National Ocean and Coastal Mapping Workshop Synopsis

INTERAGENCY WORKING GROUP ON OCEAN AND COASTAL MAPPING

National Oceanic and Atmospheric Administration (NOAA)
U.S. Geological Survey
U.S. Army Corps of Engineers

November 3-5, 2009
NOAA Coastal Services Center
Charleston, SC

Interagency Working Group on Ocean and Coastal Mapping Workshop Results

Summary

This workshop identified existing and planned coastal mapping efforts, gaps in current mapping programs, and most importantly, opportunities for improved coordination. This information will be used to decrease mapping redundancy and develop the cohesive national coastal and ocean mapping initiative.

Workshop Goals

The Ocean and Coastal Mapping Integration Act of 2009 calls for a coordinated and comprehensive federal ocean and coastal mapping plan for the Great Lakes and coastal state waters, territorial sea, exclusive economic zone, and continental shelf. This plan should serve as the primary information source that guides the acquisition and collection of ocean and coastal mapping data in the near term and the future. The National Ocean and Coastal Mapping Workshop began the process needed to coordinate current mapping requirements and define what it will take to acquire the needed framework data layers.

Objectives
- Participants agree on the priority themes that will benefit from an integrated approach to mapping.
- Participants share knowledge of existing programs, projects, and capabilities for mapping framework data layers.
- Participants identify a set of validated requirements that will benefit from an integrated mapping plan and the initial actions necessary to integrate existing programs.

The workshop was led by the co-chairs of the Interagency Working Group for Ocean and Coastal Mapping– the National Oceanic and Atmospheric Administration (NOAA), the United States Army Corps of Engineers, and the United States Geological Survey.

This synopsis describes the process followed and summarizes the results of this workshop held at NOAA's Coastal Services Center November 3-5, 2009. The information and ideas discussed will be incorporated into a 2010 report to Congress.

Process

The workshop planning committee, consisting of the interagency working group co-chairs, the Coastal States Organization, The Nature Conservancy, and the NOAA Coastal Services Center, agreed on workshop objectives and then developed the agenda to meet those objectives (Appendix 1). In order to engage participation from stakeholders representing all sectors of the ocean and coastal mapping community, the workshop was designed to include interactive discussions as much as possible.

Following introductory remarks from the Office of Management and Budget and the NOAA Coastal Services Center, the co-chairs reviewed the Ocean and Coastal Mapping Integration Act of 2009, presented the geographic scope for ocean and coastal mapping, and reviewed a potential list of key framework data layers for consideration. Attendees were then led through a participatory mapping exercise devised to collect information about current data acquisition plans across the country. The intent of this exercise was to inventory current mapping efforts, identify opportunities for collaboration, and define gaps in mapping requirements.

The remainder of the workshop was then spent in smaller breakout groups discussing framework data needs, challenges, and potential solutions to meeting the requirements for the nation's ocean and coastal mapping community. The results of the breakout group discussions were reported to all the workshop attendees. The co-chairs then closed the workshop by summarizing results and discussing next steps.

Invitees to the meeting included all federal agencies with ocean and coastal mapping interests, state associations and agencies, regional associations, and non-governmental organizations. Workshop attendees are listed in Appendix 2. Detailed notes from each breakout group are included in Appendix 3.

Workshop Synopsis
Summarized Introductory Comments from Mike Howell, OMB Deputy Administrator for E-Government and Information Technology

Creating a national ocean and coastal mapping plan presents many challenges, including the need for groups with varying interests and missions being able to come to an agreement about what a plan should include and how to best manage the coordination of these diverse agencies. However, this collaboration is key to the success of the effort to create a comprehensive national plan.

Workshop participants were charged with focusing on agency and issue challenges, while striving to stay relevant to solving problems shared by the mapping community. The success of this workshop and the resulting national plan are critical to our future abilities to address impacts of climate change, plan for alternative energy siting, ensure safe navigation, and improve the resilience of our coastal infrastructure and ecosystems to hazards. The ability to break down institutional barriers and showcase how new mapping is required to addresses societal issues will pave the way for a cohesive plan of attack that can demonstrate a unified approach when the plan is sent to Congress.

Timing is also crucial to success because of budget cycles. Having more organizations and agencies on board (e.g., the Federal Geographic Data Committee) with a single message improves the chances of receiving funding – the group should not rely on a single spokesperson, rather they should demonstrate a united front.

Summarized Introductory Comments from Margaret Davidson, Director, NOAA Coastal Services Center

It is imperative that the groups represented at the workshop come together and create a fully funded, integrated program. In order to do this, the group should create a business case for mapping activities that demonstrates why geospatial information is important. The plan should aim to prove the importance of this information to society using timely examples, such as the ability for communities to adapt to climate change. For demonstrating the utility of geospatial data, it is good to agree on the necessary framework datasets, such as topo/bathy, but also identify data gaps and the costs to society when data is lacking.

While many requirements are clearly documented, there are agencies and organizations who work individually, meeting their own mission requirements, and ignoring other needs. It is imperative that federal agencies with current budgets for mapping attempt to address other agency (i.e., national) mission gaps with their acquisition programs. The altruistic spirit behind the concept of the National Spatial Data Infrastructure (NSDI) does not currently exist across mapping organizations. This lack of an "all-for-one" approach is noticed by key decision makers outside the community, and thus leads to a strong duplication of effort perception. How can these perceptions be changed? How can a new way of doing business across the many agencies, institutions, private companies, regions, and others be demonstrated? Are all mapping agencies willing to compromise by adjusting acquisition schedules, expanding geographic boundaries for acquisition, openly sharing plans and requirements, and even potentially merging programs?

