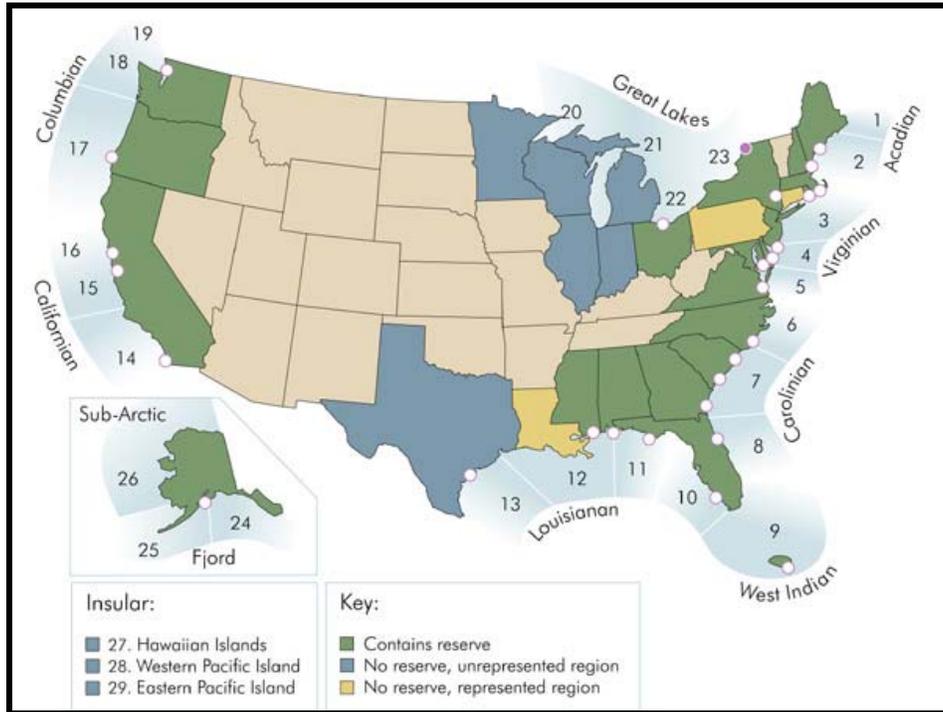


Figure 3: National Estuarine Research Reserve Ecoregions:
www.nerrs.noaa.gov/Bioregions/Coverage.html

