

**National Coastal Assessment Meeting**  
**National Oceanic and Atmospheric Administration**  
Hall of States, Washington, DC 20001  
*October 6-7, 2009*

*Workshop Summary*

## **I. Synthesis and Conclusions**

The National Coastal Assessment meeting, held on October 6-7, 2009 by the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management, identified a number of principles and considerations (described in greater detail in the body of this meeting summary) necessary for NOAA to successfully develop an Integrated Coastal and Ocean Assessment (ICOA) program:

- Cohesive national framework of goals, principles, and guidance.
- Usable results that are relevant to management objectives at the local, state and federal levels, in order to gain and maintain support at those levels
- Early involvement of policy makers and stakeholders
- Standing advisory group
- Dedicated resources
- Building on assessments and data that already exist
- Focus on integration and synthesis of existing data
- Strategies for identifying and filling data gaps
- Collaborative approach, including peer-review and public comment opportunities and strong local level input

The meeting also identified a number of key questions and decisions needing to be made by NOAA to move ahead with the development of an ICOA program. The participants felt that a comprehensive assessment of coastal and ocean resources is needed. Whether new statutory authorization is required, or whether NOAA should immediately begin to pursue the development of a national assessment under existing authority, e.g. through a series of state or regional pilots or an expansion of the National Coastal Assessment (formerly the Coastal Condition Report) are basic questions that NOAA needs to answer. NOAA proposes to consider these questions in consultation with the states and other national stakeholders in order to reach decisions in a timely manner. The answers to these questions will influence all of the other questions and decisions to be made.

Another key question that presents a particular challenge, regardless of whether the ICOA is pursued through new or existing authority, is that of scalability: What approaches can best ensure that all state and regional level assessments conducted under the ICOA address nationally consistent topics that are important to federal agencies, while giving states and regions the option to select additional parameters for those topics?

The following is a summary of the other key questions and decisions facing NOAA:

**1. Potential Immediate Next Steps:**

- Should an interagency workgroup be assembled to take the ICOA to the next step?
- Should NOAA engage with a wider set of states, CSO, and other partners?
- Should an “assessment of assessments” be done, i.e. a more detailed review of the current assessments and monitoring that exist in order to identify potential models, gaps to be filled, integration and synthesis needs, possible ICOA structures/process, and funding needs?
- What is the most compelling message (for federal legislators, stakeholder organizations, others) to accompany this effort? What forms should this message take – a 2-4 page concept paper? How specific does this message need to be at this point?
- What existing or future efforts could help move this forward (National Ocean Policy Task Force, climate change legislation, etc.)?

**2. Purpose:** Which of the following are the purposes of an ICOA: resource allocation, identification of priority issues, performance evaluation, or provision of good science for state/regional/federal plans and programs?

**3. Design:** Who should be involved in the ICOA design (level of detail, rigor, etc.)?

**4. Engagement:** What monetary or non-monetary incentives can be provided for involvement of non-NOAA federal agencies, states, local communities, and bordering nations?

**5. Advisory Input:** Should NOAA assemble an advisory panel? If so, what types of participants should be on the panel? When should it be convened? How can we ensure that all of the various levels of user (national, state, local) will be represented?

**6. Stakeholder:** At what stage of the process should stakeholders, the public, and local and tribal governments be involved: early (e.g. issue identification, goal-setting, and determining state/regional parameters), mid-term (e.g. review/comment on assessment design), later-term (use of results)?

**7. National Consistency Versus State/Regional Variability:** A national ICOA would have consistent national goals and overarching categories of issues to address, but the details of items to measure would vary between regions and/or states. Who will be involved in making the decisions about state and regional variability?

**8. Funding:** How much money is needed to carry out a regional assessment, under different design scenarios? (This depends on how the assessment is designed).

**9. Ties to Management Efforts:** What will be the roles of NOAA and the states? Will NOAA have authority to direct the states regarding their plans and programs based on the assessment results? How much force should the assessments have for determining states' compliance with legislative mandates and/or funding allocations? How can states with different approaches be evaluated in a national or regional context to ensure improved management capabilities for all partners?

**10. Integration:** Should the ICOA simply integrate data that is collected and/or monitored differently in different states or regions, or should the ICOA program more actively seek over time to promote/require more consistent monitoring and data collection?

**11. Behavior Change/Social Impact:** Should the assessments attempt to measure and assess connections between human behavior and human preferences, such as including surveys of residents or resource users about various coastal issues, and assessing behavior changes needed and the most effective ways to accomplish those behavior changes?

**12. Final Product (Presentation):** What form will the final product take in order to be maximally useful; size, format, etc.? How would the assessments be made available, and how much of the underlying data would be made available?