Introduction to Ocean and Coastal Mapping Integration Act of 2009

The co-chairs of the Interagency Working Group on Ocean and Coastal Mapping provided an overview of the Ocean and Coastal Mapping Integration Act and the reporting requirements called for by Congress. The principle purpose of this legislation is to improve coordination among the nation's many ocean and coastal mapping activities, which presents important opportunities to the mapping community to improve Congressional understanding of the importance of ocean and coastal mapping by developing a business case for this activity. This will hopefully lead to improved national mapping capacities and capabilities as a result of increased resourcing. The Act also provides a chance to develop a strategy for addressing national survey and mapping needs and strengthen national mapping infrastructures that should be tied to a long-term national vision for ocean and coastal mapping. This workshop was an important step in defining the national ocean and coastal mapping drivers, requirements, shortfalls, and challenges, which will help the Interagency Working Group as they develop the final plans that are due October 2010.

Geographic Extent of Ocean and Coastal Mapping
The co-chairs presented the geographic extent of ocean and coastal mapping that will be used for developing the national plan (see Figure 1). The seaward boundary extends to the U.S. Exclusive Economic Zone. The inland boundary was chosen since it was inclusive of most current coastal mapping efforts and includes

- all official state coastal zones
- all coastal counties
- all estuarine drainage areas and coastal drainage areas (for definitions see http://coastalgeospatial.noaa.gov/welcome.html)
- all coastal mapping zones for the national land cover database

While there are legitimate concerns being raised about using this inland boundary line to ecologically define the "coast," it was explained that the inland boundary included an existing integrated coastal mapping program for NOAA and the U.S. Geological Survey for land cover (the national land cover database and Coastal Change Analysis Program). Concerns were raised that the inland extent of this proposed geography was too large. While specific regional mapping needs or techniques may require the inland extent to be less or even greater, the majority of attendees agreed that for the purposes of developing a national plan, the boundary presented is an appropriate primary target geography that can be used in the initial response to Congress.

It's also relevant to note that the Council on Environmental Quality's Ocean Policy Task Force has identified the same coastal boundary for its coastal and marine spatial planning efforts. These two groups are moving forward and using this inland boundary line in a consistent manner for data inventory and planning efforts.
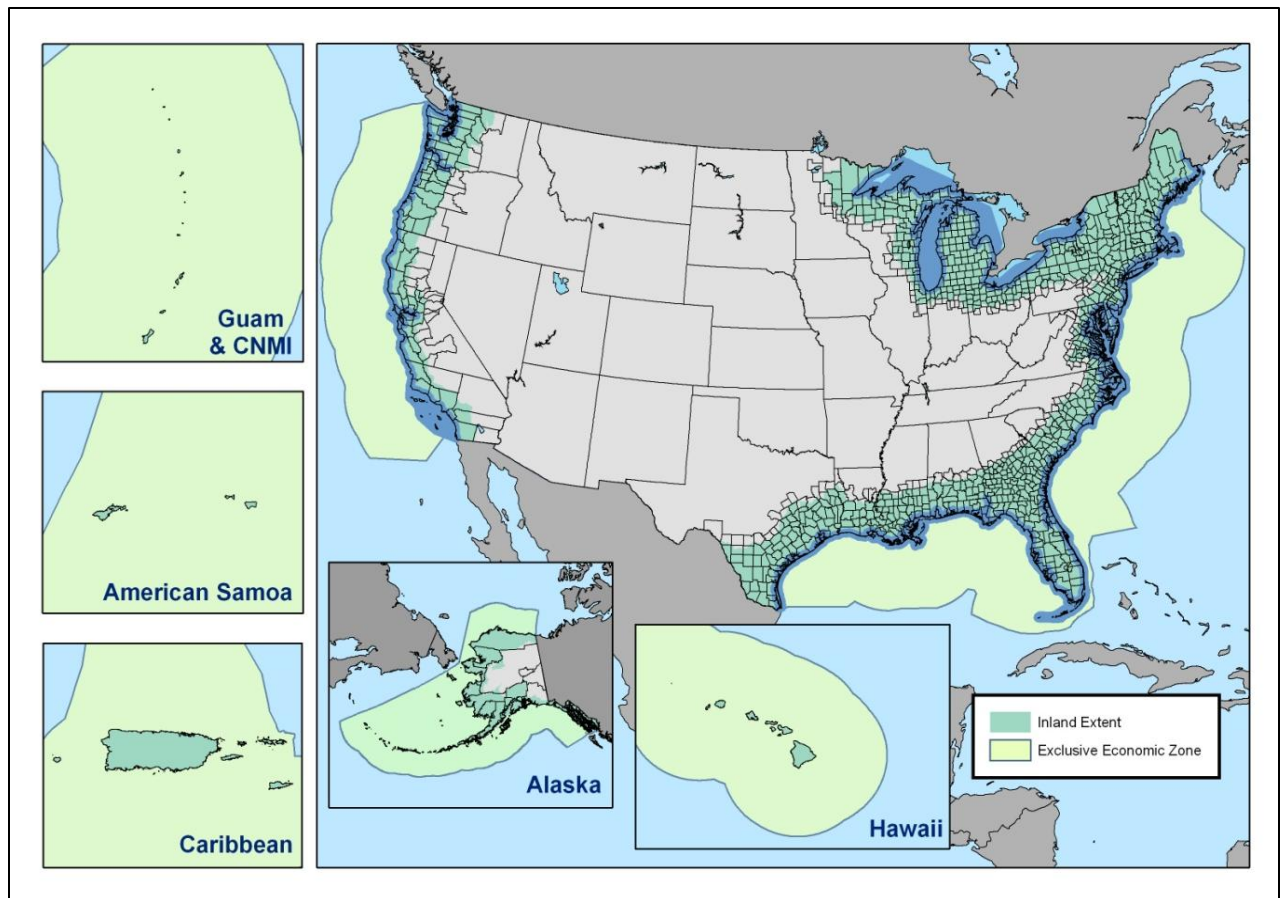
Figure 1: Ocean and coastal mapping extent

Framework Datasets
The nation's many requirements for ocean and coastal mapping have been clearly documented over the years, but resources are not available to meet the large demand. The workshop planning committee thought it was important to prioritize documented data requirements in the national plan.

