

Mapping of Florida's Coastal and Marine Resources

Setting Priorities

Report of Proceedings

Workshop Objectives:

1. To give participants an overview of new mapping technologies.
2. To have participants gain knowledge of current mapping programs, agency needs and priorities.
3. To begin an initial identification of mapping commonalities among agencies.
4. To identify and designate State of Florida priorities.
5. To begin discussing the coordination and matching of technologies.
6. To discuss the classification of habitats and bioregions.
7. To discuss next steps.

Day One: Wednesday, February 7, 2007

WELCOME AND OPENING REMARKS

Lisa Robbins, USGS, co-convenor of the Workshop, opened the day with welcome and introductory remarks. Dr. Robbins explained that a white paper will be written using the input from this workshop. She then introduced Jack Kindinger, USGS, and his superior, Barry Rosen, USGS.

Dr. Robbins explained that the agenda for the next two days is to set priorities in state and federal endeavors with regard to mapping. At this point, there is no clear consensus on the most important places to map. This is the problem which led her on the path to this Workshop. She thanked everyone for their interest and involvement, and expressed the surprise of all the convenors in the overwhelming interest in attending the workshop.

She then introduced Camille Destafney, representative of the U.S. Navy and a co-convenor of the Workshop. Ms. Destafney welcomed everyone and expressed her pleasure at the large turnout. She explained that the Department of Defense (DOD) developed the Southeastern Regional Partnership for Planning and Sustainability, (SERPPAS), a partnership of North Carolina, South Carolina, Georgia, Florida, Alabama, the Department of Defense, including the Navy, the Army, the Marines and the Air Force. SERPPAS is a multi-agency partnership to identify and address regional sustainability issues that cross federal, state and local geographic and civil boundaries. It is what is needed to have mission readiness; identifying areas beneficial to everyone and mapping these areas. Initially, the land was

mapped; now they are moving to mapping the water. As they do so, they must ask where are the resources? (e.g. whales) in order to avoid harm when conducting activities such as mine exercises. Ms. Destafney ended by saying she was looking forward to the activities of the next two days and was glad she was able to be part of the effort.

The last co-convenor was Steve Wolfe, Florida Department of Environmental Protection (FDEP). Mr. Wolfe also welcomed everyone and thanked them for their interest and said he was looking forward to hearing the input over the next two days. He explained that mapping of habitats had been an agency priority for quite a while and that FDEP had partnered with Florida Fish and Wildlife Conservation Commission in starting a mapping initiative a few years before, part of which is called GAME (Geospatial Assessment of Marine Ecosystems).

GAME is initially tasked with finding what data is already available for mapping and identifying data gaps and needs.

Mr. Wolfe specifically thanked Ms. Robbins and explained that she was instrumental in getting this workshop coordinated with FDEP. This Workshop will be used as a pilot to guide similar efforts in the other states in SERPPAS. It is a state/federal partnership with the Department of Defense.

Mr. Wolfe turned the meeting over to the meeting facilitator, Janice M. Fleischer, J.D., FLASH Resolutions.

AGENDA REVIEW AND MEETING GUIDELINES

Ms. Fleischer introduced herself and explained a little about her background (for more information see www.flashresolutions.com). She reviewed the Objectives for the Workshop (listed above), the Agenda for the two days (**Exhibit A**) and introduced the Meeting Guidelines (**Exhibit B**).

Ms. Fleischer explained that, with the exception of State of Florida mapping priorities, the participants would not be making final decisions but rather the convening agencies are trying to get general acceptance on approaches and directions to proceed through the participants' input. The State of Florida priorities will be established on Day Two.

Ms. Fleischer noted that Day One, in particular, is very full. The morning is designed for participants to become aware of new and current technologies. The time is very limited since it was the desire of the conveners for all participants to gain as much information as possible today. She went on to observe that the conveners did not expect the level of interest in this workshop. As it turned out, this could have been a three day workshop but the scale of interest and participation exceeded expectations and by the time that became evident, it was too late to change the length of the workshop. Due to this, Ms. Fleischer asked that questions be very targeted. She asked participants to notice how presentations have been grouped and requested that they make notes of the questions they want to ask and ask them after each "grouping" of presentations.

Ms. Fleischer called attention to the fact that she would be recording input directly on her computer and all comments can be seen on the projector screen allowing participants to read and correct her notes immediately. She asked that participants notify her immediately if suggestions, concerns or comments are incorrectly or inaccurately recorded.

After one or two housekeeping announcements, she asked Ms. Robbins to introduce the first group of presenters.

Group Presentations: Mapping Technologies, Scales and Resolution

Facilitator's Note: After each group of presentations, participants' comments were recorded; those comments are shown below each group of presentations. Where possible, answers are indented below the comment or question.

BOTTOM AND SUB-BOTTOM ACOUSTICS

PRESENTATIONS: (EXHIBITS C, D, AND E)

Bottom acoustics - Stan Locker, University of South Florida

Seismic - Jim Flocks, U.S. Geological Survey, St. Petersburg, Florida

Multibeam - Jane Denny, U.S. Geological Survey, Woods Hole, Florida

Questions or comments:

1. If working in shallow system, what is shallow depth?
2. In Apalachicola example, was it depth limited? Or was it funding limited?
 - a. Those are two parameters; there may also be a time element on a project
3. Paul Buchanan: Any technologies used for near shore fresh water springs?
 - a. Used to show interactions
4. From regional perspective has all of OCS been mapped in SE, not real near shore
 - a. Not entirely, some technology not capable
 - b. Need a specific idea of what you want to map

REMOTE SENSING (LIDAR, SATELLITE)

PRESENTATIONS: (EXHIBITS F, G, H, AND I)

Charts - Eddie Culpepper, U.S. Corps of Engineers

EAARL/ATRIS - Amar Nayegandhi and Dave Zawada, U.S. Geological Survey, St. Petersburg

Hyperspectral mapping - Charles Kovach, Florida Dept. of Environ. Protection

Satellite - Frank Muller-Karger, Univ. of South Florida

Questions or comments:

1. Question to Amar: Do you also have data from Florida Keys?
 - a. Some is ready, in next few months more will be published
2. What is vertical accuracy?
 - a. 10-15 cm
 - b. Depends also on how dense the vegetation is
3. Will you be doing benthic mapping in vegetative areas?
4. When you are differentiating different types of vegetation, do you collect all at the same time?
 - a. You can reconfigure wavebands in flight, so we set it ahead of the flight
5. Does tannic water influence the results you get, also other variables, how do they influence the approach needed in any given area?
 - a. Need to make adjustments to spectral data

- b. Collaborating among several groups helps with getting more accurate data
- 6. Is there a rules-based approach?
- 7. Benthic diatom map: depending on time of day it can change quality of signal
 - a. Need to know local environment enough to be able to get good results
 - b. Need to fill spatial temporal need; now you get one or the other in near shore platforms; we need to be able to do both
- 8. Any eye-safety issues with the LIDAR you have described?
 - a. No.

At this point in the meeting, the participants took a short break.