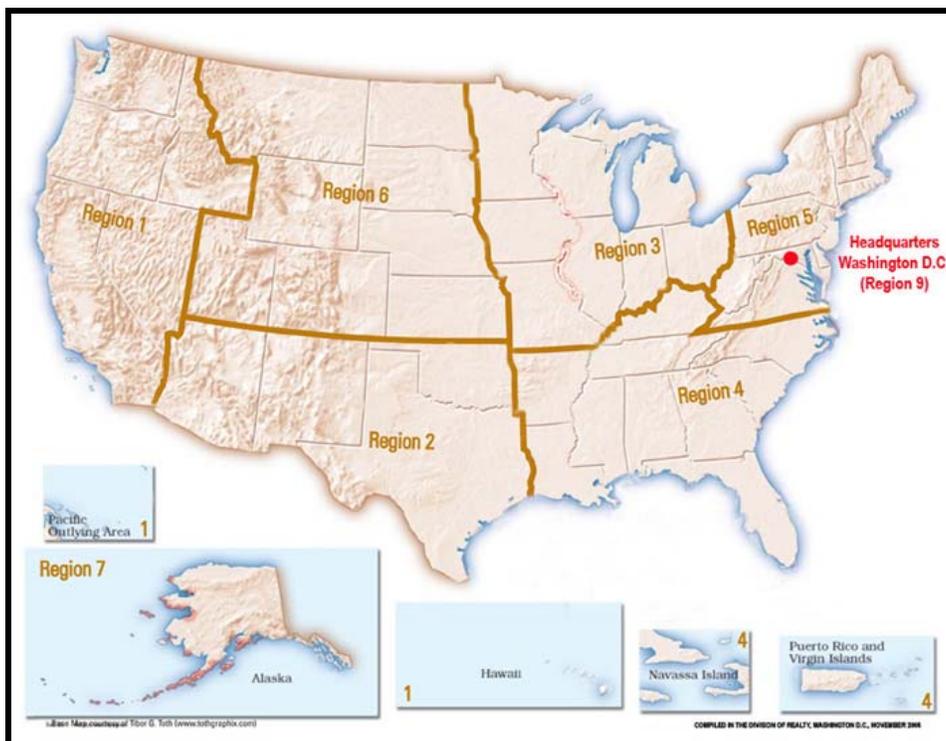


Figure 4: U.S. Fish and Wildlife Service Regional Boundaries: www.fws.gov/where/

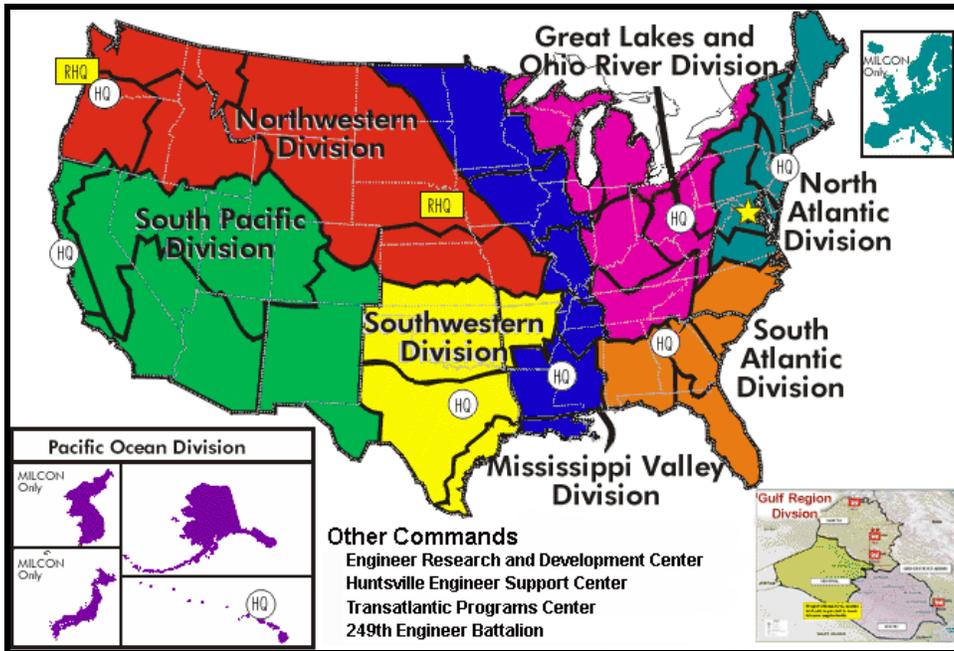


Figure 5: U.S. Army Corps of Engineers Civil Engineer Divisions and Districts:
www.usace.army.mil/howdoi/civilmap.htm