Six framework datasets were listed at the beginning of the workshop, which included elevation (topography/bathymetry), shoreline, land cover, benthic habitat, cadastre, and orthoimagery. Input from workshop participants indicated that biological data and human use data are important possible additions to this list, as was geodetic control. The proposed framework data layers are a mixture of data and derived products, but it was also pointed out that for the purposes of the ocean and coastal mapping act, each could be considered "mapping." Along with geodetic control, elevation was determined to be a very highly valued foundational layer. During a participatory GIS mapping exercise, workshop participants were encouraged to delineate both very recent mapping activities and those planned in the near future.

The result of this exercise is a series of regional maps, which will become part of the national plan, and will be used to help reduce redundancy and duplication of mapping activities. The exercise helped identify existing and planned mapping efforts, gaps in current mapping programs, and most importantly, opportunities for improved coordination. For example, the Federal Emergency Management Agency (FEMA) has resources to develop new topography maps for the nation's coastal counties, but have yet to plan their acquisitions. A more integrated coastal mapping effort could be realized with improved agency coordination on data specifications and geographies to cover.

Figure 2 depicts an example of the results from this exercise. The complete results can be viewed at: ftp://csc.noaa.gov/temp/IOCM-Workshop/.
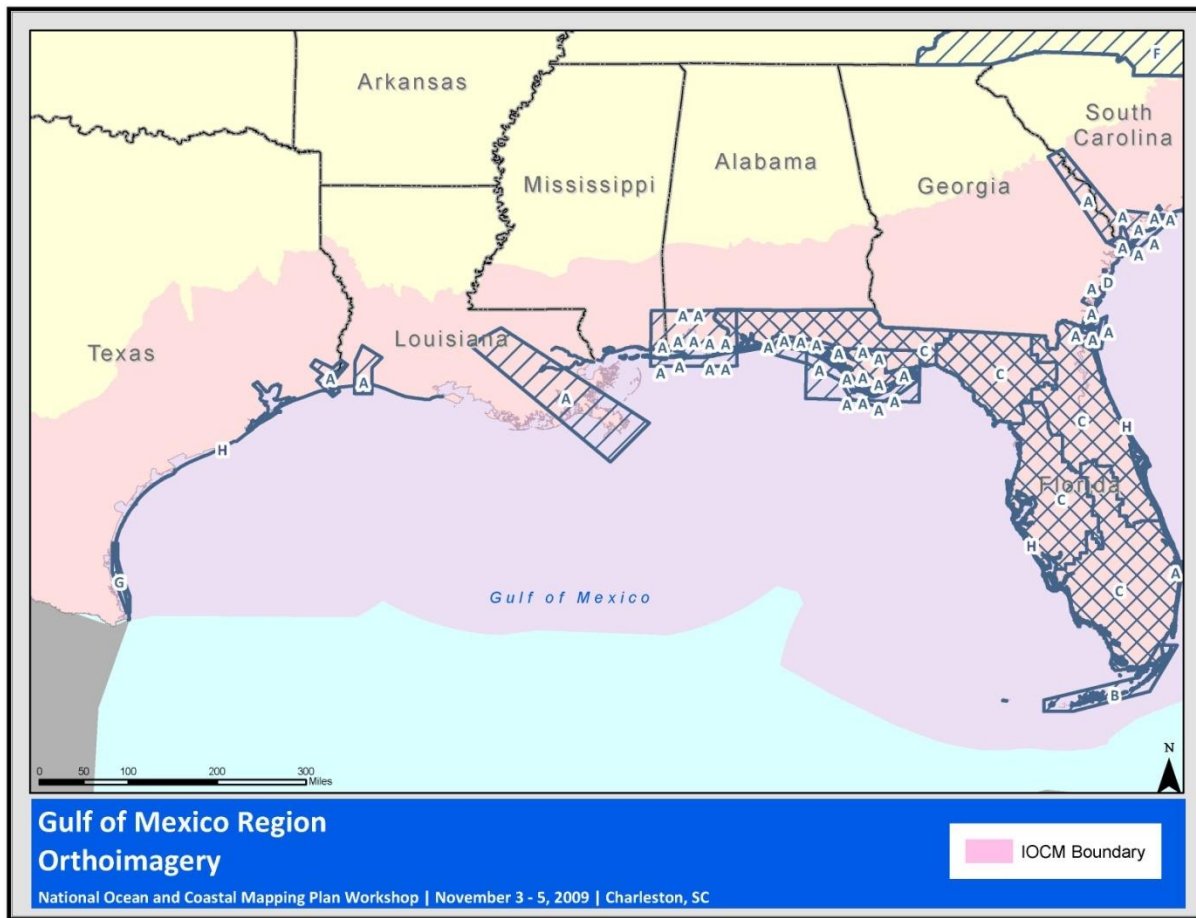
Legend

▨	A - NOAA NGS RSD Orthoimagery
▨	B - NOAA NCCOS Coral Reef Mapping Program Orthoimagery
▨	C - Florida Water Management District Orthoimagery
▨	D - USFWS Landscape Conservation Shoreline Study (SE)
▨	E - USFWS Landscape Conservation Shoreline Study (NE)
▨	F - State of NC Orthoimagery
▨	G - Texas GLO Geohazards Orthoimagery
—	H - USACE NCMP Survey Areas FY 09-12

Figure 2: Sample output from participatory GIS mapping session, depicting orthoimagery mapping activities for the Gulf of Mexico region.