## II. Meeting Goal

The goal of the meeting was for participants to provide input to NOAA on effective approaches for designing and implementing a National Integrated Coastal and Ocean Assessment (ICOA). This summary presents the key ideas, suggestions, and follow-on questions from the two-day meeting, grouped into major categories. Case study presentations are summarized in Appendix C and are available online at <http://coastalmanagement.noaa.gov/>. Workshop participants are listed in Appendix D.

## III. The Concept of a National Coastal Assessment

The ICOA concept has arisen from work NOAA and others have engaged in over the past three years on the future of coastal management. These efforts have led NOAA staff to appreciate the need for new approaches to coastal management to address persistent problems affecting the coasts, and to understand that such approaches should be integrated across agencies and at all geographic scales.

NOAA has developed several overarching national ocean and coastal management goals, which will be used to guide future work.

***NOAA's Proposed National Coastal and Ocean Management Goals***

- 1. Provide for healthy coastal and ocean ecosystems*
- 2. Ensure safe, sustainable and resilient coastal communities*
- 3. Reduce the impacts of climate change*

NOAA is proposing changes to the Coastal Zone Management Act (CZMA) that would require a periodic assessment of ocean and coastal resources within a National Coastal Planning Area. The National Coastal Planning Area would be a geographic boundary identified by NOAA, based on national criteria and in consultation with each state. Based on discussions to date, the coastal planning area would be watershed based. NOAA intends to proceed toward implementation of an Integrated Coastal and Ocean Assessment either through new legislation which would replace or amend the CZMA, or by writing guidance and seeking Congressional funding. The President's Interagency Ocean Policy Task Force has also been looking at assessments.

An Integrated Coastal and Ocean Assessment will be used to accomplish a number of objectives:

- A. Create a national State of the Coasts report that would: (a) describe the current physical, biological, social and economic condition of coastal and ocean ecosystems, (b)

evaluate current conditions against national mandates, goals and policy, (c) inform national coastal and ocean management policy development and program planning, and (d) assess progress towards national and state/territory coastal and ocean management goals.

- B. Develop state and regional ICOAs that would guide management decisions and policy development at those levels.
- C. Evaluate state programs and inform development of state/territory-specific management goals and plans.
- D. Make predictions on future options and management.
- E. Identify gaps and information needed to better assess and manage the nation's coastal and ocean systems.

These objectives would be met through examination of uniform parameters across all coastal states and territories related to national coastal management goals, and the intention would be that results would be useful at several scales/levels. Given that some degree of assessment of the state of the coast/status/trends is already being done (such as the National Coastal Conditions reports), under an ICOA program NOAA and its partner agencies would compile current assessments and address problems of data standardization to enable pooling of data and comparisons across data sets. The ICOA approach that NOAA is proposing will build on existing assessment programs by synthesizing them in a more comprehensive manner and by identifying and addressing information gaps.

NOAA staff would carry out the assessments, with participation from the states. The coastal states would be divided into five regions. Every region would progress through a five year repeating cycle of NOAA-led state assessments in which data is gathered for each state and analyzed then summarized for each state and region. The cycle would be staggered, with NOAA conducting an assessment in a single region each year until all regions were completed. NOAA would provide the results, baseline, trend information to help states create science-based plans and measurable objectives. Each state would then have one year to develop its next five-year coastal management plan and would proceed to implement that plan. Five years later, the state and other states in its region would again be assessed, in an ongoing cycle. The first time through the process, NOAA would use only existing data and would identify new data to be collected the second time around.

#### **IV. Summary of Proposed Process Components**

The following process is a compilation of ideas generated by participants for developing and implementing the ICOA. Although shown as a linear step-wise process, in practice the process may be more dynamic and complex. The sequence of these steps, as described below, is only one of several possible sequences:

**Step 1: Clarify goals and objectives.** Federal agencies' initial roles in the ICOA are to: 1) coordinate the creation of national guidance questions and definitions in terms of the three National Ocean and Coastal Management goals, with the

involvement of all players; 2) Identify the purpose and the audience for the ICOA (Congress, stakeholders, and data users, at different levels?); 3) Define what the final product will look like (data, stories, trends?); 4) Develop the benefits of and reasoning behind an ICOA.

**Step 2: Clarify roles and develop an architecture.** Federal agencies should clarify roles and develop a federal “architecture” that leverages all resources and produces a better-integrated picture of the nation’s coasts. Who will synthesize the data? Identification needs to be done of who will: measure, interpret/tell stories, react, decide. Who will be the specialists, and how will they interact?