AUTONOMOUS UNDERWATER VEHICLES (AUVs) AS MAPPING TOOLS

PRESENTATIONS: (EXHIBITS J AND K)

AUV - John Kloske - Center for Ocean Technology, University of South Florida

AUV - Manhar Dhanak, SeaTech, Florida Atlantic University

Questions or comments:

1. Are there technical challenges with using multiple AUVs?
 - a. You can deploy several small vehicles from one boat; if you need to use larger AUVs, that is more difficult
2. Monitoring AUVs, need to be careful about overlap so they don't interfere with one another
3. Range is 1-2 km
4. How is the GPS used?
 - a. Before vehicle sets out an antenna pops up and the GPS gets set, then as AUV dives the GPS keeps track of where it is
 - b. Need to bring unit up every so often to reset and correct
 - c. You can use acoustic modem to send signal as well to help with location (noisy, but keeps surfacing amounts down) (1-2 km range)
5. What is minimum depth and what is pricing for surveys?
 - a. 15 feet
 - b. FAU 2-3 meters of water depth
 - c. Each project costs are figured separately; takes 3-5 people
 - d. FAU cost: need 2-3 people, somewhere around \$2-3K
6. What is frequency of sub bottom profiler and what is potential depth penetration? ____
 - a. 2-3 mhz, 1 meter
7. Cost of AUV and maintenance
 - a. Approx. \$3M, additionally, the batteries are expensive (\$50K to replace)
 - i. Expensive but need to consider rate of return
 - ii. Can't match data quality
 - iii. There are units available for use here in the State (state institutions so you can utilize the ones that we have)
8. National Research Fleet will probably begin using AUVs; what are the problems, concerns you anticipate?
 - a. Personnel needed who know how to use them
 - b. You must have the proper equipment on board; infrastructure important

- c. Vehicles are getting smaller making it easier to launch and bringing the cost down
- d. Fleet is already using some of these

NEW MAPPING TECHNIQUES

PRESENTATIONS: (EXHIBITS L AND M)

Hybrid mapping tool & LiDAR/Single beam – Sam Purkis, Greg Foster, Nova Southeastern University

Streaming resistivity – Chris Reich, U.S. Geological Survey, St. Petersburg

Questions or comments:

1. Do you see a difference in resolution between 2 and 4 khz?
 - a. Not necessarily, you can set speed to below cavitation; also stronger scattering signal
2. What advantages might there be to a hybrid system that uses both QTC and Biosonics, Inc. Do they see different things and if put together could get a better product?
 - a. QTC provides shape parameters vs. Biosonics systems which uses 1st and 2nd echo returns and thus are two different systems. Could create a model that could use both and get better data
3. Cluster analysis: can you describe how they cluster out with different wave forms?
 - a. High degree of mixing between acoustic classes; distinction based on composition of acoustic classes; no one- to- one correspondence between acoustic classes

OPEN FLOOR DISCUSSION ON MAPPING TECHNOLOGY

At the conclusion of the morning presentations, Ms. Robbins invited the participants to comment and submit observations on what they had heard/learned during the presentations. Specifically, she asked if the participants noticed any gaps in the mapping technologies.

Participant comments/observations: Note: where possible, the name of the participant is noted.

1. Jerry Wilson: FUGRO PELAGOS Multi-beam data plus LIDAR is delivered in a merged data set from land to deep water
2. Kris Kaufman: One technology that is lacking is aerial mapping for topography
3. Mike Street, NC Div of Marine Fisheries: we have no money for all this wonderful technology; we can't afford this technology. We have highly turbid water; high salinity, over ½ million acres; have staff for ground truthing; told that digital is not ready
 - a. How do we do this within the money we have
4. Steve Wolfe: So you are modifying your needs to fit your funds?
 - a. Yes
5. Mark Finkbeiner: illustration of capabilities was good on presenters; we need to consider cost and availability; can I find instruments when and where I need them
6. Steve Wolfe: There are specific needs that drive mapping efforts; need to select mapping technology that will address the individual needs

7. Keith Patterson: aerial mapping concern, not much on accuracy assessment, pulling out certain sea grass species
8. Bob Virstein : several technologies work in deep water, we really need to know about shallow and coastal systems; for us cost is about \$2K a square mile
9. Steve Wolfe: One question is does cost change with depth; what is cheapest in deep water may not be cheapest in shallow
10. Jack Kindinger: Merging LIDAR with shallow water techniques, you can capture the transitions from deep to shallow
11. So far you need heavy ground truthing
12. Jane Denny: transition issue, shallow to deep; we use 20-30 m water depth, we use multibeam technology if going deeper than that; you can cover a wide area in a shorter amount of time; follow up with seismic for cover in shallower water
13. Dave Palandro: Coral Reef background, we need to clarify what we mean when we say "deep"; optical depth is very important also
14. Manhar Dhanak: Costs, funds are always an issue; use creative solutions, maybe ways to piggy back on other initiatives that are going on, use the data and could stay within your budget
15. Al Hine: is there a sense of what lower depth limit is here? Can you provide information at very deep levels? Emphasis seems to be on more shallow depth.
 - a. For SERPPAS, talking about 200 nautical miles off shore
 - b. Other technologies do exist to go much deeper; what are you capable of doing within budget and management questions you are trying to answer
16. Barry Rosen, is there a tool to help pick out best technology for your management question?
17. Funding is usually driven by management need
18. Henry Norris: matrix that talks about scale, tools applied, etc.
 - a. Steve Rohmann: There is a matrix that gives information that allows you get a cost per unit area; does not have all technologies
19. Mike Street NC: we need a matrix of capabilities to habitat conditions so you know what is most useful for your needs
20. Jerry Wilson: IHO standards matched with interferometric. For the CA waters statewide mapping, there was strong agreement for all mapping through verifiable IHO standards
21. Jane Denny: How are we defining "map"; system perspective? Or other ways?
 - a. How much detail, etc. comes from what is driving why the mapping is being done
22. Katherine Corbett: habitat quality can be an important factor if you are trying to look at sea grass composition or movement over time, or dead vs. live coral reef. These are ideas that need to be incorporated in the mapping
23. What is the common element to begin
 - a. Bathymetry
24. Kathleen O'Keife : depending on your use or agency focus, you have different scales and needs, these must be taken into account when doing priorities
25. Kris Kaufmann: with state agency we look at our mapping programs as a product to also be used by those outside our agency, we want to add to make it[??] (SWFWMD)
26. Chris Friel : look at life cycle cost; from mission planning all the way through product and its maintenance

At the conclusion of this discussion session, participants took a break to have lunch and visit a poster session.

Presentation: Identifying Information Gaps

Geospatial Assessment of Marine Ecosystems (GAME,) Florida's first step in an interagency mapping effort
- Dave Reed, FWC Fish and Wildlife Research Institute **Exhibit N**

There were no comments or questions at the conclusion of this presentation.

Group Presentations: Agency Mapping Programs, Needs, and Priorities

Facilitator's Note: After each group of presentations, participants' comments were recorded; those comments are shown below each group of presentations. Where possible, answers are indented below the comment or question.