Breakout Groups
Participants were divided into four breakout groups in order to discuss key management issues with strong geospatial components. The four management issues were:

- navigation, transportation, and security
- climate change and hazards resiliency
- ecosystem based management
- energy siting and resource extraction

Each breakout group then participated in two facilitated discussions to answer key questions, then reported their findings to the entire group. The complete notes from the breakout groups can be found in Appendix 3.

During the first breakout group session, participants were asked to focus on the key management decisions that apply to their issue area and to identify the priority framework datasets necessary to inform those decisions. The top challenges associated with acquiring and using the priority framework datasets was also a topic of discussion. Some of the challenges listed included institutional barriers, a lack of governance structure in support of partnerships and coordination, inability to prioritize among the different mapping requirements, lack of standards for resolution and specifications, and the lack of a centralized data distribution system. Some examples of successful efforts related to data acquisition and use were also identified, such as improvements in data sharing and distribution and increasing collaborative efforts.

The second breakout group session focused on two of the key challenges that participants identified. Two groups were asked to identify solutions to overcome institutional barriers, and two groups discussed how to prioritize mapping activities. Some potential solutions to these challenges included

- Creating high profile, ecosystem-based geographic plans for data collection for all regions.
- Designating a single agency with appropriations and dedicated staff for ocean and coastal mapping.
- Identifying incentives for collaboration and data sharing.
- Requiring agencies that receive funding for mapping to proactively and openly coordinate with other agencies and use consistent data acquisition standards and specifications.
- Having "buy up" options for data acquisition, so that regional, state, or local groups can benefit from larger scale acquisition efforts.

Next Steps

The information collected during the workshop represents the beginnings of a framework for drafting the national mapping plan and report due to Congress. The co-chairs are writing this report and will circulate a draft to the workshop participants for review. The Congressional report must be written by June in order for the final document to be delivered by October. The Ocean and Coastal Integrated Mapping Act requires periodic updates to the national plan, so future workshops to review progress and update the plan will be conducted with the broader ocean and coastal mapping stakeholder community.

Appendix 1:
Workshop Agenda

**National Ocean Coastal Mapping Plan Workshop:
Documenting Requirements**

November 3 to 5, 2009
NOAA Coastal Services Center • Charleston, South Carolina

Workshop Purpose: The Ocean and Coastal Mapping Integration Act of 2009 calls for a coordinated and comprehensive federal ocean and coastal mapping plan for the Great lakes and coastal state waters, territorial sea, exclusive economic zone, and continental shelf. This plan will serve as the primary information source to guide acquisition and collection of ocean and coastal mapping data and to support the requirements for future funding to address regional and national mapping priorities. This workshop will begin the process of coordinating current mapping requirements into an integrated plan and defining the additional actions necessary to achieve an integrated approach for acquiring framework data layers.

Meeting Objectives:
- Participants agree on the priority themes that will benefit from an integrated approach to mapping
- Participants share knowledge of existing programs, projects, and capabilities for mapping framework data layers
- Participants identify a set of validated requirements that will benefit from an integrated mapping plan and the initial actions necessary to integrate existing programs

Meeting Outputs:
- Identified coastal themes that will be highlighted in report to Congress
- Prioritized list of mapping requirements to address themes
- Information in current mapping plans to address requirements

Tuesday November 3		
1:00 p.m.	Arrival	
1:20 p.m.	Welcome and Introductions	Miki Schmidt, NOAA Mike Howell, OMB Margaret Davidson, NOAA
2:00 p.m.	**Overview of the Ocean and Coastal Mapping Integration Act**	Roger Parsons, NOAA
2:50 p.m.	**Defining Coastal and Ocean Geography and the Framework Data Layers**	Eddie Wiggins and Chris Macon, U.S. Army Corps of Engineers
3:30 p.m.	Break	
3:45 p.m.	**Existing National, Regional, and State Plans**	Miki Schmidt, NOAA Mary Culver, NOAA
4:45 p.m.	**Priority Themes**	John Haines, USGS
5:15 p.m.	Adjourn	
6:00 - 7:30 p.m.	Southend Brewery – Happy Hour (cash bar)	

Wednesday November 4		
8:00 a.m.	Arrival	
8:30 a.m.	Welcome and Recap of Day 1 Integrated Ocean and Coastal Mapping Success Story	John Haines, USGS Roger Parsons, NOAA Sam Johnson, USGS
9:00 a.m.	**Challenges to Integration: Breakout Groups**	Mary Culver, NOAA
10:30 a.m.	Break	
10:45 a.m.	Breakout Groups Report	John Haines, USGS
12:00 p.m.	Lunch (outside if weather permits)	
1:00 p.m.	**Solutions and Benefits: Breakout Groups**	Mary Culver, NOAA
3:15 p.m.	Break	
3:30 p.m.	Breakout Groups Report	John Haines, USGS
5:00 p.m.	Recap and Adjourn	John Haines, USGS
	Dinner on Your Own	

Thursday November 5		
8:00 a.m.	Arrival	
8:30 a.m.	**Welcome** **Report to Congress: Incorporating Existing Plans**	Roger Parsons, NOAA John Haines, USGS Eddie Wiggins and Chris Macon, USACE
9:45 a.m.	Break	
10:00 a.m.	**Report to Congress: Incorporating Solutions**	Roger Parsons, NOAA John Haines, USGS Eddie Wiggins and Chris Macon, USACE
11:15 a.m.	**Next Steps:** Deliverables, Timeline, and Review	Roger Parsons, NOAA
12:00 p.m.	Adjourn	

Appendix 2:
Workshop Participants

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Appendix 3:
Ocean and Coastal Mapping Workshop
Breakout Group Notes

Group 1: Navigation, Transportation and Security

<u>Morning Session</u>
Items in bold were determined to be higher priority.