**Step 3: Develop a clear process and model.** Federal agencies and the states should develop the specific process for compiling assessments, including pre-assessment work and resources needed. This should be as collaborative as possible. States need a role in designing the process including early identification of state management objectives. Start by bringing together states and federal agencies to develop a general approach and ground rules for the assessment. Define stakeholders broadly, find out what they need, and select indicators based on those needs. NOAA should explicitly incorporate the community’s voice. Hold stakeholder listening sessions to identify what they value, their concerns, etc. Plan to engage all stakeholders at all decision points. Seek funding to support the ICOA.

**Step 4: Identify current assessments and resources.** Identify current national, regional and state assessments already underway that can be linked or built on. Leverage current information as much as possible. Base ICOAs on the significant new and existing assessments around climate and other coastal management issues.

**Step 5: Determine data collection parameters.** Identify state and national components, and decide on level of rigor. Look at lessons from other similar assessments to consider pros and cons of rolling up disparate local/state data versus nationally consistent approaches. Talk to high-level managers about their expectations for end results (do they want a roll-up of state-specific information, or something more consistent?).

**Step 6: Prepare for the first ICOA.** Get set up for the first “snapshot” in the next 3-4 years. The first assessment should be a snapshot of the current status of the coasts, including available data and characterization of conditions. There is some concern that this will mean managers are not involved from the beginning and that in fact they need to be involved immediately. All later assessments would be linked to national and state priorities.

**Step 7: Revise ICOA process as needed.** Plan to utilize new data sets as they become available.

**Step 8: Provide ongoing support.** Obtain staffing and resources at the federal, state, and regional levels for long-term support of the ICOA.

## V. ICOA Model and Structure

Over the course of the workshop, participants suggested many elements of an ICOA model or structure for NOAA to consider, although no consensus was sought. Among these considerations were:

### 1. Overall Approach:

- The ICOA could follow the formal Integrated Assessment model:
  - a. Ask relevant policy questions
  - b. Document relevant status and trends
  - c. Describe causes, consequences and trends
  - d. Evaluate/project future conditions under policy options
  - e. Describe uncertainties
  
- The ICOA could focus solely on three questions:
  - a. What is the state of ecosystem health?
  - b. What is the state of ecosystem services to humans and community services?
  - c. Are the states in compliance with national mandates and goals?
- The ICOA should be integrated across temporal and spatial scales and should be interdisciplinary and multi-sectoral.
- The ICOA could follow a problem-solving model, such as pressure-state response, or DPSIR (Driving Pressures, States, Impacts, Responses)
- The ICOA could utilize a two-tiered national and state level approach, in which assessment is done in a complementary manner at both levels.
- The ICOA could first identify key issues in each region through a quick snapshot in which people are using their best professional judgment at a quick inexpensive workshop that identifies a suite of indicators (MPA approach is a good example of this model). Then drill down in states within that region, and roll up the states to get good regional and national perspectives.

### 2. Process:

- Create an ICOA Advisory Panel including federal agencies currently doing assessments (i.e. USGS, EPA, various NOAA offices) plus states and academia. This panel could produce a white paper, flow diagram and timeframe. Funding would be needed, possibly from NSF. The process would have to be codified and interdisciplinary.

- Convene stakeholders to identify priority issues and identify how the ICOA could fit with state program managers' current processes. The ICOA should be built upon and consistent with other assessments.
- Document decision processes, standards, and quality control in order to ensure that the ICOA can track trends over time even if methods and indicators change.
- Include projections to address trends, climate change, impacts of emerging coastal uses, and future needs.
- Could use both question-based monitoring and indicator-based approaches. An example is the National Marine Sanctuaries approach, which also spans local to national scales.
- Clarify language for broad understanding and decreased confusion, since people define concepts and terms like community resiliency differently.

### **3. Goals and purpose:**

- Goals need to be set at the level at which federal agencies and states work.
- Three goals are too many for the ICOA; should consider narrowing the issues to focus on. NOAA should identify one primary objective.
- Need to clarify what the ICOA is going to be used for: resource allocation, priority identification, performance evaluation or provision of good science for state plans?
- Need to decide if assessments will identify desired policy changes.
- Consider focusing on specific policy management and planning questions (including state-specific questions) to ensure that the ICOA is useful. Focus on providing useful information for managers, and beware of the risk of tracking wrong problem.

### **4. Benefits/Messaging:**

- ICOA could be useful to state programs by providing leverage within the state, particularly for networked programs. Could give some indication of behavior changes needed, so states can more readily use for management purposes.
- Articulate how the assessment would benefit constituent groups, if at all.
- Clarify how the ICOA is expected to affect state and Federal agency actions.
- Show direct linkages for local policymakers, identifying problems and causes. Want to look at cause and effect, and have the ICOA show that if you manage or stress something in X way, Y is likely to result to the community and/or resource.