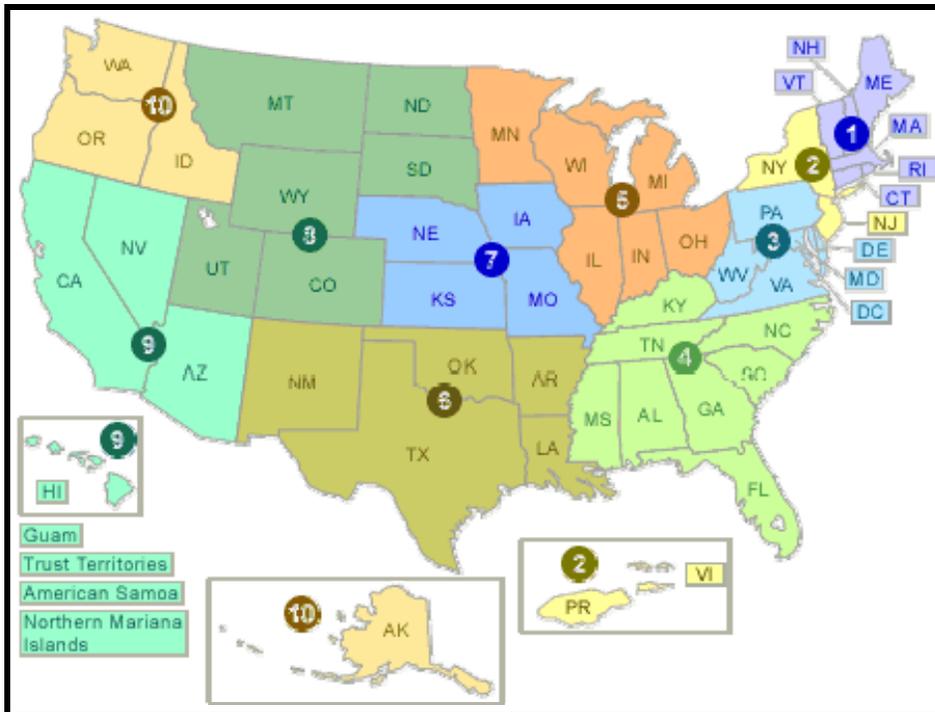


Figure 6: U.S. Environmental Protection Agency Regions:
www.epa.gov/epahome/locate2.htm