1. What are a few examples of key decisions that are being made within Nav, Trans, Sec?

    - To build or not build – for both private investment and permitting
    - Determination of requirements for building/permitting
    - Determining which ships can come into the area based on ship size
    - Navigation around harmful objects (natural and manmade) on the sea floor
    - Determining when to reopen ports after a hazard –
    - Maintaining port security, military, commerce, recreation
        - impacts to other sectors if port closed- energy, goods-
    - Maintaining continuity of transportation – shipping to trains/trucks/etc. - causes implications far down the road (on the land side)
    - Parking Lot – need to map underground assets – power lines, sewer, material transport lines. not included in NSDI
    - How often to survey channels – safety of ships passage. Need different remap cycles depending on the area.

2. What are the priority framework data sets required to make these decisions?

    - Bathymetry
    - Benthic data – fish habitat, etc.
    - Shoreline
    - High res bathy looking for hazards to navigation don't always support other needs
    - Data collections need to suit needs of collecting agency and the needs of other groups. Need to leverage $ to do complete coverage survey to avoid remapping
    - Learn from CA project, brought in more stakeholders, collected at nav standards for only 10% more cost – big success

Acquiring and Using Data for Navigation, Transportation and Security

Top Challenges
   - 5 votes – Agency culture – each agency has its own budget/mission/goals/requirements
   - 4 votes – Defining wins for each participant in the partnership *(turned out to be more of a solution)*

- o 3 votes – Incentivize (and require, "the stick") partnership and horse trading with fed, state, NGO, etc. *(turned out to be more of a solution)*
- o 3 votes – Need to keep the big picture in mind
- o 2 votes – Don't budget in an interagency manner – not easy to transfer $ *(turned out to be more of a solution)*
- o 2 votes – Leadership support, trust, and transparency in process/plans
- o 1 vote – need data collection standards

Doing Well	Challenges
CA seafloor mapping and partnerships	Each agency has its own budget, mission - has to be cultural shift
Discrete examples of working together and success in partnering – opportunistic	Not easy to transfer money. Need to budget in an interagency manner
Some conversations are occurring. Coordination occurs when the people involved want to make it happen	Incentives for considering other org needs – ex. Increase scale/scope get an IOCM credit, incl. partners outside fed agencies, horsetrading
Goals met, piece by piece, but better if had big picture right up front	Define wins for every agency
Find overlap with other agencies reqmts, could provide big picture all in one place, transparency in progress, lots of patience	Leadership onboard to support efforts of IOCM
Getting information to capitol hill and using visualization to help Congress understand	Understanding of each organization's needs for a data collection
NGDC and CSC data dissemination	Legislative mandates - confusing
	Recognize the big picture, keep this in mind
	Transparency in progress, find overlap in agencies reqmts, everyone can see why you are doing what, develop trust
	Institutional barriers
	Partnering is secondary, your agency needs comes first
	NO governing structure to facilitate partnership and coordination
	DMA –NGA DoD geospatial governing agency all together, civilian agencies do not have
	Agencies with disparate missions and audiences
	Incentivizing partnerships within the gov, make it come from the top down, carrots and sticks, there are no penalties

	Much more difficult working with states
	Success breeds success. Demonstrating success builds momentum, gains trust
	No published standards that everyone works toward, different specs- finding middle between hi specs (nav) to lower (emer)
	Different agencies could be willing to pay up to get their reqmts met
	Agencies come together and ID diff specs, prioritize to meet all needs
	Partners- infrastructure suits your needs, not easy to form partnerships to meet all needs
	Use partner to gain that capability, if resources not there, others needs overcome existing resources
	NGDC and CSC dissemination of data that is a big deal
	Place based activities memo an opportunity, urban affairs czar, % of pop of coast vs. rest of country

Afternoon Session: How will we overcome institutional barriers that prevent effective cooperation in data acquisition (and use)? *Detailed notes from this discussion are available, if needed. What's captured below is a summary. Items in bold were determined by the group to be more important.*

Envisioning the Ideal State
Examples that work – HSIP (Homeland Security Information Program) with DOD, USGS, DHS, NGA and CA Seafloor Mapping
- Have a common mission
- Results in common data layers
- CSC model for partnership will all entities
- Everyone with requirements is at the table
- Partners are willing to allocate resources to make partnership and the right data collection happen
- Participants find common ground on requirements
- Arrive at common denominators as a group – knowing that sometimes it doesn't meet everyone's needs (give and take)
- Each agency can point to a win
- Collective good (taxpayer) wins
- Define what a win is for each participant
- Understanding of each group's constituency needs

- Have a mechanism for collective planning – has data wants that can match with planned collections to suit many needs. Information then persists as a resource to see what exists
- Someone has to be the final decider
- Has a governing structure that is (1) effective for coordination, (2) includes all stakeholders (not just feds), and (3) accountability exists
- Governance structure does not necessarily mean all agencies under one roof, but that coordination is
- Have a funding pool that enables/facilitates collaboration
- Must use an impartial facilitator that doesn't favor any one party

Analyzing the Challenge – what makes it happen? What are the effects?
- Technological advances – many more user requirements (this is a good thing)
- Specific missions for specific constituencies
- Stovepipes
- Government Performance and Results Act (GPRA) measures – not helping collaboration X # of miles/tools/etc.
- Change of administration/changing priorities
- Classification – not as much of a challenge as it used to be
- PI's not releasing data
- Effects – doesn't get done as well, on time, etc.