### **5. Final Product:**

- Clarify the final product. Is it data, stories, trends? The assessment will need to tell stories from the data about the big questions like "is water quality improving or decreasing?" For example, although different agencies track different species and/or use different methods, all should be able to collectively say whether the quality of a particular resource is increasing or decreasing.
- The ICOA should consider multiple management or policy options, rather than being like an Environmental Impact Statement with one preferred solution.

- When considering the future, will the ICOA focus on predictive scenarios or desired future scenarios, or both?
- How would the assessments be made available, and to whom?

#### **6. Program/performance evaluation:**

- The ICOA could help managers look at how a particular level of effort on a particular project relates to what managers get out of it.
- The ICOA could show and thereby influence connections, linking dollars to daily decisions and actions.
- Relative versus absolute standards may be needed. Setting absolute cutoff points for performance will likely not be useful.

#### **7. Scalability:**

- Need to find ways to aggregate and dis-aggregate data.
- States prefer comparison to their own past, trends and goals, rather than to those of other states.
- Resource managers at local, state and national levels will need different types of information.
- Need to determine how the ICOA will be integrated across scales, i.e., while the ICOA should be locally relevant, it also should be able to be “rolled up” as much as possible so broad regional and national themes and conclusions become clear.
- A common protocol will be important so data collected at a local level can be integrated as part of the whole. Should not be too strict about what is comparable.
- How can cross-boundary (both interstate and international) issues best be addressed? Look at the role of existing regional bodies and consider asking states to organize regionally for the ICOA.

#### **8. Integration:**

- Consider the ICOA as an assembly of all other existing assessments relevant to the coasts. NOAA could merely fill gaps and make connections. Data availability includes: the National Coastal Conditions Report (NCCR), the National Eutrophication Report, Mussel Watch, Coast Watch, National Marine Sanctuaries Condition Reports, and the Environmental Protection Agency’s Environmental Monitoring and Assessment Program (EMAP).
- Think about how the ICOA should link with Marine Spatial Planning (MSP), perhaps in state plans. It is possible MSP will also be included in any reauthorized CZMA.
- Consider how to link the ICOA with climate assessments.

#### **9. Ecosystem Services:**

- Understand and document trends in ecosystems and ecosystem services, with NOAA integrating data.
- Ecosystem services are one area where policy and science converge. The lens of what humans want from ecosystem services could help shape the assessments.

- Use a “coastal satisfaction survey” to measure non-market benefits of ecosystem services.

#### **10. State issues:**

- Should not be used to compare one state to another.
- Should give some indication of behavior changes needed, so states can use the assessments in their management.
- What components of a Healthy Coast Index would provide some consistency between states but allow for flexibility?

#### **11. Local Issues:**

- Working with the States, NOAA should determine how locally relevant the assessments should be.
- Translating results and information for managers on the ground is an enormous task.
- The biggest challenge will be getting implementation at a local level, where many decisions are made with little technical knowledge, political will or resources. There is insufficient local capacity to manage the ecosystem.
- Prioritize study areas which include local-level information to track actual management decisions, at least in some places.
- Consider whether data from local volunteer monitoring/observation is valid and useful.
- Look at existing laws that allow coastal development to occur, since coastal management happens at a local level based on zoning and permitting, and since it is led by financing.

#### **12. Parameters:**

- Identify the scale, resolution and types of metrics where possible.
- Identify data gaps; consider interpolation.
- Need to address QA/QC and document levels of uncertainty.
- Is there a match between the questions asked and the data available?
- What should be done when data are imperfect? How do you deal with data uncertainty, especially with both quantitative and qualitative data? Consider the National Marine Sanctuaries as a model.
- Consider data availability (pre-existing) versus necessary new information.
- May not need “completely consistent” data for all regions (which may not be an attainable goal) as long as the ICOA has consistent goals and common outcomes across regions.

#### **13. Coordination and resources:**

- What incentives can be provided (monetary or non-monetary) for involvement of non-NOAA federal agencies, states, local communities, and bordering nations.
- Need interoperability among federal agencies and then consistency with states.

- Consider ensuring that NOAA has the capacity to accomplish an adequate assessment without partners, in case others decline to support the ICOA and an entirely NOAA-led effort is necessary.

