

South Atlantic Regional Research Project (SARRP)
Strategy Team Workshop Report
Held April 21-22, 2009 at the
Coastal Georgia Center in
Savannah, Georgia

Introduction

The **South Atlantic Regional Research Project (SARRP)**¹ is a regional, multi-agency effort to develop a research plan for the South Atlantic coastal region (from NC to the southern tip of FL). The plan will identify priority regional-level research needs and help to develop mechanisms for its implementation through an action plan. This “living” plan is intended for use by federal, regional, state and academic entities within the region and is sponsored by the four South Atlantic Sea Grant Programs (NC, SC, GA, and FL) and coordinated by the Georgia Coastal Research Council (GCRC)². The project involves partnerships with state and federal resource management agencies, the South Atlantic Alliance (SAA) (the Governors’ coastal alliance in NC, SC, GA, and FL), as well as regional organizations and academic partners, politicians, representatives from industry, and other stakeholders.

The South Atlantic planning effort is being conducted in concert with similar projects in other Sea Grant Regions across the US and Insular Pacific. Congress provided the impetus for this effort when, recognizing the importance of the oceans, coasts, and Great Lakes to the United States, they enacted the Oceans Act of 2000. This legislation created the US Commission on Ocean Policy³ as a top federal ocean policy advisory. The Commission in turn generated governing structures that include the National Science and Technology Council Joint Subcommittee on Ocean Science and Technology (JSOST) and the Subcommittee on Integrated Management of Ocean Resources (SIMOR)⁴. SIMOR’s work plan specifies “SIMOR and JSOST, working with NOAA Sea Grant, will seek to implement an interagency approach to establishing regional science planning efforts that are designed to support regional management activities for all regions of the country.”⁵ The SARRP project began with the development of an initial needs assessment, based on examination of over 170 documents. This involved distilling more than 100 categories of "research needs" into a DPSIR (Driver-Pressure-State-Impact-Response) framework, which assumes cause-effect relationships between interacting components of social, economic and environmental systems, and is used extensively by the United Nations

¹ <http://www.gcrc.uga.edu/SARRP.htm>

² <http://www.gcrc.uga.edu/>

³ <http://ocean.ceq.gov/about/welcome.html>

⁴ <http://ocean.ceq.gov/about/simor.html>

⁵ http://ocean.ceq.gov/about/docs/SIMOR_WorkPlan_Final.pdf

Environment Programme, Food and Agricultural Organization, European Union and others⁶

SARPP also established a Regional Advisory Group with high-level representation from state, regional and federal interests in the South Atlantic states to help guide the project and ensure that it is well-coordinated with other efforts. The Regional Advisory Group had a meeting in December 2007 to review the initial list of research needs and provide input on gathering stakeholder input. Stakeholder input was collected in the summer of 2008 through a widely distributed web-based survey and public meetings.

The results of all of these efforts were used to develop a draft “SARRP Alliance Framework”. The Framework aligns the SARPP efforts with another major regional initiative, the newly-launched South Atlantic Governor’s Alliance, and with the Ocean Research Priorities Plan (ORPP). The draft framework can be found on SARRP’s website, along with the *Stakeholder Survey Summary*, the *Needs Assessment*, the list of *Documents Examined*, Advisory Group Representation and other information.⁷

In April 2009 SARRP convened a Strategy Team Workshop with broad representation from state and federal agencies, research and educational institutions throughout the southeast. Workshop participants were charged with reviewing the Framework document and identifying priority research needs for the region that are in alignment with the four research priority themes of the South Atlantic Alliance (Healthy Ecosystems, Working Waterfronts, Clean Coastal and Ocean Waters, and Disaster-Resilient Communities), along with the twenty research priorities of the federal ORPP and the associated ORPP list of Research Activities that fall within each ORPP Priority. This report describes the results of the workshop.

Workshop Overview

The Strategy Team Workshop was held on April 21 and 22, 2009, with a total of 35 coastal experts (see Appendix A for an Agenda; Appendix B for a list of participants and additional Team members). The Team consists of the SARRP Advisory Group along with additional invited coastal experts. Professional facilitation was provided by NOAA’s Coastal Services Center, assisted by facilitators from the University of Georgia’s Fanning Institute and Florida Sea Grant. Additional Sea Grant and GCRC staff served as scribes.

The workshop lasted one and a half days. In the opening session, Terry Smith of National Sea Grant gave a presentation about Sea Grant’s Integrated Planning,

⁶ 2004. Kristensen, P. “The DPSIR Framework”

http://enviro.lclark.edu:8002/servlet/SBReadResourceServlet?rid=1145949501662_742777852_522

⁷ http://www.gcrc.uga.edu/SARRP/documents_list.htm

Implementation & Evaluation efforts and Merryl Alber of the Georgia Coastal Research Council gave an overview of the SARRP Project. Participants spent the majority of their time identifying and prioritizing research needs. In the final session they came back to plenary to discuss implementation and next steps. SC Sea Grant Director Rick DeVoe also gave an overview of the South Atlantic Alliance, the recently signed agreement between the Governors' of the 4 states in the region.

Working groups

Team members were divided into four working groups, organized according to the four Alliance "Priority Issues". The Framework document distributed the 20 ORPP themes based on their alignment with the Alliance Priorities, and working groups were charged with identifying priority research needs that fit within specific ORPP themes (each team had 4-6 ORPP themes). Participants were asked to identify research needs that a) address issues relevant to the region, b) are management-critical and timely, and c) are tractable and offer value for societal applications. Each working group had a facilitator and a Sea Grant Principal Investigator as a reporter: "Healthy Ecosystems" (Karl Havens, FL Sea Grant Director); "Working Waterfronts (Chuck Hopkinson, GA Sea Grant Director); "Clean Coastal and Ocean Waters" (Steve Rebach, NC Sea Grant Associate Director); "Disaster Resilient Communities" (Rick DeVoe, SC Sea Grant Director).

Working groups spent the first afternoon and the following morning discussing and identifying research needs under each ORPP priority associated with their theme. They were also given the opportunity to list needs that fit the Alliance theme but did not necessarily fit an ORPP priority.