STATE AGENCIES

PRESENTATIONS: (EXHIBITS O, P AND Q)

Kathleen O'Keife, FWC Florida Wildlife Research Institute (FWRI)
Seth Blich, Dept. of Environmental Protection (DEP)
Ron Hoenstine, DEP Florida Geological Survey (FGS)

Questions or comments:

1. FWC- Where do you want to map (to Kathleen)
 - a. Big Bend area not mapped
 - b. North of springs coast, out to shelf break
 - c. Finish SE (Biscayne Bay to Keys)
2. Hawk Channel is not mapped (gap)
3. Map everything inside state waters
4. FGS- Big Bend important
5. To what degree do you all talk to one another?
 - a. O'Keife: We try but so many efforts going on so makes it very difficult
 - b. Universities are doing work that you often don't know about until published
 - c. GAME catalog is very important as a source of finding out about other efforts going on
 - d. Oceans Council is important for collaboration; not reinvent the wheel
 - e. DEP has done a needs assessment
 - f. Statewide depository is needed; many groups trying to achieve this but still not accomplished; look to Ocean's Council to accomplish this
6. Availability of data: this is a problem because often those who are doing research don't want to share because they want to publish; if you are state or federal (publicly) funded you MUST share your research results; real issue that needs to be addressed
7. Ground truthing is a real issue that needs to be discussed when you talk about mapping
 - a. This should be in the design of the mapping effort itself
 - b. Money is an issue here

PRESENTATIONS: (EXHIBITS R, S, AND T)

Sherman Wilhelm, Dept. of Agriculture & Consumer Services (DACs)
Graham Lewis, Northwest Florida Water Management District (NFWFMD)
Robert Virnstein, St. Johns River Water Management District (SJRWMD)

Questions or comments:

1. Mike Street, NC: To Sherman: benchmarks for invasive species, what is that?
 - a. Few areas of Florida that people really know where things grow; this is a benchmark of what species are in an area and where they grow
 - b. We did not find things in Sebastian Inlet that weren't supposed to be there
2. Harry Norris: To Sherman: do you lease bottom and water column and surface
 - a. Yes, marinas, state agencies that need top
 - b. Aquaculture needs bottom
3. Mike Street: in NC, getting away from Submerged Aquatic Vegetation (SAV), now looking at beds and where SAV could be
4. Al Hine: did not realize Florida had a leasing program for submerged lands; how does it work?
 - a. Done through DEP, there is a rule, application and fee, reviewed by appropriate agencies, then goes in front of Governor and Cabinet
5. Suppose I represent a fishing group could I rope this off?
 - a. No, must satisfy Governor and Cabinet that it is in the interest of the state.
6. Jerry Wilson: for bathymetric LiDAR, priorities based on population density, because funding is a concern, we should spend some time (tomorrow) to discuss if LiDAR is to be used in non-populated areas while it is being done in the populated areas
7. Topographic will be done independent; plan for Biscayne Bay for LiDAR was driven by population
8. Libby Carnahan: Should we be concerned with groups that might want this for not altruistic purposes; i.e. using the information for their own purposes
9. Peter Rubeck,.: Fisheries management councils use this for allowable fishing zones, trying to see fish-habitat relationships, recommendations for protected zones
 - a. Sherman Wilhelm: if there was a map that showed migratory pattern of a species of fish, this would influence whether giving a lease to another entity would really be in the public interest (it would not be issued)
 - b. Jane Denny: Canadian fisheries worked with the Canadian government to map fish species; in doing so there was a side positive effect of seeing how to not further hurt the sea bottom
10. Steve Rohman: Concern is that legislature wants a map in front of it in order to decide if they should allow a lease, but there is no money to make the map; why don't they see the value of having the maps made and give money to get it done?

The group took a short break before commencing the next presentations.

PRESENTATIONS: (EXHIBITS U, V, AND W)

Kris Kaufmann, Southwest Florida Water Management District (SWFWMD)
Cecilia Conrad, South Florida Water Management District (SFWMMD)
Catherine Corbett, Florida National Estuarine Preserves (NEPs)

Questions or comments:

1. Graham Lewis : To Kris: When you went from photo to digital did you see a cost increase or decrease?

- a. A cost increase but more images within same area (cost went up about 50%, but 4x more pictures) therefore image cost went down
2. How do you factor the two different types of images if you are doing trend analysis?
 - a. Classification refinements (ex: tidal flats went to open water and seagrass beds)
 - b. Looking at where shifts happen, acreage
3. Dave Palandro: Degrade photography to 8 bit to do comparisons (take the 12 bit and lower to 8 bit)
4. Harry Norris: to Kris Kaufmann: need equal intervals, use LiDAR to get this
5. Mike Street: Does anyone have direct comparison of traditional photography and digital?
 - a. There is a consulting firm that did direct comparisons in a portion of Tampa Bay in 2004
 - b. Bob Virnstein: he did it too but it has not yet been analyzed
6. What were fly dates for 2004 and 2006?
 - a. 2004 (Jan 14) 2006 (Feb 8, 10, 12); in Tampa Bay the water gets progressively clearer as you get into February
 - b. Also a loss of biomass in February
7. Matt Patterson: How do you ground truth your mapping?
 - a. 90% accuracy
 - b. Worked with partners to get random data for groundtruthing

FEDERAL AGENCIES

Presentations: (Exhibits X, Y, and Z)

Jack Kindinger, U.S. Geological Survey (USGS)

Steve Rohmann, National Oceanic & Atmospheric Administration (NOAA)

Jennifer Moore, NOAA National Marine Fisheries Service (NMFS)

Questions or comments:

1. Harry Norris: To Jack: Are you taking the coastal geomorphic classification statewide
 - a. not yet
2. Al Hine: What kind of ground truthing are you using?
 - a. Jennifer Moore: we rely on those who are doing this for us
 - b. Steve Rohmann: do extensive ground control, use ROVs to 30-100m depth range
 - c. Ability to validate a map depends on cost and time you can spend
3. Need to understand the subsurface if you are going to do value mapping, topographic mapping in particular.
4. There is a study looking at Ophelia Banks in NC and Florida
5. Jennifer Moore: two themes of awareness and accessibility, don't re-invent the wheel
6. Steve Wolfe: Florida Governor recommended Ocean's Council budget of \$8.1M, part is a data management and dissemination strategy. If funded this will lead to work and implementation strategies to make this happen
7. Amar Nayegandhi : Is the Governor's money a recurring fund?
 - a. No, not recurring funds

PRESENTATIONS: (EXHIBITS AA, BB)

Matt Patterson, National Park Service (NPS)

Mary Bryant, The Nature Conservancy (TNC)

Questions or comments:

1. Libby Carnahan: To Mary Bryant: We need to see the amounts of data available on maps because some maps don't show much complexity and it may just be that there isn't enough data
2. Peter Rubec: shrimp distribution and hard bottom correlation may not be accurate; some of the designated hard bottom is not really hard bottom
3. There is annual coral monitoring in place now;
4. Brian: Dry Tortugas: although low hanging fruit, what are the needs out there
 - a. Wall-to-wall bathymetry
 - b. We can work on classification without all the bathymetry; large parts of the Dry Tortugas Park has been closed off now, we need to see how this will affect the bottom/where to allow divers, etc.

EVALUATIONS/ ADJOURN

Participants were asked to complete their Evaluation forms and the meeting was adjourned for the night.

Day Two: Thursday, February 8, 2007

GOOD MORNING, AGENDA REVIEW AND GOALS FOR THE DAY

Ms. Fleischer quickly reviewed the Agenda for the day. (See Exhibit A)

Steve Kopach from MMS, and co-chair of Marine Boundary Working Group gave short informational talk on MMS mapping needs including,

Marine Boundary Working Group (primarily federal agencies but also state reps), methodology to serve all this data; housed in "geospatial one stop", handout with information
Best Practices product may be of interest,

Includes creating metadata and other information needed to create a boundary
MBWG works on Leasing for rights and responsibilities, not oil and gas leases
Multi-purpose marine cadastre

Mapping Priorities and Coordination of Efforts

The next group of discussions and exercises focused on Florida State mapping priorities and how mapping efforts can best be coordinated. This began with an open discussion on what commonalities exist among the agencies with mapping needs.