#### 14. Examples and models

- NOAA's Coastal Change Analysis Program is a good example of a consistent approach.
- National Marine Sanctuaries – especially on evaluation questions that are quick and useful (versus long term and elaborate).
- Should examine the Gulf of Maine Council's ecosystem indicators project as an example of integrating information on a regional scale and selecting parameters that tell a regional story.
- Learn what to do and what not to do from other projects. Should examine pros and cons of EMAP and NCCR.
- Nova Scotia's Genuine Process Indices – used to increase awareness, accounting and reporting, and to model the use of environmental information to support economic gain.
- See the International Union for the Conservation of Nature report entitled "How is your Marine Protected Area doing?" for ideas on metrics.
- The National Marine Sanctuaries' system-wide monitoring condition report is a good example of integrating different methodologies and scales.
- Healthy Reefs for Healthy People
- Commission on Environmental Cooperation Reports.
- The Great Barrier Reef Condition Report.
- Heinz Center's State of the Nation's Ecosystems Report
- The Mussel Watch products.
- Science-based scenarios, such as "Chesapeake Futures": a) continuation of current trends, b) adoption of feasible actions/practices, c) development of new technologies or approaches.
- NMFS 2009 State of the Coastal Economy report
- National Ocean Economy Program

#### VI. ROLES

Many participants noted the need to identify the players and linkages necessary for an effective ICOA. Comments on key roles included:

- *Local*: The local community voice is critical input if the ICOA is to be successful and useful, including determining variables, types of information, how information will be used, and what the most useful portrayal or analysis of the information would be. Maybe require state programs to partner with local coastal communities? How can NOAA guarantee/require that local communities have input into state plans,

assessments and programs? What are the best ways to get communities engaged? Some are leaders and want to be forward looking, but what about the others?

- *State government and resource managers*: Engage the Coastal States Organization and other state representatives early on. Encourage states to drive the connection with local community resilience programs.
- *Federal*: Interagency coordination is important. Help with data management and integration. NOAA should not try to reinvent the wheel by developing another data management system to support this assessment, rather it should consider adopting a distributed data system. Create a framework describing the roles of different federal agencies. NOAA should be designated the “lead agency” for the coasts among federal agencies.
- *Scientists*: at all scales and disciplines.
- *Tribes*
- *Stakeholders*: A particular question is how to define and engage inland stakeholders who may not have a strong awareness of their influence on and/or utilization of coastal resources.
- *Resource Managers*: Need to be defined. Think holistically about which organizations, budgets and legal authorities are most important for the coast.

One participant suggested considering the following key roles, noting the need for interpreters who look at the scientific results and decide what it means for a particular policy. The synthesis of the data is different from interpretation of the data, with the latter being question-driven and policy-centric.

- Measurers, who measure the systems;
- Storytellers, who communicate what the results of the measurements mean. The storytellers, who characterize the changes shown in the data, have a key role in saying what is significant or insignificant;
- Reactors, who hear the results from the storytellers and explore options of what to do next; and
- Decision makers, who decide what to do next (action) and what to measure.

## VII. ICOA Topics & Measures

Participants identified the issues that the ICOA should be designed to measure, analyze and synthesize, from the perspectives of: 1) current status; 2) trends; and 3) emerging concerns. It was suggested that these issues be measured and assessed relative to their functionality within the ecosystem (with ecosystem defined broadly to include the human dimension, social sciences, ecosystem services, economics, etc.) Indicators should be selected as follows: Start with a question, look at related stresses and threats, look at the resource response to those threats, and select an appropriate indicator or suite of indicators.

The following list presents the major categories of issues identified by the participants (a list of more detailed questions that the ICOA could be designed to answer is presented in Appendix A,

and a table of specific items that could be measured to answer those questions is presented in Appendix B):

- Overarching issues
- Climate change, stressors, and other transitions
- Governance
- Ecosystem services and community values and services
- Ecosystem health: habitats, plant and animal species, water quality, shellfish
- Sustainability
- Socio-economics
- Community resilience
- Information and data
- Vision for the future
- Competing uses

### **VIII. Messaging about National Coastal Assessments**

In order for an ICOA to be implemented and effective, and to lead to changes on the ground, a strong, positive message will be needed to articulate the benefits the ICOA will provide. An important component is to effectively describe, at the national level, the costs and benefits of different resources and of the ICOA. Possible audiences for a strong ICOA message include Congress, the states, stakeholders and the public.

*Messages that might resonate for Congresspeople:*

- Studies on coastal flood vulnerability (this worked in the UK with Parliament).
- The vast majority of the US population lives within an hour of the coast – this is your constituency!
- X percent of the economy that is dependent on the coasts.
- An assessment is valuable because it answers the following questions: What are we doing with our coasts (status)? Is the money Congress is spending doing any good? What should Congress do next?
- Coastal management will be much more efficient with assessments, like other management is with census information and economic indicators.
- Because of coastal development and change, you are going to need to make decisions, and NOAA is here to provide good science to help you with those decisions.

*Messages that might resonate broadly:*

- What are our leaders doing with public funds, what are they planning to do next?
- There are unprecedented changes on the way because of climate change impacts.