Figure 7: U.S. Geological Survey Regions: <http://geography.usgs.gov/places.php>

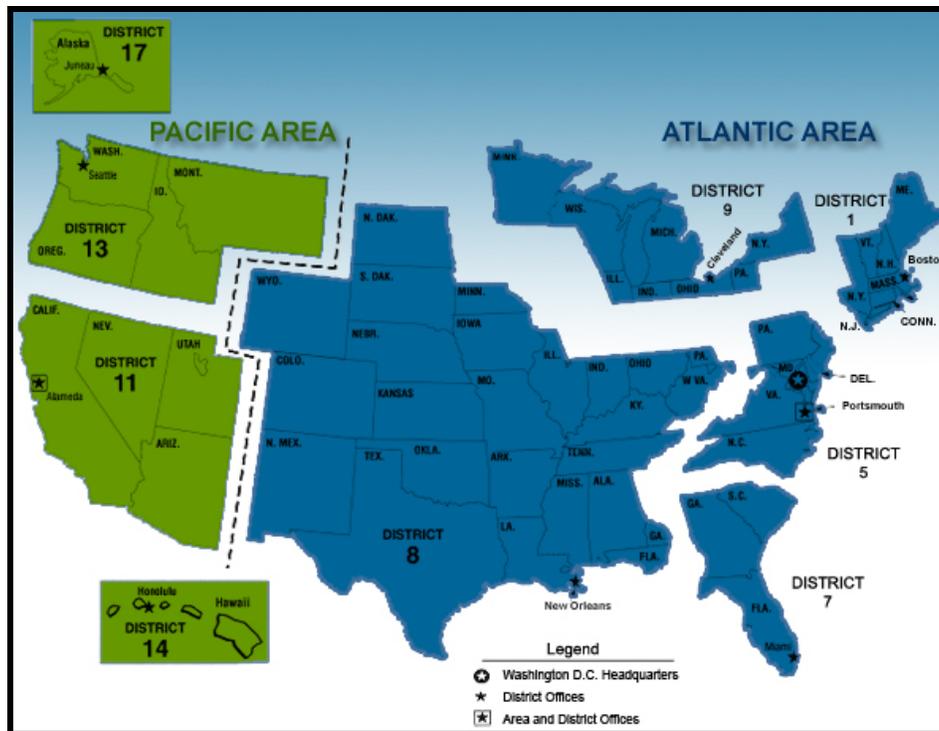


Figure 8: U.S. Coast Guard Districts: www.uscg.mil/top/units/

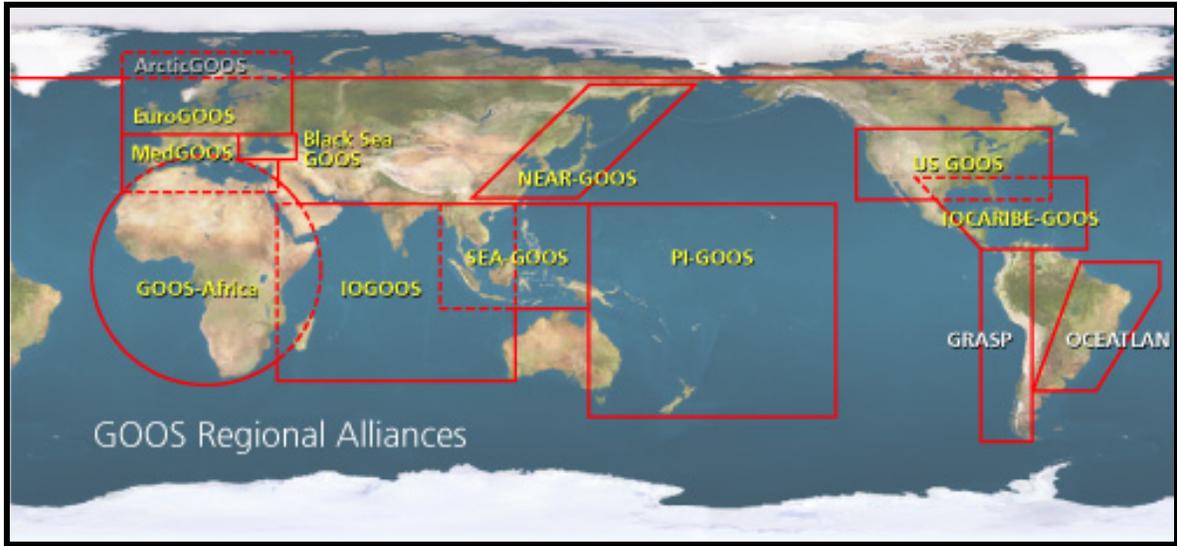


Figure 9: Global Ocean Observing System Regional Alliances: www.ioc-goos.org

Appendix B:

Gaps in Data and Explanations of Population Calculations for Certain Regional Associations

Population Calculations and Data Gaps

GLOS: The coastal populations on the Great Lakes for Ontario and Quebec in Canada are not included in the table.

CaRA: The coastal population for the island of Navassa was not found in the research. However, the island has a very small coastline of five miles and will most likely not have a significant impact on the total coastal population for CaRA.

SCCOOS and CeNCOOS: The coastline mileage encompassed by SCCOOS and CeNCOOS was calculated using geographic information system (GIS) analysis. The coastline mileage and coastal population for SCCOOS was calculated from the California–Mexico border north to Santa Barbara County. The coastline mileage and coastal population for CeNCOOS was calculated from the California–Oregon border south to San Luis Obispo County. SCCOOS and CeNCOOS do overlap slightly in these two counties, but for this analysis the overlap was not calculated because of undefined borders.

PacIOOS: The coastline mileage for PacIOOS was found in the research, but gaps in coastal population data would not allow an accurate coastal population to be presented in the table. The Pacific Island coastal populations that were not included in the populations listed are the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands.

Appendix C:

Federal Agency Participation in IOOS Regional Associations

(Information gathered through Regional Association (RA) website analysis in September 2008—not reviewed by RAs, except for AOOS, SECOORA, PacIOOS, and GCOOS)

GLOS – Great Lakes Observing System

Board of Directors:

- National Oceanic and Atmospheric Administration (NOAA)
- NOAA Sea Grant
- U.S. Army Corps of Engineers (USACE)

Subsystem Teams:

- NOAA Center for Operational Oceanographic Products and Services (CO-OPS)
- NOAA Great Lakes Environmental Research Laboratory (GLERL)
- NOAA National Data Buoy Center (NDBC)
- NOAA National Ocean Service (NOS)
- NOAA National Weather Service (NWS)
- U.S. Coast Guard (USCG)
- U.S. Environmental Protection Agency (EPA)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Geological Survey (USGS)
- USACE

Steering Committee:

- NOAA Coastal Services Center
- NOAA CO-OPS
- NOAA GLERL
- NOAA Sea Grant
- USACE
- USCG, District 9, Maritime Safety
- USFWS
- USGS Great Lakes Science Center

Regional Interest Group:

- National Park Service (NPS)
- NOAA Coastal Services Center
- NOAA National Estuarine Research Reserve System (NERRS)
- NOAA NDBC
- NOAA Sea Grant
- U.S. EPA

USACE
USFWS
USGS

Data Providers:

NOAA
NOAA CoastWatch
NOAA CO-OPS
NOAA GLERL
NOAA NOS
NOAA NWS
U.S. EPA Great Lakes National Program Office (GLNPO)
USFWS National Wetlands Inventory
USGS

NERACOOS – Northeast Regional Association of Coastal Ocean Observing Systems

Co-Principal Investigators:

NOAA National Marine Fisheries Service (NMFS)

Advisory Committee:

NERRS
U.S. EPA Region 1
USACE
USCG

Executive Committee:

USCG

Data Providers:

NOAA

MACOORA – Mid-Atlantic Coastal Ocean Observing Regional Association

Data Providers:

NASA
NOAA
NOAA CO-OPS
NOAA NDBC
NOAA NERRS
NOAA NOS
U.S. EPA National Estuary Program
USACE

SECOORA – Southeast Coastal Ocean Observing Regional Association

Members:

- Florida Sea Grant
- Georgia Sea Grant
- NOAA National Marine Sanctuary Program
- NOAA NERRS
- North Carolina Sea Grant
- NPS
- South Atlantic Fishery Management Council
- South Carolina Sea Grant

Data Providers:

- NDBC
- NOAA
- NOAA CO-OPS
- NOAA NERRS
- NOAA NWS
- National Park Service
- USACE
- USGS

CaRA – Caribbean Regional Association

- NOAA
- NOAA NWS
- NOAA Sea Grant

GCOOS – Gulf of Mexico Coastal Ocean Observing System

Stakeholder Council:

- Barataria-Terrebonne National Estuary Program
- Minerals Management Service (MMS)
- Texas Sea Grant

Education and Outreach Council:

- Florida Sea Grant
- Grand Bay National Estuarine Research Reserve (NERR)
- Louisiana Sea Grant
- NASA Neutral Buoyancy Center
- NOAA Flower Garden Banks National Marine Sanctuary
- Rookery Bay NERR
- Texas Sea Grant
- University Corporation for Atmospheric Research, Digital Library for Earth System Education
- Weeks Bay NERR

Data Management and Communications (DMAC) Committee:

NOAA NDBC
NOAA National Coastal Data Development Center (NCDDC)
USACE

Observing Systems Committee:

NOAA
USACE
USGS

Products and Services Committee:

Minerals Management Service (MMS)
Naval Oceanographic Office (NAVOCEANO)
Naval Research Laboratory (NRL)
NOAA NCDDC
NOAA NDBC
USACE

Task Team on Public Health:

Centers for Disease Control and Prevention
NOAA Atlantic Oceanographic and Meteorological Laboratory
NOAA NCDDC

Memorandum of Agreement Signatories:

MMS
NOAA Sea Grant
NRL
Tampa Bay Physical Oceanographic Real-Time System (PORTS)
U.S. EPA National Estuary Program

Board of Directors:

MMS
NOAA Sea Grant

Data Providers:

NASA
NOAA
NOAA National Environmental Satellite, Data, & Information System (NESDIS)
NOAA National Water Level Observation Network (NWLON)
NOAA NCDDC
NOAA NDBC
NOAA NERRS
NRL
USACE
USGS

PacIOOS – Pacific Islands Ocean Observing System

General:

Hawaii Sea Grant
NOAA
NOAA Pacific Seces Center
Pacific Risk Management Ohana (PRiMO), organized by
NOAA Pacific Services Center
USACE

Data Providers:

NOAA
NOAA Climate Program Office (CPO)
NOAA Coral Reef Information System (CoRIS)
NOAA Data Management Integration Team (DMIT)
NOAA Ecosystem Observation Program (EOP)
NOAA Integrated Data and Environmental Applications Center
NOAA National Climatic Data Center (NCDC)
NOAA National Geophysical Data Center (NGDC)
NOAA National Oceanographic Data Center (NODC)
NOAA National Operational Model Archive & Distribution System (NOMADS)
NOAA National Virtual Ocean Data System (NVO DS)
NOAA NCDDC
NOAA NDBC
NOAA NESDIS
NOAA Nowcoast (NOAA forecasts)
NOAA NWLON
NOAA Observing Systems Council
NOAA OceanWatch
NRL

SCCOOS – Southern California Coastal Ocean Observing System

Board of Governors:

NASA

Senior Advisory Committee:

California Sea Grant
MMS
NOAA Southwest Fisheries Science Center/PacOOS
Tijuana River NERR
University of Southern California Sea Grant
USACE
USGS

Executive Steering Committee:
NASA

Data Providers:
NASA
NOAA
NOAA NGDC
NOAA PORTS
USACE

CeNCOOS – Central and Northern California Ocean Observing System

Memorandum of Agreement Signatories/Governance Council:
Elkhorn Slough NERR
Fleet Numerical Meteorology and Oceanography Center
NOAA Southwest Fisheries Science Center
Point Reyes National Seashore
Naval Postgraduate School