This activity was followed by a Gallery Walk, when all participants had the opportunity to review and "add-in" to the Research Needs identified by other working groups. The complete list of Research Needs identified by each working group (including Add-ins and additional needs) can be found in Appendix D.

Working groups were then asked to prioritize their list of Research Needs using a dot voting system, with each member having 3 dots to cast per ORPP Priority within their Theme. All identified Research Need (including "Add-ins") are presented in the Ballot Results section below, along with the number of votes each received.

The top 8-12 Research Needs from each working group were presented to the entire Team (regardless of ORPP priority). The whole group then had an opportunity to vote on their top three within each Alliance Theme (for a total of 12 votes per person). These results are presented in the Ballots Results section that follows.

Note that, in the working groups, when needs were identified as being Policy or Education and Outreach (i.e. not specifically Research) they were noted separately (see Appendix C). These additional needs were collected by a representative of Centers for Ocean Sciences Education Excellence (COSEE), to be utilized in COSEE planning

Strategy Team Ballot Results

The tables below show the research needs that received the highest number of votes within each working group and were then voted on by the whole group, along with their corresponding ORPP theme. A complete list of research needs can be found in Appendix D.

Table I. Results from Healthy Ecosystems Working Group

Research Need	Votes in Whole Group	Votes in Break-out	ORPP Issue#
Develop climate change scenarios and predictions at scales that are relevant for regional management, planning and decision making.	18	4	#11
Develop detailed benthic maps and quantify coastal habitat.	16	5	#1
Address the impacts of climate change on coastal habitats and species.	12	4	#1
Better understand the role of nutrient loading from uplands on coastal /ocean water quality and algal blooms.	12	3	#12
Examine disturbance recovery following storms and other natural events.	11	3	#12
Quantify the relative importance of fishing and other factors on trends in fish stocks and health.	9	6	#1
Understanding the opportunities, effectiveness of methodologies and benefits of ecological restoration and engineering of threatened habitats.	8	4	#4
Develop an effective social marketing program for awareness of ocean and ecosystem benefits (add-in; not linked to specific ORPP).	7	5	-
Use ecosystem and habitat modeling in concert to identify key signals and changes in response to stressors.	7	3	#20

Table II. Results from Working Waterfronts working group

Research Need	Votes in Whole Group	Votes in Break-out	ORPP Issue#
Assess current and future impacts of renewable and non-renewable energy extraction in coastal zone. Forecast/model impacts of new development (wind, wave, drilling, ports).	23	3	#8
Investigate current demographics and trends for different working waterfront industries and examine social implications of those trends (different ethnicities, immigrants, ageing populations) including traditional working waterfronts.	15	3	#3
Assess working waterfronts status and trends on a regional level throughout SE, including traditional working waterfronts in this analysis. combines several fragments, so break-out dots moot)	14	-	#3
Enhance environmental observations and forecasting of coastal and ocean conditions (e.g. currents, turbidity, surface waves, water levels, wind conditions, pH- ocean acidification, HABs, pathogens, fecal counts, emerging chemicals of concern.	11	4	#9
Evaluate impacts of climate change on marine operations/ infrastructure and ways to increase resilience: flooding impacts, sea level rise, and erosion.	8	6	#8
Cumulative impacts- need good way to assess (e.g. network analysis), secondary and cumulative impacts (e.g. on environment, on housing, on transportation, etc).	7	3	#15
How are human activities in working waterfronts impacting freshwater resources (e.g. salinity intrusion freshwater availability) and how vulnerable are working waterfronts to changes in freshwater resources?	6	4	#15
Climate impacts on relationship between human uses and impacts (e.g. freshwater inflow impacts viability of working waterfronts).	5	3	#15
What do people perceive re: risk of living/buying on coast, given erosion, sea level rise, possibility of HABs, etc (regional study).	5	3	#15
Employ an ecosystem-based management approach to evaluate impacts of human uses.	3	3	#15

Better information (including geologic setting) to inform where to site marine transportation/ working waterfront infrastructure to minimize environmental impacts while maximizing utility for the industry sector (long-term planning)	2	4	#10
Identify existing regional assessments of working waterfront issues (regional integrated ecosystem assessment-literature review). (add-in not linked to specific ORPP)	1	3	-
Fly LIDAR in entire region; need high precision topobathy.	0	3	#9

Table III. Results from Clean Coastal and Ocean Waters working group

Research Need	Votes in Whole Group	Votes in Break-out	ORPP Issue#
Fine scale monitoring of highly variable physical and chemical parameters, including near-shore (surface zone, tidal zone, estuary) using observing and monitoring network (bring ocean observation network in-shore) for salinity, pH, temperature, DO, nutrients, Cl (does not include pollutants).	21	6	#14
Develop real-time detection techniques to indicate and quantify presence of pathogens and contaminants, e.g. fecal.	20	3	#17
Predict changes in habitat with sea level rise.	19	4	#14
Develop responsive management strategies based on public preferences for resource use.	14	3	#16
Develop fisheries models with ecosystem perspective for SE region.	12	5	#14
Compile information more frequently on percentage of impervious surface in watersheds.	6	4	#16
Finer scale predictive models for climate change and sea level rise.	3	7	#14
Develop a composite index of relative abundance for important species.	3	3	#16
Develop an indicator of carrying capacity of coastal zone for human occupation.	2	3	#16