- We want to know how our coastal ecosystems are faring to ensure that they will continue to provide the benefits people value in the future. [Consider noting that management activities are underway to ensure specific results.]
- There is a need at the state and local level for more information, and NOAA is stepping up to fill that need.
- The cost-benefit analysis and how a healthy coast would benefit society.
- Help states identify areas that require programmatic improvement!
- NOAA is creating a comprehensive picture of how we're doing nationally.

*Other comments on messaging:*

- If assessments show data from local to federal level, there need to be compelling messages for all audiences, whereas if it is just a national-level assessment, there may not be interest at all levels.
- Highlight coastal issues as an impetus for appropriate state-level action.
- The messages should resonate with people both inland and on the coasts – this is an issue of national importance.
- Frame the message in terms of climate *impacts* (rather than the term climate *change* which turns people off).
- Negative report cards can trigger action (for example, Oregon took action after receiving a report card grade of D on a fecal indicator study in near shore waters.)

## **IX. Next Steps and Wrap Up**

Participants suggested the following next steps, primarily for NOAA:

### **1. Purpose and Scale:**

- NOAA should decide and articulate the purpose(s) and drivers of the ICOA to the degree of specificity necessary to frame its development.
- Do not be overly ambitious – be clear about what you will/can and will not/cannot accomplish. Narrow the scope so NOAA isn't creating the "be-all and end-all" of assessments.
- Decide what will happen if there is no reauthorized CZMA.

### **2. Process:**

- Get very specific about the process for compiling assessments, including pre-assessment work, roles, end goals, resources needed.
- Identify the questions to be asked, existing gaps to be filled, and how assessments will be designed.
- Identify whether there will be specific national-level performance measures that would roll up at the state and local levels and relate to their specific policy questions.
- Consider the possibility of packaging assessment results in different ways for different audiences, so you have flexible and effective products.

### **3. Message development:**

- Clarify the message. Articulate the benefits and reasoning behind an ICOA.

### **4. Outreach/Engagement:**

- Engage states more.
- Identify partners (national, regional, state, local) and get them involved now.
- Get input from scientists about what assessment results would be important for them.
- Seek information from other federal agencies and serve a synthesis role.

Donna Wieting, Director of NOAA's Office of Ocean and Coastal Resource Management, made closing comments. She said that the input from participants in this workshop builds on the 2007 visioning process of how to improve coastal management in coming decades. NOAA will take all the good advice from participants and further refine their ICOA plan. Donna believes that NOAA is ready to move forward on larger coastal issues, and that assessment is one of the keys to ensuring that the nation has resilient, thriving coastal communities and resources.

Ralph Cantral noted that he had heard a consistent theme among participants that a National Coastal Assessment is a worthy effort, that translation of goals and results is key, that the local voices need to be involved, that the assessment needs to address the science to management continuum, and that the results of an assessment must be presented in a form that is widely understandable and useful. He thanked all for their attendance and thoughtful participation.

## APPENDIX A: QUESTIONS A NATIONAL COASTAL ASSESSMENT SHOULD ANSWER

Participants developed the following detailed questions they would like the ICOA to answer:

- Overarching issues:
  - Are we meeting our broad national goals?
  - What is the condition of the coasts with respect to program objectives and goals?
  - Is the projected rate of sea level rise a threat to ecosystem health?
  - Have coastal change scenarios been developed?
  - What is the overall condition of the nation's coasts?
  - Is a coastal management plan in place to minimize stressors, protect natural resources and control future coastal development?
  - What emerging issues need to be monitored and researched?
  - What are the primary trends, risks and vulnerability, and resiliency levels on the coasts?
- Climate change, other stressors and transitions
  - What are the major and emerging stressors to coastal conditions?
  - How is the state of the coast changing? (Value neutral)
  - How will climate change, economic transitions and other stressors change the economy and ecology of the coasts?
  - How is near shore ecological connectivity being maintained/enhanced, including in the face of climate change?
- Governance:
  - Program evaluation: how have coastal management rules and regulations improved or protected coastal environments and water quality?
  - What are key regional issues (for example issues identified by the West Coast Governors' Agreement and the Gulf Alliance)?
  - What are states' abilities to address new coastal ocean uses (e.g. such as expanded oil and gas development and renewable energy)?
- Ecosystem services and community values
  - What ecosystem services are most important to people (e.g. fisheries, commercial, recreational, endangered species protection, storm protection)?
  - What is most valued on the coast and what is our federal-state-stakeholder 10-30 year vision for these valued aspects of the coast?
  - Have recreational opportunities in coastal waters increased or decreased?
  - What are the coastal trends related to tourism, public access and recreational use?
- Ecosystem health:
  - What living resources are important in the region/state?
  - Are the levels of human use that affect ecosystems restricted to levels that are acceptable?