COMMONALITIES OF PRIORITIES – OVERVIEW AND DISCUSSION

To initiate this discussion, Ms. Robbins and Mr. Wolfe distributed a first draft of the matrix of commonalities they had compiled from information presented on Day One. (Exhibit CC) They explained to the participants that the purpose of this matrix was to assist in determining which priorities are shared among agencies. There was a short discussion and changes were made adding agencies to commonalities. There are some general categories that should have more specificity to them. These changes are reflected in Exhibit CC.

Participant comments:

1. If you are looking for trends, you must consider when was last time each area was mapped (for example, with seagrass, we are looking for 6-year intervals)
2. You must define a map; it depends on what data is available
3. You should have another column with research interest
4. Next time do this type of exercise using maps for people to write on; we are all mappers and visualize this better rather than seeing a table.

BREAKOUT SESSIONS (INCLUDES BREAK)

At this point in the meeting, participants were divided into two main groups: one consisting of only the formally-designated Florida agency representatives and the other consisting of all the remaining participants. The group of agency representatives moved to a separate room to work on identifying state mapping priorities. The remaining participants were divided into five (5) smaller groups to conduct more in-depth discussions on the following topics:

1. Commonalities among mapping priorities
2. Coordination of mapping activities
3. Technologies
4. Designation of bioregions
5. Baseline mapping data

Each small group was given a list of questions to answer within the topic on which they were working. The small groups were given two (2) hours to work on their responses. At the end of the two hour time period, all participants, including the state representatives, gathered together again. What follows below is: a) a list of the questions asked of each small group; b) the small group's responses to the questions (small group report); and c) all participants' responses to the small group report.

SMALL GROUP REPORTS WITH PLENARY DISCUSSION

GROUP M1: COMMONALITIES AMONG MAPPING PRIORITIES

Questions presented to small group for response:

- 1) How does one assess commonalities among the agencies mapping-data needs?
- 2) Where commonalities of state mapping areas exist (refer to handout), which of the data needs are in common?
- 3) Which data needs are not in common?
- 4) If data needs are not in common, what do you suggest?

M1 Small group work:

1. How to assess:
 - a. Diverse information needs among agencies
 - b. Assume some basic needs for all
 - c. Other agencies not here or represented including counties, cities, because they make land-use decisions
 - d. Leverage efforts with coordination
 - e. GAME and other efforts to catalog projects and avoid duplication
 - f. Catalogs should include future projects, e.g. MMS planning FY 09 now

- i. Note: presenters listed ongoing and completed projects as well as information needs
- 2. Common information needs:
 - a. Bathymetry: varying vertical resolution depending on location and depth
 - b. Sea level rise: need high vertical resolution
 - c. Shoreline change
 - d. Benthic communities and habitats-scale
 - e. Subsurface geology
 - f. Sediment types; texture
 - g. Human structures-pipelines, cable, etc.
- 3. More common data needs and suggestions:
 - a. Charismatic flora, fauna, manatee, endangered species
 - b. Shorelines and boundaries
 - c. Overlapping jurisdictions
 - d. Uncommon information needs (information needs specific to particular agencies)
 - e. Agency specific needs
 - i. Address with conceptual model
 - ii. Site-specific needs
 - iii. Coordination can reduce incremental cost of added data collection
 - iv. U.S. regional to statewide to state regions
 - v. SE US to Florida to Regional Planning Councils?
 - vi. Marine boundary working group to GAME to Regional Planning Councils?
 - vii. Use existing organizations

M1: Commonalities plenary comments following small group report:

- 1. Question 1: ASSESSMENT: how do we ask the right questions to get to common information for priorities
 - a. use an online data management tool like GAME
- 2. Would a ranking system be helpful? We might want to rank the specifics in commonalities
- 3. In GAME, we report data sets that are planned, completed and ongoing and available online
- 4. We each need to put our data into GAME so it has as much information as possible
- 5. Defining future work from state level, don't put anything that you want to do in two years because legislators will strike anything they think you already have funding for

GROUP M2: COORDINATION OF MAPPING ACTIVITIES

Questions presented to small group and their responses:

- 1) Is there a need to adopt a common 'language' to standardize how agencies specify their mapping data needs? If so, how?
 - a) Change "need" to "advantage" or "opportunity" to adopt a common language
 - i) Develop a glossary of terms
 - ii) Adopt classification schemes that allow cross-walking
- 2) How do we keep diverse agencies and entities in the communication loop in the upcoming phases of the mapping effort?
 - a) Good base map (matrix) (projects and status)
 - b) Coastal assessment framework (CAF).shp (?)
 - c) Push for a geographic information officer and board
 - i) GAME or similarly group/website/blog

- ii) CSC (NOAA) potential website supporter (?)
 - iii) FOCRC?, FLCOOS Caucus
 - iv) We need a portal!
- 3) Should there be a coordinating liaison individual/ group established?
 - a) Yes, GIO (Geographic Information Officer); Committee; Lisa Robbins and Steve Wolfe (Florida Benthic Habitat Project); GAME
 - 4) What would they oversee?
 - a) Website- listserve (email, BLOG)
 - b) Maintain status matrix through soliciting updates on upcoming projects
 - c) Develop list of contacts (include local users)
 - d) Links to legislative updates
 - e) Links to funding sources
 - f) Beginning responsibilities; housekeeping duties; long term to build more cohesive community
 - 5) What is the best structure for this liaison effort?
 - a) Start small (one or two people); ramp up

M2: Coordination plenary comments following small group report:

1. DCA is trying to get the GIO through cabinet right now
2. There are other working groups we can tie into with similar mapping needs

GROUP M3: TECHNOLOGIES

Questions presented to small group and their responses:

- 1) State and Federal agencies require mapping of habitats and bioregions at a scale necessary to address agency management needs. Is there a compilation of information on mapping technologies to determine which technologies provide the necessary resolution and types of information? If there is a comprehensive compilation, where is it and how can it be accessed?
 - a) No, no comprehensive compilation
 - b) Lists do exist that address specific fields
- 2) If there is no compilation, how should this be done?
 - a) Lead organization develops a matrix (template) based on management needs-fill matrix with technologies based on expert consensus
 - b) Develop database, web-based (interactive)
- 3) Will present technologies provide the necessary habitat resolution in all waters under consideration (i.e., out 200 miles from the coast)? If not, where are we not yet able to cost-effectively map?
 - a) Regionally specific examples, shallow mid, deep (anything can be done- whether it is cost effective is the key question)
- 4) Are there methods already under development that would address the shortcomings?
 - a) Yes, see #3 above, better, faster, cheaper

Additional information from small group:

Establishment of technologies:

1. SPACE
 - a. Platform-satellite
 - b. Sensors-optical, radar, thermal
 - c. Products-bathymetry, SST, color, habitat, Delta (Δ), photo, currents, winds
 - d. Scale- 1m-km's
 - e. Practicality- global, 24 hour
 - f. Cost
2. AIR
 - a. Platform- planes, helicopter
 - b. Sensors-optical, thermal, atmospheric, magnetics, radar
 - c. Products- see SPACE
 - d. Scale- cm's to 10's m
3. SEA SURFACE
 - a. Platform- vessel, platforms
 - b. Sensors- acoustic, active and passive optical, chemical, thermal, magnetic (2D, 3D), direct sampling (physical)
 - c. Products- ...
 - d. Scale- mm's-km, subsurface
4. Example products
 - a. Shallow- grassbeds
 - b. Technologies: photo interpretation, bathy (2-3m), LiDAR, acoustic, direct sampling
 - c. Problems: shallow, weather, cost/time
 - d. Methods under development- unsupervised interp (hybrid mapping tool)
 - e. Product- GIS layer, VRML
5. Example projects: geographical regions
 - a. Mid/deep water- Pulley Ridge
 - i. Problems- 3D (water column, volume), distance (x,y,z) groundtruth, resolution, cost
 - ii. Technologies: acoustic, multibeam, sidescan, bottom class, optical (video, AUV)
 - iii. Technology consistent in deeper water-cost increases
 - b. Med- Coral Reef (20m water depth)
 - i. Problems: fringe of passive optical, too shallow for SWATH
 - ii. Technologies: ROV, towed platforms, single beam, optical
 - iii. Bottom line: anything can be done, cost effectiveness is key