Table IV. Results from Disaster Resilient Communities working group

Research Need	Votes in Whole Group	Votes in Break-out	ORPP Issue#
Determine natural hazard related stresses on community systems (ecosystems, built environment and lifeline elements) and develop physical-societal-economic consequence based vulnerability models.	20	7	#6
Improved risk/ vulnerability assessment information concerning extreme and chronic events (floods, tsunami, hurricanes, sea level rise) and impacts (social, economic, structural) to provide the science foundation for evaluating adaptation strategies and investment options.	17	5	#7
Economic assessment of sea level rise as it relates to ecosystem services and the built environment.	16	6	#6
Improve understanding of coastal precipitation, temperature and circulation patterns for projections of impacts including drought, freshwater supply and quality, flooding, movement of nutrients and pollutants and coastal upwelling effects on natural systems and productivity.	14	5	#13
Develop cost-benefit based visually effective multiscale decision-making tools for end-users (individuals, policy makers, emergency managers, etc.) e.g. MAEVIZ for earthquakes.	9	5	#7
Predictive models for the removal of subsidies for beach renourishment, coastal armoring, and flood insurance.	8	4	#13
Understand temporal and spatial relevance for climate models (especially as they are down-scaled to most local and regional needs). Downscaling needs to be driven by the local and regional needs.	8	3	#13
Develop, integrate, and map and create vulnerability assessments for infrastructure systems.	5	4	#6
Using real-time data re; whether climate change is increasing the frequency and intensity of storm events (e.g. sea level rise and global warming)	2	3	#13
Integrated assessment and validation/ testing of coastal inundation models for a variety of management applications.	1	5	#5

General Discussion

The concluding workshop session was a discussion by all the participants, which addressed several strategic and implementation issues for the *South Atlantic Regional Research Plan*. The key points have been organized below according to general questions or topics that were either presented by organizers or arose during the discussion.

1. Regional Identity: is there something that is unique to this region that separates it from a group of states doing things collectively, e.g. tidal marshes, etc? What characteristics make it a region?

- We have a large amount of coastal area undergoing rapid development.
- Our abundance of intertidal wetlands and the gradient of sediment availability along the coastline provide an ideal opportunity to study the role of sediment availability.
- Development in the upper piedmont is impacting freshwater availability throughout the region: Chapel Hill, Research Triangle, etc.
- Region can still proactively act; we are not in a crisis or reactive mode yet. Area is still relatively healthy and can act to preserve it. We need to market a proactive approach better;
- This is the most active disaster region in the country;
- Fisheries yield per mile of shoreline is lowest in SC and GA – interesting research question? Does this include landings from SC/GA waters in other states?
- There is value to the relatively good condition of our natural resources. We need a better understanding of ecosystem services and what they can and do provide. Our population is able to grasp “valuation”. Don’t lag behind, the time is now. We need to spread that understanding, regionally. There is high incentive in the SE region for this.
- Our abundant low-lying areas are highly vulnerable to inundation.
- Demographics of our growth region increasingly include growing percentages of immigrant populations, and elderly (retirees from NE and Midwest). This could be an important variable in how plan gets implemented.
- Our region has a lot of deep water coral reefs all along the majority of the region’s coast.
- We are largely dependent on the existence of the Gulf Stream circulation. Changes could mean large impacts for our region;
- Geochemistry of the river systems.

2. What are some overall strategies for getting the research done? What are the existing research activities that are currently ongoing that fit into our 4 broad areas?

- Partnership with South Atlantic Alliance is crucial to implementation of the plan. Alliance could adopt the SARRP plan outright; so much of the workshop results are fundamental to Alliance activities. It would be a great contribution to help inform their activities. This plan will present authentic Stakeholder or *Demand-Driven* science.
- Whatever framework is devised, it should have buy-in from this group, priorities, and speak to the audience and the interests that they have.
- SAA Working groups will probably include some of this team. Need to leverage work we have already done/committed to and build on it.
- The first steps should include an inventory / catalogue of current research efforts so that these can be rolled up at a regional level.
- Look at all research needs identified and see what types of data are needed to help inform SAA working group analysis; this could dictate data and mapping priorities.
- The working groups could address what data needs prevail in each Alliance category.
- Pursue non-governmental partners, industrial and development-related industries as well.
- Use priorities from this plan to inform RFP activities.
- Bundle socioeconomic needs into 2010 census work.
- Bundle with local resources also.
- Relate how individual research efforts contribute to larger, regional goals.
- Identify low hanging fruit, and other efforts that are already underway and we can support to move forward. You don't want to start a new initiative without folks that have been working on this before.
- We can also package these in other ways, dividing research needs along different lines and not just keeping objectives in SAA Categories, in order to promote widely.
- Implementation will benefit from some sort of structural support, either through SAA, or a South Atlantic Regional research-type Council modeled in part perhaps on the GCRC model.

3. Mapping needs discussion:

- Identify data and mapping activities as precursors to other research needs.
- We need reliable regional mapping; federal disaster coastal mapping act coming up. Let's speak with a unified voice to decision-makers about the importance of types of mapping such as seamless topobathy mapping for the entire SE coast and its value to several important research needs. Possibly coordinate with Coastal States Organization on this.

4. Are there existing partners or groups that could help this effort not represented here today?

- Army Corps of Engineers does a large amount of near-shore research. They have representation on SARRP Advisory but could not attend workshop, and will be involved in the Alliance.
- Tap into AmeriCorps or student conservation initiatives for data collection needs.
- Involve students early in their studies; trains scientists in this interdisciplinary approach.
- Add representatives from Industrial and Development sectors as partners.

5. Funding ideas and discussion.

- What can we do with no additional funding? Gulf of Mexico Alliance partners used ongoing efforts to bolster the beginnings of the alliance.
- Extramural funding through state Sea Grants could solicit proposals for priority issues identified in the plan. Other funding opportunities can help get the work done if the priorities are cross listed there.
- South Atlantic Alliance and SARRP have at least 5 advisory group members in common; Alliance has the potential buy-in to help get the SARRP plan going.
- Identify areas where SE can take lead for nation – not just doing near term activities.
- Keep and promote priorities in context in which they were discussed.
- Packaging these efforts – need to distribute these needs more broadly.

- Georgia Coastal Research Council⁸ is a forum for academics and state-managers to communicate. Their website allows needs to be articulated and research support leads shared.
- Secure federal government monies through participation by academic institutions.
- Don't overlook local and municipal entities.
- Extramural funding rfps., Opportunities through contact with various funding agencies, indicating what our priorities are to get funding. We can also use cross listing with agencies and other groups, such as Sea Grant, clean water groups, nonprofits, etc.