- What is the current status of anthropogenic contaminants in the marine and near shore and estuarine environment, and how are concentrations of contaminants changing over time?
- Habitats:
  - Are habitats suitable (i.e. uncontaminated) for natural resources?
  - Is habitat alteration controlled?
  - What is the status of coastal aquatic habitats?
  - What is the current status and extent of submerged aquatic vegetation in US estuaries and near shore waters, and how is SAV abundance/distribution changing over time?
- Plant and animal species:
  - Are relative and absolute abundances changing?
  - Is species loss occurring?
  - Are invasive species a problem, and are they under control?
- Water quality:
  - Are waters suitable (i.e. uncontaminated) for natural resources?
  - What are the trends related to nutrient concentrations?
  - Are nutrient loads and their effects at desired levels?
  - What are the trends related to coastal and estuarine hypoxia?
  - Are waters swimmable and wadable?
  - Is seafood edible? Measures include fish tissue contaminants.
- Shellfish populations:
  - What is the current status of marine and estuarine shellfish communities, and how are they changing?
- The coastal economy:
  - What do coastal regions contribute to national, state and regional economies?
  - How do human and ecological systems interact to shape the national coastal area?
  - Are coastal economies sustainable?
  - How are water-dependent communities prospering or suffering? Look into economic value of the coastal zone, ability to handle hazards, climate change, loss of resources, gentrification.
- Sustainability
  - Are coastal economic development and environmental protection balanced?
  - Are uses of the coast sustainable, and how do we measure that?
  - Are trends in development, agriculture and land use compatible with maintaining healthy coasts?
  - Is the current status of land use sustainable in the context of healthy ecosystems?
  - What stressors are affecting habitats?
  - What wildlife are living in a watershed and what adaptation strategies are available to ensure that populations are not diminished?
  - What is the biological condition of the coasts?

- Community resilience
  - How resilient are communities based on accepted resiliency elements and indices?
  - Are response plans developed?
  - Has response readiness been assessed?
  - Is infrastructure intact to control the effects of disturbance?
  - What are the management options for improving community resiliency, and how should the outcomes of any management option be measured?
  - Has knowledge of local decision makers and others improved as needed?
  - How should local people be engaged?
  - How do communities' perceptions of ecosystem health align with their behavior?
- Information and data:
  - What key information gaps were identified?
  - What information exists already?
  - What are the state-level indicators of the human and non-human components of the coastal ecosystem?
- Vision for the future:
  - What do local governments most value in their communities, and what is their vision of the future?
  - What are the major desired uses in the coastal zone and how do we want our coasts to look?
- Competing uses:
  - How do we optimize among uses that are competing?

## APPENDIX B: PROPOSED MEASUREMENTS

<b>Items to Measure</b>	
<i>For questions about:</i>	<i>Participants suggested measuring:</i>
General	Sediments, nutrients, dissolved oxygen, pH, toxics, algal toxins, PCBs, mercury, sea level rise, wetland acreage.
Ecosystem Services	Current status of ecosystem services. Economic impacts of hazards on ecosystem services.
Water quality, swimmable/wadeable waters	Concentrations of fecal indicator bacteria in surf zone, beach sands and estuaries, and analysis of duration. Pathogens, algal toxins, beach closures, trash/debris, safety issues, loss of beaches, disease incidences. Groundwater.
Biological conditions	Bugs/macro invertebrates, fish communities, mussel beds/fish stocks, invasive plants and animals, species diversity and community composition
Invasive plants and animals	Known species and efforts, species threatening to invade
Habitats	Distribution and extent of key land-based and marine habitats, amount of habitat types important to living resources that exist and their conditions, land use and habitat type, change and conditions. Integrate with state wildlife plans.
Submerged Aquatic Vegetation	Sea grass abundance, distribution metrics of productivity, analysis of changes over past decade in intertidal and sub-tidal habitats. Corals.
Fish/shellfish	Disease incidences, fishing closures, fish landings. Shellfish biodiversity, population size/age frequency distributions, abundance and distribution, changes over time.
Species	Species loss, richness, relative and absolute abundance for selected species,
Chemical	Industrial pharmaceutical contaminants, nutrient concentrations, harmful algal blooms, nutrient primary production. Contaminant concentrations and loads in water, sediments, and tissues of target/indicator organisms.
Socioeconomic	The ocean contribution to the US economy (use the National Ocean Economics Program, Spatial Trends in Coastal Socioeconomics, E-NOW). Resident, transient and seasonal human populations. Employment by place of work (ocean-related and non-ocean-related). Output (gross national product). Economic values of ecological resources.
Resiliency	Disaster expenditures and business days lost to disasters. Volunteer response time. Resiliency trends. What is the threshold of a hazard? How acute or chronic does the problem need to be?
Government capacity	The federal and state responses to stressors, and their efficacy.
Development/Land Use	Landscape change, shoreline hardening, development within X miles of the coast, number of permits granted, population density, open space, and the resiliency index. Livability of current land use patterns in a watershed (impervious surface, transportation corridors, open space).
State program evaluation	Degree of integration of CZM planning and programs with other regulations, programs, plans and policies.