M3: Technologies plenary comments following small group report:

1. Not adequate technology to large scale map shallow water of high turbidity. Technology gap
2. Online matrix of technologies; get various vendors go in and put their price line in, make it competitive
3. Alliance for Coastal Technologies: Mark Luther, USF

GROUP M4: DESIGNATION OF BIOREGIONS

Questions presented to small group for response:

1. What are the bioregions on the State coast and shelf?
2. Which of these bioregions need to be identified by collecting baseline mapping data?
3. What is the minimum scale of mapping to identify each bioregion?

M4 Small group work: (Note: this group changed the questions to better suit the needs they perceived existed.)

1. Should bioregions be based on biology, geology or other parameters?
 - a. Ecoregions- defined by Natural Parameters
 - i. Geological provinces
 - ii. Physical conditions
 - iii. Chemical parameters
 - iv. *Biological communities
 - b. Ecoregions are not static
 - c. Take the parameters and Synthesize available research
 - i. Is data sufficient?
 1. if yes, then
 - a. additional research
 - b. map transects in each ecoregion, map across ecotones
 2. if no, then
 - a. identify gaps
 - b. further research
 - c. go to "additional research" above
 - d. Natural Borders
 - i. Geological provinces
 1. synthesize available research (GAME, Al Hine)
 - ii. Physical parameters
 1. SST
 2. Currents/Gyres
2. What we know: static seafloor mapped geological structures
 - a. Where are the "blanks" - what we don't know
 - b. Benthic communities relate to geological features
 - c. Start at bottom and work up
 - i. Issues of scale
3. Minimum scale to map bioregions
 - a. Very large $\approx 100 \text{ km}^2$
 - i. Ecotone-"edge"
 - ii. Bioregion- more specific habitats/species/communities
 - iii. Ecoregion-entire systems-links between systems
4. Map diagram as example:
 - a. Additional mapping in ALL AREAS
 - i. Look at areas where WE believe there to be a separation in Ecotone, transect these areas-Diagrams

M4: Bioregions plenary comments following small group report:

1. Map they created is a general basis of geo-bioregion areas
2. A real definition of what is a bioregion is needed
3. Bioregions have scales
4. Some bioregions are more important than others: like the coral reefs in the Keys is economically more important than the seagrass beds in the NW
5. Ecoregions not being static: currents, temp, salinity are not static; bathymetry may be static, depends on the parameter you are measuring
6. Some benthic communities have preferences for certain substrates. Some have temp preference.
7. Look at Coastal Assessment Framework, CAF, created by NOAA years ago and agreed upon working definitions; used for many purposes over the years
8. Ecoregion must be defined by multiple layers; not by one parameter
9. Human parameter is being left out; human activities, etc.
10. NOAA has recently defined and outlined ecoregions; more consistent with LME (large marine ecosystems)

GROUP M5: BASELINE MAPPING DATA (BMD)

Questions presented to small group for response:

1. How do we establish specifications for Baseline Mapping Data for mapping of large areas?
2. How do we balance data density vs. costs?
3. Within the BMD mapping, how do we allow for areas needing additional or higher resolution data that may be required to meet the needs of some program(s)?
4. Can this be most cost-effectively accomplished by temporary changes to the routine mapping, or by separate mapping efforts?

M5 Small Group Work:

What comprises a baseline map? ("sea floor" characterization)

1. Bathymetry- depth/geomorphology
 2. Substrate
 - a. Surface sediments
 - b. Sub surface control
 3. Living Resources
 - a. Benthic-sessile-species
 4. Shoreline mapping (upland vs. wetland)
 - a. Cultural, archeological (wrecks, etc.)
 5. Ground truth!
- I. Specifications
- a. Driven by user needs (resolution)
 - b. Ground truth
 - c. Repeatability
 - d. QA/QC
 - e. Spatial accuracy (vertical and horizontal)
 - f. Classification (accuracy)
 - i. Regional vs. site specific
 - g. Cost- adhere to regulations/statutes
- II. Data Density vs. Cost- *what data are needed to define the problem*

- a. Project life cycle- realistic expectations
 - b. Resolution required based on project (management) needs
 - c. Data type to answer question- management/research
 - d. Evaluate methods
 - e. Study logistics- mobilization, production rates, location of site, etc.)
 - f. Additional data at no additional cost
 - g. COST SHARING
- III. Higher resolution in specific areas
- a. Regional overview (lay of the land)
 - i. Site specific (high resolution detailed study)
 - b. Agency (user) coordination
 - i. Cost sharing
 - ii. Commonalities
- IV. Changes to routine mapping to accommodate high resolution needs
- a. Anomalies
 - b. Try to build into existing program (cannot be a “project buster”)
 - c. If not feasible-initiate another/secondary program
 - d. Maintain flexibility
 - i. Survey design, operation, etc.
 - ii. Site specific falls under “ground truth”
 - e. Routine mapping is most cost effective
 - f. Dependent on temporal variability
 - i. Biomass movement, geology

M5: Baseline Mapping Data plenary comments following small group report:

1. No such thing as getting additional data at no additional cost; maybe “minimal” cost but not no cost
2. No one brought up there are a lot of projects ongoing across the state at different scales; we need to decide statewide what needs to be done for entire state; need consistency in what is done and shared with everyone
3. Working definition of baseline working sets
4. Data density vs. costs: frequently defined by different entities; budget may not give you what you need, comes down to lobbying for why/what you need
5. should be most cost effective data at what minimum level of data is driving it
6. Cost effective is not necessarily “cheap”
7. Reps of agencies need to make a case for why they have their needs; don’t be limited by current budgets for defining needs
8. National Spatial Data has very land based bias; we need to look at negative elevation; wedge in our needs; land cover should include benthic, that is bottom land cover; content standards

STATE PRIORITY RESULTS WITH PLENARY DISCUSSION

At the end of the reports and discussions of the small groups, the results of State mapping priorities were revealed. They were:

1. Big Bend

2. NW Florida
3. Indian River
4. NE Florida
5. Key/Tortugas
6. 10,000 Islands
7. Charlotte Harbor
8. W Florida Shelf Break
9. Springs Coast
10. SE Florida
11. Florida Bay
12. Tampa
13. Oculina

These priorities were achieved through a process known as “paired comparisons” in which each potential priority is compared to every other priority. As an example of the worksheet, see **Exhibit DD**. Further, it is to be noted that when the small group of state representatives began discussing priorities, they made the decision to collapse the areas in the list created by Ms. Robbins and Mr. Wolfe (see Exhibit CC) and prioritize the larger regions of the state.