6. How do we get this research applied? How do we get to the on-the-ground management piece? Does SARRP need a feedback step for the process? Do you need to go back to your agency and ask what the management needs are / find out what's been done along these lines?

- Engage existing outreach capability that we have in the region, e.g. Sea Grant Extension, Coastal Training Programs, Marine Sanctuaries, other non-NOAA conduits of information, cooperative extension, etc.
- Funding should require researchers to engage with the end user as a condition of the rfp.
- Benchmark some of these activities with resource and community managers to ascertain whether we are not missing things or missing the mark.
- Outreach to let people know results are available and also to let people know products are available – web based distribution is great for reaching a lot of people – also for tools, etc. Make it accessible and help folks apply it.
- Through State Coastal Programs, work with local officials to apply resulting information in ordinances, planning, etc.
- As in other parts of the project, an iterative loop is needed to connect information about research results back to the original concern.
- Disseminate research results to community and managers through virtual appliance – package models and graphic data allowing the user to conduct scenario simulations. This allows for very broad outreach.
- Get research priorities into state level rfps.

⁸ <http://www.gcrc.uga.edu>

7. How do participants feel about the voting results? Do you feel satisfied that it is a good representation? How did this work? How much weight should we give to the “top priorities?”

- Some important research needs and issues are not reflected in ORPP at all: erosion, shoreline hardening, structural engineering etc
- Note from Working Waterfronts Break-out Group: Traditional working waterfront activities are not included or reflected in the ORPPs, so Break-out group broadened criteria to include those that were articulated in their discussion.
- Cultural resources underrepresented in some groups (working waterfronts had plenty).
- Break-out group ranking wasn't apparent in the current display of only Whole group results..
- Survey has top issues – could bin these with regard to top issues.
- Survey results differ from these, how to reconcile? For example, top need from survey is wetland loss but that doesn't really show up in top 3 in workshop, or does it?
- We should couch rationales and explanations in the ORPP priorities – it explains why we focused where we did.
- We should organize the research needs in tiers, e.g. 1 through 3. Acknowledge that this will be a living document and change over time (iterative).
- Connect with regional entities and solicit their feedback on these research priorities. . Alliance and SARRP have a growing list of the names of leaders of group.

8. What additional skill sets should we look for in reviewing this or in any future working groups?

- Engineering, economists, planners and public health professionals too
- Benefit from further analysis – could lump or define further.
- Cultural resources had a focus in working waterfronts group
- These results need reconciliation with other perspectives like cultural resources. Some of the suggestions are reflective of the group composition – for instance having mostly fisheries people begets many fisheries research needs.

- Upcoming meetings for SE Alliances; would be great to have this information in a way that will be useful to that effort and that can be taken to these meeting stand alone
- Climate predictive modeling appears as a research need in 3 groups. Consensus was to leave as is for now, rather than grouping in one category.

Appendix A

South Atlantic Regional Research Project (SARRP) Strategy Team Workshop Agenda April 21-22, 2009 Coastal Georgia Center, Savannah, GA

~ APRIL 21st ~

1:00 – 1:30pm	Welcome and Introductions
1:30 – 2:15pm	Sea Grant Regional Research Planning, SARRP Project Overview
2:15 – 2:20pm	Introduction to Breakout Session
2:20 – 2:30pm	Break
2:30 – 4:00pm	Breakout Groups: Review ORPP Research Activities and Identify Regional Research Needs
4:00 – 4:15pm	Break
4:15 – 4:45pm	Breakout Groups: Identifying Regional Research Needs Continued
4:45 – 5:30pm	Report out: Highlights from Groups' Discussions
5:30pm	Adjourn Day 1

~ APRIL 22nd ~

8:30 – 8:45am	Review of Agenda for Day 2
8:45 – 9:30am	Breakout Groups: Identify Regional Research Needs Continued
9:30 – 9:50 am	Gallery Walk: All Participants Visit Other Groups' Work
9:50 – 10:30am	Groups Refine Lists of Research Needs and Prioritize
10:30 – 11:00am	Break
11:00 – 11:45am	Presentation of Top Research Topics
11:45 – 12:00	Prioritization across South Atlantic Alliance Priority Issues
12:00 – 1:00pm	Lunch
1:00 – 1:15pm	Prioritization Results, Next Steps for SARPP
1:15 – 1:30pm	Overview of the South Atlantic Alliance
1:30 – 2:15pm	Large Group Discussion: Strategies for Implementation
2:15 – 2:30pm	Break
2:30 – 3:45pm	Large Group Discussion: Strategies for Application of Research
3:45 – 4:00pm	Wrap Up and Adjourn

Appendix B

Sea Grant South Atlantic Regional Research Project Strategy Team Members' Contact Information April 2009

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Appendix C
Policy and Education-Outreach Needs
Noted separately from Research Needs lists by each Working group

Policy Needs

Healthy Ecosystems

- Conserve land critical for preservation in the face of climate change; shifting species and habitats.
- Metadata Standards and data collection standards.
- Permits for restoration.
- Develop marine development zones.
- Safe seafood labeling- accurate representation.

Working Waterfronts

- Affordable housing for workers.
- Land use protection strategies for preserving working waterfront uses.
- Get access to technologies that allow monitoring /observing.
- Determine appropriate mix of federal and non-federal resources to effectively monitor coastal resources.
- Need to get information that private sector has- could inform a lot of research re: marine operations.
- Encourage regional cooperation among regional ports.
- Modify insurance policies based on sea level rise/ who's bearing risk.

Clean Coastal and Ocean Waters

- Integrated land and water management policy on coastal margins.

Disaster Resilient Communities

- Strategies for engaging climate impacts related discussions among diverse audiences.
- How do we initiate response to hazards when risk is low and cost vs. benefit is high? (progressive rather than episodic)
- Buy-in by elected officials to support ocean observation science and data use.

Education and Outreach Needs

Healthy Ecosystems

- Outreach: More efficient harvesting mechanisms to fishermen.
- How to enhance the public's value of coastal resources.
- Increase awareness of the value of ocean exploration (leads to more ocean exploration, e.g. rainforests).
- Increase awareness of microbial effects on humans- vibrio, etc.