Big Impact Solutions
- Easy – use existing incentives for partnership and require coordination with federal, state, NGO's
- Medium effort – Define "wins" for each participant in a partnership
- Medium effort – Establish a data collection/need priority plan to meet a partner requirements/criteria and to respond to external event-based priorities
- Hard – New incentives to measure success (individual agency and collaborative success)
- Hard – create a funding pool of existing funds for geospatial data development and coordination/sharing for IOCM
- Hard – same as above ("create a funding") but with new funds
- Hard – change budgeting – easier to transfer $ and make interagency/governmental budgets
- Hard – Recommend legislation to authorize a geospatial acquisition and management program
- Hard – One governance structure for improved civilian geospatial coordination

Lesser Impact (between low and moderate impact) Solutions
- Easy – use interpersonal communication to facilitate the discussion
- Easy – institute a personnel detail for exposure of geospatial community to policy office (legislative/executive)

Group 2: Climate Change and Hazards Resiliency

<u>Morning Session</u>

1. What are issues and key decisions?
2. What data do we need to address those?
3. What are we doing well?
4. What are challenges (top 3)?

1. Key Decisions
   - Impacts of SLR (emergency preparedness)
   - lowering lake levels
   - Siting of development (land use planning)
   - Marine use planning
   - What/where/how to restore habitats
   - Decisions about where to rebuild after episodic (or more gradual) events
   - Impacts to infrastructure - making existing structures more resilient
     o Civil works as well as residential planning (ex. Ports vs. subdivisions)
   - Evacuations, adaptation
   - Mitigation, planning
   - Risk management, flood insurance programs and erosion (in terms of set-back lines)
   - Sediment impacts/geological hazards (ecological impacts of sediment)
   - Gulf Island restoration
   - Impacts of temperature change
     o coral bleaching – access to marine protected areas, manage human impacts (pollution, fishing restrictions)
     o shift of range of organisms
     o increased evaporation
     o change in ice cover – NW passage
   - Cost benefit analyses – understanding if an action is worthwhile or not
   - Impacts of ocean acidification

2. Priority Framework Data

   - Biological data
   - Habitat data
   - Elevation data (vdatum, merged topo-bathy).
     o Need to agree on specs (temporal, spatial). Regions could drive what the specs should be. Depends on question and how it will be solved. Local issues will determine specifics of data required – These will be variable. In FEMA, specs are determined by agency. Need to provide some definition in plan in order to justify funding requests

- Shoreline data

3. Challenges: (number of votes)

- Defining Resolutions (4)
    - Spatial, temporal, spectral
- Elevation – standardization for different specs (tree canopy, bare earth, subsurface features) (3)
- Data format standards (to make accessible)
- Data propriety/ownership – how to get cadastre? (2)
- Coming up w/cost effective solution
- Technical limitations – substrate class, veg issues, Vdatum challenge – vertical datum challenge. (2)
- Imagery – temporal change (1)
- Fusing w/ocean observations (base layers and point layers)
- Coordination – inter-agency cooperation and funding (6)
- Archiving and disseminating data
    - people collecting because they can't access someone else's.
    - lack of central archive, distribution center (3)
    - classified data (military classified)
- licensing challenges

Afternoon Session

- How will we overcome institutional barriers that prevent effective cooperation in data acquisition?

Barriers to institutional collaboration
- Lack of knowledge of what's going on
- Individual connections (personalities) – can help or hurt
- Mandates – must do something by certain time, resolution, etc
- Mission creep – overlapping responsibilities that lead to competition
- Budget process
- No incentives to compromise – how do we get mandates to compromise?
- Cultural biases – research vs. technology vs. management
- Partnership is hard
- Lack of well-defined roles among agencies
- No designated person or mechanism to ensure agencies follow through
- Requirement to share data exists, but there is no enforcement of this
- Data management for collaboration is unfunded
- Specific customized data needs for different applications – leads to perceived redundancy

Potential solutions

1. Coordinate/mandate
   - Coordination needs to take a top-down approach. Legislative mandate (provide carrots and sticks)
   - Need mandate for delivering geospatial data
   - Language in contracts and grants to require immediate sharing of raw data
   - Reduce barriers to data archive
   - Designated lead for data collection
   - Enforcement of mandates
   - 1a – Single agency with appropriation: Piece of legislation that appropriates ocean and coastal mapping and one lead agency that oversees and takes charge. One person in charge of dispersing $ across the agencies.

2. Encourage/reward for sharing data
   - Cultural change of rewarding sharing of data. PIs need to publish data and get credit for it.
   - Primary metric needs to be $ for sharing data (not publication) across organizations.

3. Build sense of ocean and coastal mapping community
   - Foster a sense of community and build a personal relationships
   - Unified approach across

4. Engage other integrated mapping groups
   - Coordinate w/National Map
   - No duplication of effort
   - Want to prioritize key things to show congress that we're addressing cooperation, leveraging resources to do more mapping. Feds, states, RAs coming together to meet common requirement.