After the priorities were announced to the participants, the following comments were made:

1. Southwest Florida Water Management District was missing from this exercise
2. In 2001, Big Bend seagrass was mapped; when you identified Big Bend as a first area; what was the reason
 - a. No single thing
 - b. Levels of resolutions that really need to be mapped
 - c. Land-use change in that area is great
3. Some information that is coming out of this workshop is previously unknown, some needs we thought were unmet are actually fully or partially met
4. There is a big hole in bathymetry data in Big Bend
5. Florida Keys imagery taken in 1998, and using 1991 data; don't know how many acres there are actually
6. Why did Keys and Tortugas come to priority 5?
7. South Florida Water Management District rep: had to chose between regions in full area; so I had to decide which ones were more needing
8. We may need to cross-walk the priority list with the data we now are aware of from this workshop
9. This is an iterative process

Note, the decision was subsequently made based on comments to allow agency representatives to take workshop information back to their home agencies. The prioritizing exercise was repeated two weeks after the workshop and responses were received from all the original agencies plus the 'missing' one. This resulted in the following final priority list.

	<i>Mapping Region</i>	<i>Cumulative Score</i>
1	Big Bend	77
2	NW Florida	71
3	Indian River	59
4	Key/Tortugas	58
5*	Charlotte Harbor	54
5*	Springs Coast	54
7*	NE Florida	46
7*	10,000 Islands	46
9	Florida Bay	40
10	SE Florida	35
11	Tampa	31
12	W Florida Shelf Break	30
13	Oculina	19

*tie

BOX LUNCH AND POSTER SESSION

CLASSIFYING HABITATS FOR MAPPING

In order to set the stage for the next exercise (having participants begin thinking and making suggestions about next steps), the following presentations on different habitat-classification schemes were delivered to the participants.

Presentations:

Becky Allee, NOAA – CMECS, Coastal and Marine Ecological Classification Standard

Steve Rohman, NOAA – NOAA coral classification scheme

Katherine O’Keefe, FWC FWRI – SCHEME, System for Classification of Habitats in Estuarine and Marine Environments

Open Discussion following presentations:

1. Florida FLUCCS codes- would they switch over to SCHEME?
 - a. SCHEME could be modified; FWC is not “married” to present version of SCHEME
2. Could SCHEME handle mixed habitats
 - a. Yes
3. Structure and labels are there for what is being mapped.
4. SCHEME and CMECS are/can be nested
5. There are standard codes all the way down to subclass 4 of CMECS, there is a paper available
6. SCHEME has been used in the field and tested;
 - a. It is still evolving, too.
7. Effort under way on land, we need to make sure land to water is seamless transition
8. Is there a central place where descriptors are located now?

- a. We could/ do use GAME
 - b. Don't want the modifiers and descriptors go "haywire", need to be a collaborative effort
9. Next step suggestions:
- a. SCHEME AND CMECS mesh; maybe have them meshed
 - b. Has NOAA coral program compared their definitions with CMECS?
 - i. Not with CMECS, but did do that with SCHEME for those that can be cross-walked
 - c. Zonation is important
 - d. NOAA developed this because of responsibility to US Coral Reef Task Force to report out every two years what is happening; needs to make sure it allows them to link what is being done elsewhere to what is being done here
10. Why wouldn't you use the SCHEME and CMECS systems?
- a. NOAA- we need to use our classification system
 - b. Can't just add categories to classification scheme, need to go out and make sure it works in mapping (application to real life mapping activity)
 - c. The amount of detail needed is the determining factor
 - d. Power of GIS is that it allows you to apply as many attributes as you want; species, grain size
 - e. Most important thing is that you can validate your map and demonstrate that your map is accurate and working
11. There is a need to come up with a single mapping scheme; each researcher has his/her favorite scheme
12. NOAA's is a coral ecosystem based system, but could be used for other habitats
- a. But mostly geared toward reef ecosystem
13. Why did you do CMECS if NOAA's system is there?
- a. When CMECS was started, NOAA's system did not exist
 - b. NOAA's system was split off specifically for corals
 - c. CMECS may be able to be adjusted for the corals but CMECS really wants to accommodate all habitat types nation wide; CMECS is willing to adjust as necessary to achieve a feasible nationwide scheme
14. If CMECS moving into an FGDC standard; that may be where we can achieve some central system
15. CMECS is doing 3 pilot programs: FL, TX (Redfish Bay) and MS pilots, TX and MS should be done this summer; FL is almost done (Florida Bay)
16. Is CMECS structurally changing so much that if we went out and used it would it make all our data wrong?
- a. No, CMECS is not changing that much, not to impact what had been done
17. Mapping seagrass I could use SCHEME and I should look at it and then see if it needs any adapting
18. Happy to adapt to SCHEME and glad an approach exists
19. Let's do a SCHEME training session
- a. CMECS is planning a training session already
20. Some samples are not covered; some definitions need refining
21. NOAA proposal: we develop a cross tabulation with CMECS, SCHEME and NOAA's scheme; as long as the systems can be crossed/looked up information can be cross walked

In-Depth Discussion: Matching Priorities to Next-Steps

PLENARY QUESTIONS

Participants were given individual worksheets containing the questions listed below and allowed approximately ½ hour to work on their questionnaires individually. Comments on each question were then taken and recorded during the meeting. What follows are the results of the transcribed completed questionnaires as well as the comments recorded during the meeting:

1. **How could the new data collected be made available to those needing it? (Note: Consider existing data as well)**

COMMENTS during meeting:

- a. Select someone that DEP works with, Labins or FWRI
- b. GAME
- c. Most data delivery comes from requests from public; missing is cataloging of all data, who do you ask (use GAME)
- d. Free of use restrictions; LiDAR data re: Homeland Security, can we get the data that can shared
- e. Having a state GIO; someone who is aware of all mapping in Florida
- f. Web portals with identified sources of funding etc.
- g. Other sources of data from numerous sources as provisional data
- h. Need a state geographic planning council reps from all agencies; rather than one person; they would facilitate data sharing

COMMENTS from questionnaire:

- Web portal(s) with identified source of ongoing finding for update-maintenance.
- Huge data portal administered by ?? Annual symposium for initial introduction of data? Both require an agency or NGO to take ownership.
- GAME (common portal)- it should be a condition of state and federal money that data is entered
- Internet-FTP site
- Website, e.g. GAME, FWRI, USGS
- Use existing database developments, maintain communications among various database development efforts. Aggressive data mining of existing datasets.
- Data clearinghouse-accessible by internet-housed at one agency, data CD's and DVD's available as well, distributed through clearinghouse
- Establish a website where metadata on data available could be posted by all agencies and sources for that data or establish a centralized depository for all data and encourage all agencies to submit their data or each agency create CDs and post data to their web site.
- Through any data portal like USGS Geospatial one stop and by entering information in the GAME catalog is searchable online.
- Entered as a data set in GAME catalog (online) with contact information and link to data (online) if available.
- Communications between groups and the use of existing infrastructure, i.e. GAME, leading toward a single contact (GIO) and clearing house. (David Palandro)
- Most data delivery is by request from the public and/or data delivery mechanisms like FSP or LHP, CD or web sites (agency or project specific). By

cataloguing data sets in GAME, the location/contact information for new data sets is available.