Working Waterfronts

Noted on separate sheet:

- Teach people how to better judge risk (of contaminants, etc).
- Use volunteers/folks already on the water to help with monitoring and observing.
- Education about non-market valuation, foster acceptance of these valuations.

Clean Coastal and Ocean Waters

Noted on separate sheet:

- Climate extension.
- Educate on means to abate pollution at marinas (new bottom, paint, fecals, metals, PAHs)
- Improve human understanding of consumption advisories vs. benefits of seafood.

Disaster Resilient Communities

Noted on separate sheet:

- Strategies for engaging climate impacts related discussions among diverse audiences.
- How to translate results of research activities in order to change behaviors and investment activities.
- Develop visualization tools for previous item.
- Social science needs: strategies and options.

Appendix D

Working Group Results

Listed below are all the research need identified by each working group, including “add-ins” that were identified by members of other groups.

Healthy Ecosystems Working Group: List of Research Needs

ORPP Research Priority 1: Assess the status and trends of resource abundance and distribution.

- Quantify relative importance of fishing and other factors on trends in fish stocks.
- Develop detailed benthic maps and quantify coastal habitat (IOOS).
- Impacts of climate change on coastal habitats and species.
- Baseline on physical characteristics relative to spatial and temporal trends.
- Key species as indicators of vulnerability/resilience of ecosystems.
- Mapping/assessment and characteristics of deep water habitats.
- Better linkages of upland activities with near shore water quality and fish distribution.
- Coordinating counts and trends for seabirds as an indicator of ecosystem health.
- Research role of invasives.
- Standards for data collection, maintenance and storage.
- Inventory of invertebrates.

Add-ins From Gallery Walk for ORPP1

- Efforts to improve benthic mapping should be approached as a comprehensive resource/framework (living and non-living resources). Regional mapping techniques can and should also result in sand inventory and broader habitat characterization.
- Examine (monitor and map) cultural usage of natural resources, e.g. recreational fishing, economic base, ecotourism. Awareness of historic, cultural resources within ecosystems. Map/Inventory archeological sites. Map/inventory above ground historic resources as part of healthy ecosystems with humans.

ORPP Research Priority 2: Understand interspecies and habitat/species relationships.

- Examine potential benefits or impacts of stock enhancement, aquaculture, catch and release policies and current fisheries management policies.
- Determine role of pollutants (metals and nutrients) on exacerbating microbial activities.
- Study organisms’ response to stressors over lifetime (habitat loss, fishing effects on food web, temperature and pH, fresh water flow).
- Modeling Ecosystems with enhanced data and analyses to represent multiple species accurately.
- Examine the function of the SE migratory bird corridor and what we need to do to maintain it.
- Regional water demands and drought impacts on fresh water delivery to estuarine systems.
- Pollutant and marine debris impacts on coastal and ocean ecosystems.

- Human activity/ adaptation in response to sea level rise and effects on ecosystems.
- Examine organism and endpoint sinks of organisms throughout their lifetime by modeling interactions between habitat and species. Emphasis on habitat type and oceanographic features.
- Examine how rights based management affects fishery population dynamics.
- Impacts of energy exploration activities and infrastructure on coastal habitats.
- Bio-energetic modeling of seabird-fisheries interactions.
- Looking at near-shore and offshore ecosystems as lifetime habitat.

ORPP Research Priority 4: Enhance the benefits of natural resources.

- Understanding the opportunities, effectiveness of methodologies and benefits of ecological restoration and engineering of threatened habitats
- Placement of energy, military with less impact to species.
- How to enhance public understanding and value of coastal resources. Social marketing.
- Identify hotspots for pelagic vertebrates and migratory seabirds.
- Examine economically viable species for aquaculture.
- Ensure seafood product integrity.
- Continue to develop more efficient harvesting gear, particularly in the commercial trawling industry.
- Identify policy tools that enhance value society places on coastal resources.
- Modeling areas used by both fisheries and seabirds- spatial overlap and interaction
- Examining opportunities of inland aquaculture.
- Examine impacts of diver fishing on species and habitat.
- Study innovative ways for safe and high quality seafood.
- Investigate and preserve role of wetlands in the carbon cycle.
- More research and development on recreational fishing gear.
- Support socio-economic research.

Add-in From Gallery Walk for ORPP 4

- What is the vulnerability of intertidal wetlands (aerial extent, wetlands open water ratio, wetland types, e.g. freshwater marsh vs. swamp or mangrove vs. salt marsh) to changes in sea level rise, freshwater inflow and upland armoring and use?

ORPP Research Priority 11: Understand ocean-climate interactions.

- Research to drill down international and national scale climate change scenarios/predictions so they are regionally applicable.
- Research to optimize placement of ocean observation systems.
- Investigate climate's impact on increased ocean acidification and spatial extent.
- Changes in circulation: Are they happening and what do we expect to happen.
- Investigate the role of climate in the deep ocean.
- Investigate climate's role in severity of storms.
- Severity and number of storms impacts on ecosystems and species.

- Increase and strengthen monitoring to collect information on water mass movement.
- Better understanding of deep ocean currents' influence on species abundance and distribution (physical and natural system).
- Develop comprehensive sea level rise model for the SE region.

ORPP Research Priority 12: Understand the impact of climate on biogeochemistry and implications for its ecosystems.

- Better understand role of nutrient loading from upland areas → algal blooms.
- Examine disturbance recovery following a storm events and perturbation.
- Study the effects of climate change in shifts of microbial communities.
- Examine carbon cycle and carbon flows in different trophic levels.
- Research the effects of increased water temperature on microbial communities in various water quality scenarios.
- Evaluate effects of climate (change in temperature, pH) on microbial processing of nutrients (not just what species are there, but rates of denitrification, etc.)
- Effects of change in water temperature and vertical mixing on nutrient cycling and phytoplankton, i.e. impacts on food webs and fisheries and associated socio-economic impacts.

ORPP Research Priority 20: Develop products and biological models to enhance human well-being.