5. High profile, ecosystem based geographic plans for data collection plan for all regions (Example: CA sea floor mapping program)
   - Know advertisement schedule
   - Focus on multi-use data sets
   - Show gaps within the regions

Big impact | **Small impact** axis (vertical), **Easy/Hard**, **Cheap/Expensive** (horizontal)

Quadrant chart:

Top-left quadrant (Big impact / Easy / Cheap):
- 1a
- 5 (top center)
- 4 2
- 4 3
- 1 1

Top-right quadrant (Big impact / Hard / Expensive):
- 5 1a
- 2
- 3

Axis labels:
- Big impact (top left)
- Small impact (bottom left)
- Easy (bottom, left of center)
- Hard (bottom, right of center)
- Cheap (bottom, left)
- Expensive (bottom, right)

Parking Lot:

- For broad applications, what is minimum standard? Need to look further at specific issue. Large range of specs (resolution) based on local needs. We may be able to develop national standards for general categories (continental shelf, continental slope, shoreline, etc)
- Data collection plans need an organization or mechanism that are interoperable – need structure to be universally adopted and funded. Need mandate or funding to ensure this.
- Discussed why various agencies collect the data in the same location. For example: Shoreline data – don't want to use another agency's shoreline data because it is not same or able to be used with my set of data – perceived overlap, but not necessarily.

Group 3: Ecosystem Based Management

<u>Morning Session</u>

What are some key decisions being made related to Ecosystem Based Management:
- Establishing protected areas (both marine and terrestrial) – where to protect or not to protect
- Fisheries management – need data, e.g. identifying essential fish habitats, conducting stock assessments
- Developing monitoring and measuring plans
- Responding to incidents, e.g. oil spills
- Marine spatial planning – minimizing human impacts - e.g. human use conflict, competing uses
- Restoration – do you restore or retreat
    - how to prioritize where to restore
- Wildlife conservation & protection decisions
    - identifying and addressing species distribution
- Need to measure change over time

What are the data required to make these decisions:
- The intertidal zone is important – SLR will result in change to this zone
    - it is important to identify the salt water extent and map the resulting change over time
- Elevation is an important base layer
    - Geodesy and control should be considered integral to this component
    - need vertical datum to establish elevation
    - tidal models are desired
- Important EBM data sets not included in the 6 fundamental data list
    - seafloor or substrate
    - water temp and other observational oceanographic data
- Important derived data products (these come from both dynamic and base layers):
    - Benthic Habitat
    - sea level rise impacts and inundation
    - species distribution abundance & activity
    - ecosystem boundaries
    - land cover
    - ecosystem health index
    - environmental sensitivity index – ESI maps
    - Digital elevation models
    - shorelines
    - environmental change maps (from time series mapping)
    - ecosystem services valuation

To focus the discussion, what are the data that define these broad areas for EBM?

- currents
- temperature
- salinity
- biology - species, extent of invasives, etc.
- need to add ecosystem characterization as fundamental data

These EBM essential data sets need to be referenced in the report, even if they are not "fundamental" data. They must be mentioned to get buy-in to IOCM from the EBM community.

Do we only talk about the inputs or do we bring in products? How do we sell this to Congress? E.g. - There are many "shorelines" - maybe we don't need to highlight shoreline since it is a derived product: alternate view… shoreline tells a very strong story

So what information do you need to make decisions, regardless of whether it is base data or derived product?

- Fundamental geology
- Substrate or surface geology
- Observational data
- We need benthic habitat as a fundamental data

What are we doing well in terms of data collection:

- Elevation and geodesy, just need a lot more of it
- Collecting a lot of data
- Have excellent benthic data at some local scales
- Elevation – what is working
    - we have the technology to establish elevation sets
    - we now understand the use and need for lidar and its applications
    - vdatum tools – an example for merging data sets
    - we are able to disseminate elevation data (data distribution)
- technologies to analyze data are increasing – we can share and use data better
- there are some examples of federal and state leveraging for data
    - good lessons learned from CA mapping work
    - tapping into the regional alliances

What are the biggest challenges or barriers:

- substrate – how do we do this better
- not enough money
- shallow water mapping – intertidal mapping is difficult and expensive
- stakeholder input – lack of activity
- too much data – large volume of imagery or billions of points can be overwhelming
- data discovery – how to find, get, and use – how do we make it ALL accessible

- lack of skilled technical personnel and money to pay them
- NOAA Coast Survey requirement for IHO standard sometimes unattainable or too costly
- Fed institutional challenges
  - the funding cycles and the need for planning ahead – both timelines and requirements
  - often need MOA's, MOU's for partnerships and it can be difficult to know if these exist
  - there can be conflicting mandates between agencies
- the technology is limited for benthic mapping
- EBM theme – integration of biological data with sea floor mapping data is difficult
- Communication is a challenge
  - poor discoverability (what is going on, what is available, who's doing what)
  - poor internal communication within the mapping community
  - poor communication between feds - academics
  - poor communication between feds – states - academics - NGOs

<u>Afternoon Session</u>

EBM in general is a tool rather than a theme or issue, how do we focus the discussion?
- Group decided to narrow the focus to Ecosystem Health

Fundamental (base) data layers for to Ecosystem Health:
1. Orthoimagery (particularly if use broad geographic extent)
2. Topo-bathy (ensure that geodetic control is included)
3. Surficial geology (sonar + ground truthing) – substrate (geoform)
    - derived product – benthic habitat
4. Surficial biology
5. Cadastral information – legal rights & responsibilities, ownership, use
6. Human uses

Recommendations on criteria for data acquisition (not in order of importance or priority):
- age of the data
- opportunity for potential multi-uses
- legislative mandate
- authoritative data
- support from non-governmental partners – "leverage factor"
- ecosystem/species vulnerability
- high benefit to cost ratio
- social value ("skunks vs. dolphins")
- potential human impact (including conflict areas)
- develop base line conditions
- politics
- human health

- crisis response
- scientific value

Why aren't we applying these criteria?
- Research is often driving the decision-making
- CA example – led to the conclusion that we "just have to map everything"
- Do legislative mandates limit how we use decision criteria?
- Much data exists, but it is stove-piped – the problem is finding the existing data
- One problem is converting data to useable products not originally planned for – "data discovery & rescue"
- There is a problem with follow-though on existing inventories