- Web- one stop, with links to FWC seems most appropriate
- Standardize reporting format, submit dates to a central clearinghouse for distribution, storage and retrieval.
- Web-site(s); hard-copy Atlases; CD/DVD products
- Geospatial one stop or similar website specifically for coastal and marine resources.
- Geospatial one stop for derived data imagery may be more difficult due to data storage size and licensing. (Matt Patterson)
- Made available over the web. One central clearinghouse such as OneStop to locate data and point one to where the data are stored. (Henry Norris)
- Web portal free of use restrictions, make available as completed.
- There needs to be better coordination between federal, state, academia, and industry in order to avoid duplication of efforts and wasteful spending/time alterations. Appoint (like a state GIO) a coordinating officer/agency to constantly update communications between groups.
- Web server
- Scientists collecting with federal or state funds have rights to the raw data for up to 5 years. They must submit the data to a central authority or agency. The central agency will manage the data in a database and share it with those needing it. Funds will be needed to manage the data longterm. (Peter Rubec)
- Several data portals are in place or in development (NCDDC, GAME, SORI, etc.). An inventory of these portals should be conducted and then an existing portal selected. Data holders could populate this using certain protocols.
- Agencies that collect data/make maps, should make them available electronically, store own websites such as SWFWMD and SJRWMD's websites, both very good at this.
- Select DEP to store collected data and distribute through LABINS or FWRI. (Paul Buchanan- SRWMD)
- Through an internet mapping portal where data can be downloaded.
- Clearinghouse
- GAME; existing government agency internet map server websites; LABINS; GIO (Mary Bryant-TNC)
- Researchers/users need to know what and when data has been (is being) collected. The concept of a state GIO seems appropriate to serve as a clearinghouse but management and cataloging will be crucial to use. Need some flexibility between user groups to accept slightly different data.
- Data portal such as PHINS, GAME, GoMRC
- Require in contracts and grants that data be shared.
- Utilize your state GIS center; if finished, as a central repository for sharing.
- State or Gulf-wide GIS/IMS or web-portal data inquiry tool- must be interaction to the extent that agencies/map companies can submit old/new data sets to be inquired; doesn't have to SERVE data-but does have to show source and format and contact

2. How should priorities be updated to allow for future events? How often should this occur?

COMMENTS during meeting:

- a. Events definition: existing initiatives and determine priorities through those, Florida over next 50-65 years; latest maps of these big initiatives have nothing marine based
- b. shoreline after catastrophic event or every 15 years
- c. Bathy every 20 years
- d. Benthic every 5-6 years
- e. Include county and municipal governments; data that are not being included here
- f. Using legacy concept; large statewide analyses as basis for another workshop or querying folks about their priorities
- g. Legacy stuff (Harry Norris) will be updated every 5 years
- h. Geographic priorities should be updated every year; maybe 2x a year

COMMENTS from questionnaire:

- Every 3-5 years, have re-evaluation with large inclusive group like this.
- Priorities should be ranked by critical decisions to be made by the state-not on what areas need to be mapped.
- First identify priorities and then identify what influences those priorities; which [sic] should help define a timeline; e.g. barrier islands and hurricane.
- Regional data collection like FDEP; each region is re-evaluated or collected on a biannual or tri-annual basis. If storms affect resources, re-schedule and collect if threshold affects are exceeded. (Defining thresholds will be tough).
- At least yearly.
- Someone has to be tasked as the responsible agency (person) who sends updates to people who request to be updated, by email for example as often as needed.
- Through another meeting with representatives from all state and federal agencies. Every five years.
- Workshop; once or twice a year before budgets and workplans are made.
- Include county governments as they make landuse decisions-there are ultimate user groups of these maps. What are their needs? Map priorities should be updated every 2 years. Existing data should be surveyed first before trying to determine needs by region. Some folks don't know what own agency has mapped.
- Existing priorities should have at least a two year life cycle to allow effective project development. A list of criteria could be developed by this group by which priorities would be adjusted. (Hurricane, funding, new law, coral bleaching, etc.) Hold this workshop periodically.
- Long term monitoring of mappable features (e.g. seagrass; sediments, water quality, fish) are needed. The periodicity will vary (e.g. fish, water quality should be monthly; seagrass beds every 5-6 years, sediments might be every 10-20 years). In the event of a

catastrophe, shoreline features, sediments, seagrass beds would need remapping in certain areas.

- Basic map products should be acquired in all areas. Major review every 2-5 years. Once a need for a priority area has been met, priority areas would be expected to change. The timing could link to funding cycles-i.e. a 5 year program needs to retain its funding for proper completion.
- Agency representative process is good, better coordination on agency goals needed prior to agency representatives meeting to set priorities. Better communication between agencies on activities will help set priorities. Should be updated annually.
- Shoreline-update after catastrophic event or every 15 years
- Bathymetry-every 20 years
- Benthic habitat/bottom type-every 6 years.
- Evaluate management requirements, such as Florida Wildlife Legacy Initiative and Century Commission's Conservation Blueprint and determine priorities. Have research community evaluate possibility. (Henry Norris)
- Five year strategic plan, with annual review to determine progress and re-evaluate priorities. (Matt Patterson)
- It might be impossible/difficult to predict the future well enough to effect priorities now. Backdate mapping can be done to evaluate past trends to determine future priorities.
- 1. website(s); 2. workshop; 3. State GIS coordinator; do once or twice a year.
- Priorities should be reviewed yearly by those who set them initially. Reviewing priorities should be done in the same manner as the initial review.
- I'm not very comfortable on today's statewide priority being used as the State's priority list- as a crude guideline it is o.k. The agency list has not been subjected to agency review. Update every 2-20 years e.g. biology every 2-5 years, bathymetry every 5-30 years.
- Yearly review of priorities allows for exchange of information, update of mapping activities and re-allocation of funding and/or priorities.
- Priorities are dependent upon those asking questions and the questions asked, in other words. Difficult to produce a shopping list. Some issues are natural perturbations and tracking environmentally sensitive or value managed environs.
- Establishment of GIO to coordinate mapping priorities with biannual statewide meetings-in the interim, hold biannual workshops like this one. Bottom line, we need a volunteer (until GIO) to champion this.
- An extensive communication among state and federal agencies, private companies and other organizations should be sought, as often as possible and when necessary. Conference calls, meetings, workshops are a good way to bring people together to discuss priorities.

- State priorities (i.e. priority areas the state would like to see mapped for its purposes) could be updated periodically through a coordinated input and review by GAME or some other state designated coordinating body or agency. Every 5 years.
- Annual multi-agency workshops to re-assess needs.
- Workshop such as this; 1 or 2 years; distribute updated information to workshop participants in the meantime; event driven if need be.
- Find the missing data-the gaps; once a year- for inventory; for needs, including project deadlines.
- By keeping an inventory of mapping efforts (when, what, where, how, who) it will allow "us" to assess needs and data gaps.
- Administrative body (council??) would maintain needs list. When projects are completed priorities would be shifted by council and mapping community.
- Continually through portal discussion group with annual to biannual formal adoption by end user groups.
- Priorities should be updated on a regular basis-maybe annually at a meeting of agencies, state-but include federal and counties, cities, etc.; but flexibility should be built in- in case of extreme storms some big event priorities would need to be re-assessed. A teleconference call of agencies following the event.