- Use ecosystem and habitat modeling together to identify key signals and changes to ecosystems.
- Using sea turtles, seabirds and other shorebirds as indicators of emerging toxins/pollutants.
- Identify locations with unusual species: ocean exploration.
- Comprehensive site assessments.
- Identify species per habitat that serve as indicators within the ecosystem to benefit human health

Add-ins to “Healthy Ecosystems” from Gallery Walk, not linked to specific ORPP

- Develop an effective social marketing program for awareness of ocean and ecosystem benefits.
- Economic benefits of having reefs and coastal habitats.
- Quantifying the role of coastal habitat for protection (human, property).

II. Working Waterfronts Working Group: List of Research Needs

ORPP Research Priority 3: Understand human-use patterns that may influence resources.

- Assess working waterfront usage and trends on a regional level.
- Understand development patterns surrounding working waterfronts.
- Research current demographics and trends – social implications of shifting demographics- different ethnicities/ immigrants involved in different industries (e.g. fish houses).
- Develop tools to conduct life cycle analysis.
- Case studies of different communities at different stages of development.
- Where is the deepwater access and how do you protect that?
- Research how housing stock has changed over time and how that connects to labor force being available and to transportation to the working waterfronts.
- Research the connections between different pieces and components of a working waterfront (life cycle analysis).
- Develop evaluations that address working waterfronts vs. x (sociologists, economists, etc as needed). Apply/ adapt existing methodologies.
- Understand public perceptions of working waterfronts.
- Develop consistent methods for evaluating value- quantitative and qualitative.
- Understand political processes behind/driving development (and discouraging some types of uses). Assess risk to cultural resources from coastal development.

Add-ins From Gallery Walk for ORPP 3

- Identify existing access to waterfronts and project need for public access.
- Identify incentives and options for monitoring vitality of traditional uses of waterfronts in the face of increasing property values.
- Research to document the existence and trends in use of working waterfronts by the commercial fishing industry.

ORPP Research Priority 8: Understand the interactions between marine operations and the environment.

- Evaluate impacts of climate change on marine operations/ infrastructure and ways to increase resilience: flooding impacts, sea level rise, erosion.
- Assess current impacts, and forecasting and modeling future impacts of renewable and non-renewable energy extraction in coastal zone (new developments in energy, ports, wind, wave, drilling).
- How are marine operations changing and what will the environmental impacts be in the future (e.g. speed is changing, routes, type of fuel used etc.).
- Regional assessment of invasives (different species in different ports).
- Research how to treat/eliminate invasives in ballast water/ ship hulls/ pump out.
- Identify best management practices for marine operations.
- Effect of dredging and sediment management on salinity regimes; contaminants. How to make dredging sustainable?
- Research ways to minimize whale-ship interactions.

- Research into perceptions of risk of contamination (people exaggerate or under-estimate).
- Research impacts from contaminants using local knowledge, e.g. fishing populations (traditional ecological knowledge).
- Extent/ footprint of contamination from marine operations, including working waterfronts, energy development, etc.

Add-ins From Gallery Walk for ORPP 8

- Conduct research on the movement of whales in relation to shipping traffic. Use results to create shipping lanes to reduce number of whale strikes.

ORPP Research Priority 9: Characterize and predict conditions in the maritime domain.

- Enhance environmental observations and forecasting of coastal and ocean conditions (e.g. currents, turbidity, surface waves, water levels, wind conditions, pH- ocean acidification, HABs, pathogens, fecal counts, emerging chemicals of concern).
- Fly LIDAR in entire region- define elevations, need high precision topobathy.
- Increase precision in forecasting storm surge and water levels and wind conditions in coastal communities.
- Develop risk assessments that link observations to biological conditions/ impacts (re: physical conditions predict risk). Develop models that link observations to biological conditions and help guide decisions.
- Understand how sea level is rising and how we should anticipate it; use this to inform working waterfront design and management.
- Ongoing observations to do rapid detection of toxics, threats (air borne and water borne).
- Consider Bioterrorism potential and risks.
- Research how climate change will impact spread of invasives.
- Policy research into best mix of federal and non-federal resources to effectively monitor coastal resources.
- Research impacts on human health from marine operations (e.g. ports).
- Understand dynamics of sea bed/ geologic hazards to inform offshore development.

ORPP Research Priority 10: Use environmental information to enhance the marine transportation system.

- Better information, on where to site marine transportation infrastructure to minimize environmental impacts while maximizing utility for the industry sector (land use info).
- Characterize geologic setting to inform marine transportation/ working waterfront development, long-term planning (e.g. inform port expansion, deeper dredging).
- Assess marine operations to inform development of best management practices (identify how to “green” operations; industrial ecology).
- Assess the cost-benefit and environmental impacts of different expansion strategies rather than port expansion/ deeper ports; alternative handling methods (e.g. offload to smaller boats, and send to other small ports).
- Examine mitigation efforts and whether are working/ environmentally compatible and effective.

- Determine relative contributions to oxygen depletion from working waterfronts and other sources.
- Research whether expansion of marine operations leads to overall growth- is marine transportation an engine of growth.
- Research trends regionally re: cargo, capacity, distribution.

Add-ins From Gallery Walk for ORPP 10

- Conduct research on shipping vessel traffic as it pertains to whale movement and migration.
Research into the “real needs” for SE ports in terms of handling capacity, location and impacts on natural resources (i.e. work cooperatively through the region rather than states competing with excessive infrastructure).

ORPP Research Priority 15: Develop socioeconomic assessments and models to evaluate the impact of multiple human uses on ecosystems.