Solutions:
- Make existing data discoverable and find ways to expand its use
  - can't get away from metadata and a catalog
- Need some criteria that don't always come down to who has the money
  - politics weighs too heavily
- Work at regional perspective to repeat collections (?) – establish and address regional priorities
- What's the impact you're going to have? Will this meet an immediate need?
- One potential solution is to outsource the work where resources are short

Opportunities:
- Environmental justice is an opportunity for raising mapping profile

Questions and Issues (Parking Lot)
- We often need to combine base layer data w/dynamic data to get derived data. Given this, what do you sell (what message to convey) to Congress? How do you handle the dynamic data?
- There was some discussion that the list of fundamental data "doesn't make sense" – i.e. comparing apples to oranges. Data considerations include:
  - Hydrography vs. bathymetry – the plan needs to acknowledge the difference and be specific about the intent and consistent in usage
  - Shoreline is a derived product of elevation, so doesn't fit as "framework"
- EBM decision-makers need to be responsive to local planning efforts
  - account for infrastructure
  - aware of permitting process
- The nearshore data gap – this is the critical data that has the largest potential for expanding and we have good stories to tell about why it is so important.

Group 4: Energy Siting and Resource Extraction

Key decisions that are being made related to this issue *(those in bold were identified as being more pressing)*:
- Siting decisions
    - Wind farm placement – many decisions being made about this in certain regions (mid-Atlantic)
    - Establishing protected areas, sanctuaries, and other restricted use areas
    - Sediment borrow areas for renourishment projects
- Identifying viable alternative energies (both near shore and offshore)
- Determining the boundary between state and Federal waters, and balancing that with the need to work across those boundaries
- Human uses
- Fisheries
- Endangered species management

Key data needs for informing these decisions *(those in bold were identified as being higher priority)*:
- Elevation, including bathymetry
- Socioeconomic – human uses, economics of competing uses
- Infrastructure
- Biological – habitat, migration corridors, distribution
- Physical – wind fields, circulation/ocean currents
- Geological – critical in some areas, but useful everywhere
- Habitats, including benthic
- Cadastre

Success stories – what the geospatial community is already doing well related to this issue area:
- Seafloor mapping – map once, use many times. This is being done well in some areas (West coast example).
- Government agencies developing the business case for mapping
- Identifying potential locations (geography) of resources, which could be used for collaboration
- Number of collaborative efforts are increasing
- Beginning to use geospatial information to change policy
    - One example is using whale interaction data to change the location of shipping lanes
    - Private sector uses geospatial technology well for the purposes of resource extraction, so we should be able to learn from that in order to improve decision-making process by using this technology
- Synergy between ocean observation community and coastal/ocean mapping community – making some progress on improving data access

Challenges faced in making these decisions:
- Data sharing (data collected as part of permit requirements is usually proprietary)
- Setting priorities for mapping/data acquisition
- Lack of understanding of the decision making process
- Economic information is difficult to collect
- Gaining access to human use data
  - Cadastre does not include human use data
- Assessing cumulative impacts of energy siting decisions
- Biological characterization
  - Benthic data doesn't include biological information
- Scale of decisions – both state and national; there are acute regional needs that aren't always satisfied by national datasets
- Understanding impacts of fisheries decisions
- Establishing restricted/protected use areas – need to do this prior to granting permits

Criteria that should help determine mapping priorities *(those in bold were identified as being more important)*:
- Flexibility and usability of data (map once, use many times principle)
- Data gaps – either the data hasn't been collected, or quality is poor
- An immediate or urgent political or economic need exists – decisions are already being made without the pertinent data to inform those decisions; societal relevance/impact
- Leveraging potential
- Scalable minimum standards for data collection (both national and smaller scales)
- Achievable or realistic goals/needs
- Baseline data should be complete for the entire nation, including Alaska and the Pacific, before new acquisition is allowed to occur
- Existing mapping plans are in place

Potential solutions for establishing mapping priorities:
- Single contracting mechanism that is responsible for each data type
  - Should meet 80% of the national need, and should have funding appropriations for completion.
- "Buy up" options for data acquisition – smaller collection efforts can buy into larger acquisition contracts, which would make it more affordable to get different specs or resolution for the same data type
- Clarify or focus what the data needs are
- Create a priority-setting model or framework that can be applied to mapping efforts across agencies
- Quantify the economic value of natural resources
- Coordinate mandates and existing mapping efforts geographically
- Build on and improve existing tools and resources (such as Geospatial OneStop) AND get dedicated resource allocated to maintain those tools, rather than continue under the

current method of having people work on these ad hoc in addition to other full-time duties

Necessary information for making the case for integrated mapping to agency heads and Congress:
- Clear process – need to understand the management decisions and the processes that they undergo
- Graphics/maps – need visual to help demonstrate how the data is used to make decisions, and what information comes from the data
- List of data gaps – need to show where we have data, as well as where it's missing; could use a map to help visualize
- Description of data benefits/uses; also describe what's at stake if mapping DOESN'T happen (potential cost of failure)
- Cost of acquisition
- Cost/benefit analysis with strong numbers

Parking lot:
- Framework data layers need refining – suggest using the existing definitions from the NRC report
- Geospatial community interfacing with the ocean observation community
- Need FULL nationwide coverage for framework data (Alaska and Pacific included) with a deadline for completion prior to new collection starting
- Data access and interoperability needs to be addressed
- Mapping products should be served through existing portals/tools, such as Geospatial OneStop
- Agencies should stipulate that data collected as part of permitting application process will be shared publicly (with a few exceptions that should understandably remain proprietary)