General:
California Sea Grant Program
Desert Research Institute Western Regional Climate Center
Fleet Numerical Meteorology and Oceanography Center
Naval Postgraduate School
NOAA: Marine Protected Areas Center Science Institute; NMFS; NWS; NERRS
Environmental Research Division; Office of Coast Survey; NOAA Coastal
Services Center; West Coast CoastWatch; HAZMAT; West Coast and Polar
NRL Marine Meteorology Division
Point Reyes National Seashore
Regions Undersea Research Center
USCG
USGS: Coastal and Marine Geology Program; Water Resources Division

Data Providers:
NOAA
NOAA National Marine Sanctuary Program
NOAA NDBC
NOAA NWLON
NOAA NWS
NOAA PORTS
Rapid Environmental Assessment Laboratory (REAL)
San Francisco Bay NERR
Sanctuary Integrated Monitoring Network (SIMoN)
USGS

NANOOS – Northwest Association of Networked Ocean Observing Systems

Data providers:

- NASA
- NOAA
- NOAA National Centers for Environmental Protection
- NOAA NDBC
- NOAA NERRS
- NOAA NESDIS
- NOAA NWS

AOOS – Alaska Ocean Observing System

General:

- Arctic Research Commission
- Alaska Sea Grant
- MMS
- Natural Resources Conservation Service
- NOAA NMFS
- NOAA NWS
- NOAA Office of Oceanic and Atmospheric Research (OAR)
- NPS
- U.S. EPA
- USFWS
- USGS

Governance Committee:

- Alaska Sea Grant
- Arctic Research Commission
- MMS
- NOAA Alaska Fisheries Science Center
- NOAA NWS, Alaska Region Headquarters
- NOAA OAR
- USACE
- USCG
- USGS

DMAC Committee Members:

- MMS
- NOAA Alaska Fisheries Science Center
- NOAA NWS
- NOAA Pacific Marine Environmental Laboratory

Appendix D:

Global Ocean Observing System (GOOS) Regional Alliances

The GOOS contributes to the Global Earth Observation System of Systems, or GEOSS, and is divided into Global Regional Alliances (GRAs). IOOS, also known as the U.S. GOOS, is the GRA for the U.S. that contributes to GOOS. See Figure 9 for all the GRAs that contribute to GOOS. Out of all the GRAs of GOOS, IOOS and EuroGOOS seem to be the most mature in their development. Looking at the ecosystem-based and jurisdictional boundaries described, discrepancies are illustrated with regard to appropriate boundaries for IOOS RAs. Not only does IOOS have this issue, but other GRAs such as EuroGOOS do as well. EuroGOOS is not divided into RAs as IOOS is, but instead has member countries that are responsible for observations off their coasts. The divisions in EuroGOOS are identified through jurisdictional boundaries, which illustrate the need of using not only ecosystem-based boundaries, but also jurisdictional boundaries for administrative purposes. The geographic extent, membership, and responsibilities of GRAs were briefly evaluated through websites and documents to examine any similarities between the construct of the GRAs and the RAs of IOOS.

Similar to the rationale for IOOS RAs, GRAs were established for GOOS to enable user groups to be identified, to incorporate user knowledge and feedback, and to establish information and data requirements that are constantly being refined. This information allows the GRAs to plan and implement regional observing systems that meet national priorities. GRAs were identified similarly to the IOOS RAs; ecosystem-based management was being promoted during the decisions of GRA locations and large marine ecosystems were an influencing factor in these locations. Regional Fishery Bodies also played a role in their locations. It was stated that the geographic boundaries of the GRAs should overlap, not be fixed, and be determined based on the priorities in each region. This was thought to ensure that data would be collected as a global network and that each GRA would add new elements that enhance and contribute to the global network (UNESCO, 2003).

As discussed previously, the U.S. contribution to GOOS, IOOS, is divided into RAs, smaller components that connect with user groups and contribute to the larger IOOS. A scan of GRA websites suggest that this type of subdivision has not occurred, officially, for GRAs. Many of the GRAs are in the beginning stages of their formation and may end up separating further within their regions to maintain ocean observations on a smaller scale. As the GRAs continue to develop, they will need to be evaluated to recognize changes in their boundaries.