- How are human activities in working waterfronts impacting freshwater resources (e.g. salinity intrusion freshwater availability)? How vulnerable are working waterfronts to changes in freshwater resources?
- Cumulative impacts- need good way to assess- network analysis- figure out secondary impacts, cumulative impacts (e.g. on environment, on housing, on transportation).
- Climate impacts on relationship between human uses and impacts (e.g. freshwater inflow impacts viability of working waterfronts).
- Employ an ecosystem based management approach to evaluate impacts of human uses.
- How human uses of beaches will impact habitat availability when sea level rises. Policy options to deal with eroding shorelines.
- Research who has liability for introducing invasives and is that system working (involves better monitoring). How can policy framework be improved to reduce introductions?
- Models and assessments of ecosystems’ impacts in humans (because of human impacts) – close the loop. Human health impacts, lower benefits/ecosystem, services for humans, HABS, etc.
- Comparative analysis of cost-benefit of different uses of a piece of waterfront.
- Network modeling to understand connections between human uses.
- Develop risk-management procedures/options to reduce negative impacts/risks.
- Assess risks regionally (HABs, invasives, loss of ecosystem services, etc.).

ORPP Research Priority 19: Understand how human use and valuation of ocean resources is affected by the relationship between human activities, health threats, and ocean resources.

- Regional study: What do people perceive re: risk of living/buying on coast (given erosion, sea level rise, possibility of HABs, etc).
- Need better bio-sensors for human health risks; sentinel habitats (early health warnings).
- Assess how risk is distributed, how insurance risk pools function in SE.
- Research how policies (building codes, insurance) impact building and development on coast.

- Risk perceptions about invasives.
- Trophic studies to examine human health threats throughout the food chain.
- Research to identify and learn how to apply benefits from the sea (pharmaceuticals, aquaculture) e.g. screening process to identify specific compounds quickly- “bioprospecting”;
- Ethnopharmacology (what have people traditionally been using); learning about anti-fouling possibilities.
- Research on how wealth of traditional coastal communities is changing.
- Impacts of sea food advisories on fish consumption: do people internalize warnings? Do some people have any choice?
- Impacts of beach warnings-surf, rip-tides, HABs- do people stay off the beach?

III. Clean Coastal and Ocean Waters Working Group: List of Research Needs

ORPP Research Priority 14: Understand and predict the impact of natural and anthropogenic processes on ecosystems.

- Finer scale predictive models for climate change and sea level rise
- Fine scale monitoring of highly variable physical and chemical parameters, including near-shore (surface zone, tidal zone, estuary) using observing and monitoring network (bring ocean observation network in-shore) for salinity, pH, temperature, DO, nutrients, Cl, does not include pollutants.
- Develop fisheries models with ecosystem perspective for SE region.
- Predict changes in habitat with sea level rise.
- Better understand the long-term impacts of fishing activities on trophic dynamics.
- Construct a GIS map of historical values of physical, chemical and biological parameters.
- Understanding/ exploring further physical, biological and chemical properties in urban coastal ecosystems, and interactions with wetlands, estuaries, freshwater, ocean resources. Especially with fluctuations or small point changes in fill, impervious surface, decreased/ increased vegetation cover, increased/decreased building and styles, and effects on water usage, heat indices, increased water run-off (pollutants) sedimentation.
- Correlate abiotic parameters to biotic distribution and abundance.
- Monitor nutrient loading.
- Monitor the effects of drought on salinity profiles and effect on distribution, survival and recruitment of marine species.
- Examine long term effects of coastal engineering projects.
- Improve predictive ability of fish kills in estuaries due to eutrophication (e.g. DO).
- Look at fine and coarse scale current and circulation models in relation to the distribution and dispersal of marine organisms.
- Data analysis of short and long term impacts of habitat change brought about by hurricanes.
- Evaluate effects of emerging contaminants.

ORPP Research Priority 16: Develop appropriate indicators and metrics for sustainable use and effective management of marine ecosystems.

- Compile information more frequently on percentage of impervious surface in watersheds
- Develop a composite index of relative abundance for important species.
- Develop an indicator of Carrying Capacity of coastal zone for human occupation.
- Develop responsive management strategies based on public preferences for resource use.
- Develop relationships between habitat connectivity/fragmentation and ecosystem services.
- Develop social carrying capacity of marine waters (i.e. marine parks).
- Develop metrics to evaluate restoration success.
- Monitor relative abundance and trends of apex predators.
- Look at effects of demographic changes and amount of coastal development on near-shore ecosystems
- Survey recreational users on satisfaction with Ecosystem Services.
- Coast-wide Evaluation of flushing time as an indicator of susceptibility to nutrients & pollutants loading.
- How do the Indicators developed by the NCAP relate to Priority #16?
- Monitor species diversity in benthic and pelagic marine fauna
- Develop metrics for health of individual animals that are representative species.

ORPP Research Priority 17: Understand sources and processes contributing to ocean-related risks to human health.

- Identify indicator organisms that can be used to assess contaminants.
- Develop real-time detection techniques to indicate and quantify presence of pathogens and contaminants.
- Real-time detection of fecal bacteria rather than a surrogate (rainfall) for closure of shellfish areas.
- Research on the relative risks of stormwater retention ponds as source of pollutants that threaten those living nearby.
- Determine conditions necessary for outbreaks of HABs.
- Determine effects of emergent toxicants on all trophic levels in near shore communities.
- Assess effects of climate change on pathogens and their vectors.
- Research into how estuarine circulation may concentrate toxins.
- Study life cycle of food-borne diseases, both those toxic to the species and to the humans.
- Monitor atmospheric deposition.
- Monitor pathogen loads and contaminant concentrations in apex predators.
- Develop techniques to identify sources of pollutants (e.g. fecal coliforms, PCBs, pharmaceuticals).
- Determine if linkages exist between impervious surface level, and occurrences of known water borne diseases.
- Inventory existing outmoded sewage treatment systems in coastal zone.
- Model impacts of drastic (long drought/ quick flood) weather events on compounds being bio-accumulated or entering water source.

- Develop new Disposal techniques for hazardous wastes that minimize pollutant levels to coastal waters.

ORPP Research Priority 18: Understand human health risks associated with the ocean and the potential benefits of ocean resources to human health.

- Effects on human populations from consumption of seafood from areas of high- levels of emerging toxicants, pollution, HABs, etc. Screen fisherman and coastal residents who eat a lot of fish for body burdens of contaminants.
- Expand monitoring of fish tissue to develop a better picture of the extent of contaminated fish.
- Assess long-term benefits/risks of seafood consumption of apex predators vs. short-lived species.
- Determine if there are any pharmaceutical value-added uses from fish-processing waste.