## **APPENDIX C: CASE STUDIES**

### **Case Study 1 - Canada's Atlantic Coastal Action Program (ACAP)**

Presented by Larry Hildebrand, Manager, Sustainable Communities and Ecosystems, Integrated Ecosystems Division, Environment, Canada

In recognition of the complexity of coastal issues, the limitations of government capacity to address them and a growing demand from the citizenry, particularly community-based coastal organizations, to be meaningfully involved in environmental stewardship, the Canadian Department of Environment (Environment Canada) launched the Atlantic Coastal Action Program (ACAP) in 1991. ACAP is a government sponsored, but community-centered approach to environmental management that vests the lead for vision setting, local comprehensive management plan development, multi-stakeholder engagement and on-the-ground action with 16 watershed/estuary-based organizations throughout the four Atlantic Provinces of Canada. Over the past 18 years, the ACAP organizations, in partnership with all orders of government, the private and NGO sectors, academia and citizens, have compiled and built a comprehensive understanding of their local ecosystems, developed and managed ecological monitoring programs, and conducted collaborative community-government science initiatives that have produced a uniquely rich understanding of the complex ecological and socio-economic conditions in the ecosystems in which they live and earn a living. These assessments of local ecological conditions have provided the basis and rationale for environmental restoration projects, government and private sector investment in major infrastructure upgrades, public understanding and support for local responsibility and stewardship, and an overall sense of trust and partnership for our shared patrimony, the coastal ecosystems upon which our society and economy depend. We can learn from the experience of this program that coastal assessments, typically conducted by governments, can indeed be richly complemented by the monitoring, data compilation and stakeholder engagement that this program provides.

### **Case Study 2 - Biogeographic Approach to Coastal Assessments and Spatial Planning**

Presented by Chris Caldwell, Marine Biologist, NOAA Ocean Service, Center for Coastal Monitoring and Assessment

The Biogeographic Approach is a process developed to provide coastal zone managers with robust information to enable spatially explicit management decisions. It involves the integration and synthesis of biological, physical, and human use data. Data frequently pulled into the process includes: information on species abundance and distribution patterns (fish, invertebrates, mammals, birds) along with both natural (e.g. bathymetry, benthic habitats, etc.) and anthropogenic (human use, stressors) information on factors driving those patterns. Implementation of the process by NOAA's Biogeography Branch provided the state of Massachusetts with the information required to direct shipping traffic in their Ocean Plan, enabled the Gray's Reef National Marine Sanctuary in Georgia to determine where to designate a Research-Only Area, and provided the required information to assess a ship grounding in the US Virgin Islands. The success of the process is dependent on clearly establishing goals and

objectives, selecting an appropriate scale at which to work, and developing key partnerships within the management agencies and data providers.

NOAA's Biogeography Branch (<http://ccma.nos.noaa.gov/about/biogeography/>)

### **Case Study 3 - Community and Regional Resilience Institute**

Presented by Robin White, Senior Fellow, Meridian Institute

The mission of the Community and Regional Resilience Institute (CARRI) is to help develop and then share knowledge and tools that any community or region may use to strengthen its resilience. Currently, communities are hampered in understanding and achieving resilience by the lack of a commonly accepted framework for assessing community resilience. A "common framework" would provide the nation and its communities with a widely accepted, coherent, measurable way of understanding community resilience and applying that understanding to a community in a meaningful way. Communities need a framework that is scalable, can be used by community members (not just by experts), and which aids the community in defining and prioritizing actions which would improve their resilience. CARRI has begun development of a common framework for community resilience that can provide the nation and its communities with a widely accepted, coherent, and common "language" of understanding community resilience. A common framework can also help communities translate that understanding into actions that will actually make them more resilient by providing the basis for tools to measure and evaluate communities' state of resilience. One of the most important next steps is the convening of a broad-based discussion of community resilience particularly focused on incentivizing progress. That discussion will ultimately lead to a widely accepted common framework that reflects the best thinking and experience of experts, practitioners, researchers and stakeholders across the nation. This first step toward a framework, combining community experience with scientific understanding, is intended to be a beginning that points to CARRI's ultimate goal: more resilient communities.

## APPENDIX D: MEETING PARTICIPANTS

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Holly Greening, Executive Director, Tampa Bay Estuary Program  
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