Add-Ins from Gallery Walk for ORPP 17 and 18

- Identify appropriate bio-sensors and/or sentinel organisms that can provide early warnings of impending human health impacts.
- Expand research of trophic relationships to include human consumption and long-term health impacts (SE issue with cultural / historical communities and changing health conditions).

Additional Add-ins for "Clean Coastal and Ocean Waters" from Gallery Walk, not linked to specific ORPP

- Identify existing regional assessments of working waterfront issues (literature review) - integrated ecosystem assessment.
- Watershed linkages- How do upland activities impact waterfronts (inflow, contaminants) -"working watershed".
- What are the State/local Policies that can be used to protect traditional working waterfronts (e.g. tax policies, incentive programs).

IV. Disaster Resilient Communities Break-out Group: List of Research Needs

ORPP Research Priority 5: Understand how hazard events initiate and evolve and improve forecasts of future hazard events.

- A test bed for integrated assessment and validation/ testing of coastal inundation models for a variety of management applications.
- Evaluate effects of event-related inland flooding- coupled modeling (terrestrial, oceanic and atmospheric) at basin level.
- Incorporate recent historic events into modeling efforts.
- Better understanding of tsunami development and propagation.

- Improve existing micrometeorological wind/rain models to map progression and intensity of storms after landfall.
- Develop map-based vulnerability index based model on tsunami, storm surge, nor'easters with mechanisms to superimpose sea level rise scenarios.
- Incorporate built environment and infrastructure into projecting efforts.
- Explore the linkages between short and long term patterns in hazard generation.

ORPP Research Priority 6: Understand the response of coastal and marine systems to natural hazards and assess future vulnerability.

- Determine natural hazard related stresses on community systems (built environment/lifeline elements and ecosystems) and develop physical-societal-economic consequence based vulnerability models.
- Determine natural hazard related stresses on community systems (built environment/lifeline elements and ecosystems) and develop physical-societal-economic consequence based vulnerability models.
- Economic assessment of sea level rise as it relates to ecosystem services and the built environment; cost analysis to remediate, retrofit or mitigate within human built community.
- Develop, integrate, and map major infrastructure and create a vulnerability assessment from infrastructure database.
- Develop models for the impacts of wind/ inundation on natural/built environment and infrastructure.
- Develop a model for the effect of wetlands on wind/inundation.
- Evaluate human built and natural environment as an integrated system for vulnerability assessments.
- Model the vulnerability and impacts to existing and opportunistic species from habitat fragmentation and regime shift due to development and climate change.

ORPP Research Priority 7: Develop multi-hazard risk assessments and support development of models, policies, and strategies for hazard mitigation.

- Develop cost-benefit based visually effective multiscale decision-making tools for end-users (individuals, policy makers, emergency managers, etc) e.g. MAEVIZ for earthquakes, http://mae.ce.uiuc.edu/software_and_tools/maeviz.html.
- Improved risk/ vulnerability assessment information concerning extreme and chronic events (floods, tsunami, hurricanes, sea level rise) and impacts (social, economic, structural) to provide the science foundation for evaluating adaptation strategies and investment options.
- Model and assess the effect of long-term changes on recreation and tourism.
- Quantify elements of successful community response to and recovery from hazard events.
- Evaluate current utilization and projected use vs. ecosystem service losses re: hardened shorelines.
- Risk Perception: develop more effective ways to display and communicate risk information to public to insure appropriate response.

- Improve science-based decision-making tools (maps, visualization) for public works investments, siting and design, green infrastructure, relocation.
- Explore “incentives” to move communities into less risk-prone behavior based on models and risk assessment.
- How are requirements for ecosystem services framed? How to quantify and value the benefits derived from restoration, conservation, geo-engineering, human integration with the man-made and natural environment.
- Assess the efficacy and vitality of natural systems for hazard mitigation as engineered systems become more prevalent.
- Evaluating lessons learned and accumulating knowledge on successful strategies for “resilience”.
- Modeling the elements of community resilience.
- Evaluate the economic impact of coastal hazards on transportation systems and evacuation.
- Assess the robustness of various methods for multi-hazard risk assessments.
- Assess potential of cascading component failure due to natural hazards and identify back-ups (e.g. mutual aid compacts, alternate power generation, mitigation of components most likely to fail).
- Develop community “scorecard” for assessing decisions → feedback into model → areas vulnerability.

ORPP Research Priority 13: Project future climate changes and their impacts.

- Improve understanding of coastal precipitation, temperature and circulation patterns for projections of impacts including drought, freshwater supply and quality, flooding, movement of nutrients and pollutants and coastal upwelling effects on natural systems and productivity.
- Predictive behavioral models for the removal of subsidies for beach renourishment, coastal armoring, and flood insurance.
- Improved short-term forecasts using real-time data of how climate change is changing the frequency and intensity of storm events (e.g. SLR and global warming).
- Understand temporal and spatial relevance for climate models (especially as they are down-scaled to most local and regional needs). Downscaling needs to be driven by the local and regional needs.
- Determine where expansions in ocean observation are needed.
- Cost-benefit analysis of who is using ocean obs. data and prioritize for additional deployments.
- More real-time data to enable validation of hurricane/ storm-surge inundation models.
- Correlate historic storm data with paleoceanographic information.
- Relative historical sea level rise trends (5-10K years) – understand this information at different scales.
- Evaluate the sensitivity between sub-regions in SE to sea level rise response.
- Develop response scenarios to declining or increasing CO2 targets.
- Impacts of drought (related to water resource management).

- Develop systems approach to modeling and observing coastal regions and cities (physical processes, social infrastructure, human practices).
- Consistent baseline data, standards (trust), and evaluations of effectiveness for monitoring data, predictions and projections.

Add-ins from Gallery Walk for ORPP 13

- Impacts of sea-level rise on access to public resources along shorelines
- Cost-benefit analysis of armoring vs. retaining natural shorelines.