3. **Is there a better way to collect stakeholder mapping priorities?**

COMMENTS during meeting:

- a. Provide the invitees with enough read ahead materials to know what is available
- b. Have “visuals” maps, etc. using GIS software so folks can see how it works
- c. GIS managers: mostly state and regional agencies represented; they could identify stakeholders to gather and discuss
- d. Do a smaller group because they can delve deeper down, particularly the priorities identified in this workshop
- e. Internal blog or website where folks can converse, listserve, chatroom

COMMENTS from questionnaire:

- Don't know
- Personal interviews
- Online survey with responses set to automatically populate an online database.
- A matrix should be created of local resources, threats (development), regulatory layers, etc.
- Possibly-meet at each agency or state department to gather input on missing data.
- Probably not-might be broader range of participants
- Give stakeholders a venue to express needs, example: interactive web matrix; annual working group meetings.
- Not sure-really don't know.
- If there was a person responsible for collecting this kind of information people would know who to refer to; also, it would be possible to modify what's already in place (GAME catalog?) to accommodate priority information.
- Possible modification to GAME catalog to incorporate a section to address priorities by agency because catalog entries are specific data sets and not larger project entries.
- The stakeholder can easily define his/her own priorities easily [sic], it becomes more difficult over Florida. It is feasible to decide on a single attribute statewide, i.e. bathymetry. (David Palandro)
- Face to face meetings like this are useful but access to real time updates (like a web portal) is best.
- Yes
- Most likely not, but that could change depending on who is setting the priorities.
- No
- Workshops and issue papers are effective, but, ultimately consensus and a decision must result.
- Invite broader stakeholder audience; provide invitees with read ahead material that allows audience to understand what data is available statewide.

- Yes, use existing organization such as “GIS manager” to discuss on a quarterly basis. Push for a GIO position. Develop list of stakeholders and poll annually via web.
- Use interactive map in a group setting; with discussion organized by data “theme” (bathymetry, etc.)
- Better inter-agency communication on active projects and needs will clarify stakeholder priorities.
- Not known
- GAME catalogue D?MS could be a central source to exchange information and help set priorities.
- The process is good but 2 days is too short. Establish and release the agenda in advance to a wide-group. Agency reps can convene with ideas already formulated for consideration.
- Survey GIS staff of agencies and interview them for data/maps they have. Use these interviews to complete GAME as well as compile dataset lists by region. This would allow more informed prioritization by agencies.
- No. But a smaller group usually works better, i.e. like the state representatives that met in the breakout meeting. (Paul Buchanan)
- Should include state, federal, as well as local stakeholders.
- How sure are you that the individual representatives have “captured” all of their agencies and priorities? Maybe an independently researched report could better grasp true priorities by studying the agencies and their documented priorities (as evidenced by what they actually do)
- Develop a workshop to evaluate priorities that would utilize GIS as part of the planning tool/exercise. Instead of text/tabular information, have a GIS specialist/technician assist in the workshop by operating a GIS software (eg ArcMap) to illustrate the area of interest visually. That way, data can actually be viewed and analyzed during the discussion to help inform the discussion. (Mary Bryant)
- This meeting seems to be a great opportunity, but each of us needs to talk to three other stakeholders to see if the main issues are/have been included in the discussions. Ongoing coordination/communication will further identify stakeholders and may refine issues and priorities.
- Workshops and surveys seem to work best.
- Start with a map of already existing metadata so that all understand the beginning point. Then overlay critical issues to resolve – this will lead to mapping priorities.
- This is a good start. Might want an internal working group chat-room or site-blog or ? for ongoing formal discussion.
- Where are the counties?

4. **Is there a benefit to the federal agencies establishing a single overall federal priority for mapping within Florida?**

COMMENTS during meeting:

- a. Absolutely yes! As long as it doesn't take away from ongoing initiatives; new money
- b. No, federal agencies should focus regionally
- c. No, each agency will have its own priorities to carry out mandates; what would be helpful for all agencies to know what each agencies priorities are so they can collaborate/cooperate
- d. Not on our own, continue the collaborative effort

COMMENTS from questionnaire:

- Probably not, Florida abandoned Cowardin years ago [Cowardin et al. wetland and deepwater classification scheme, 1979]
- Not necessarily, Each will continue its own objectives and mission. Encourage and support more and better collaboration where possible.
- Yes, dollars are getting tighter and tighter – need a collective/integrated support structure behind the fewest number of initiatives possible.
- Federal agencies need to develop regional mapping priorities, not state specific
- It seems that we all need to set a higher priority on collecting a comprehensive baseline data set that can be used. Federal money and resources help this effort, but we will continue to collect and recollect our “pet” areas without concern for other sites. Focused group direction is critical.
- Not qualified to address this. However, I would certainly recommend more (effective) communication between the various federal agencies would be extremely beneficial to not only the agencies (to save time, resources, efforts) but to those who use their mapping products.
- I can't answer this. It would seem that there could be reasonable arguments either way.
- I think there is a benefit for a federal priority since most agencies represented at this meeting are state and most state agencies want to map shallow, coastal areas whereas some federal work is in the deeper, shelf areas.
- No, unless they only have a limited amount of funds for a statewide data layer or if they have a limited time frame to complete the task or mission.
- No
- Within state waters the Feds should generally defer to the state, and support state efforts to coordinate on a regional basis.
- Yes, but federal agencies should work with state agencies (e.g. FWRI Center for Spatial Analysis)
- This would focus funding, but I think a broad effort should continue.

- Yes, if the federal agencies established a common goal, then the resources (both financial and logistical) can be allocated to the common goal, allowing for more efficient data coverage/collection/processing and ultimately a better product.
- Possibly-if it is organized by geography and theme with inclusive feedback from stakeholders
- Yes, this helps the state and regional agencies to plan their activities. We can also request input.
- South Florida Mapping Implementation Plan (MIP) is an example of fed/state prioritization. Different agencies have different legislative mandates and may require different scales.
- Yes
- Yes, but only if it is clearly a new requirement, not a redirect of existing efforts and resources.
- Yes, if the priority is general enough to cover the state's needs
- It ought to be state driven.
- No, not unless the priority is established by the citizens of Florida.
- No
- Definitely, Economy of effort and better employment of resources.
- I don't think so. Each agency will have its priorities to address its mandates and needs. There would be possible benefits for all agencies (federal/state/local) to know of each others' priorities and possible opportunities for collaborative mapping efforts (i.e. where here are common priorities) but I don't see a benefit to a single overall priority list.
- Difficult to provide a comprehensive priority, federal agencies are tasked with different obligations. So, no.
- Not on their own- continue collaborative efforts.
- Yes- FEMA for example
- Possibly. However, sometimes a little bit everywhere can be better than a lot in one place. We want to be sure, federal agencies don't misunderstand intentions of a priority list.
- Yes, but local entities will still have higher resolution needs that may not be addressed by large area initiatives from federal agencies.
- Yes, focused effort and continuing level of long-term support of infrastructure for development, maintenance and updating.
- No, different federal agencies have very different mandates and have (and need to maintain) different mapping priorities. You cannot single out any one of these as being the overall federal priority.l

SMALL GROUP WORK

At the end of the above discussion, participants broke into four small groups for the purpose of discussing what specific next steps need to be taken with regard to the priority areas and on the topic of funding. Participants were allowed to self-select their groups as long as the number of individuals in each group remained balanced. Each group was asked to answer the following questions about their priority areas:

PRIORITY	What is the mapping scale needed to meet the resource management needs of the agencies that identified this area as a priority? Q1	What are the mapping technologies needed to provide the information with the most impact for this priority. Q2	What is the minimum data needed to address the management questions for this priority? Q3
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Each small group found their own way to respond to the above inquiries. What follows is a transcription of the work of each of the small groups:

GROUP A: Northeast region

Small group work:

Scale	Technologies proposed	Minimum data to answer management?
Large scale- detailed	Multi-beam	MPA creation ~100 nmiles area Identify hardbottom in 100-200 m depth
Large scale (detailed)	Photo interp aerials- must acquire imagery Ground truth required	Emergent vegetation and oysters all through the estuaries
Small scale (large area)	Lidar/Inter sonar Multi-beam?	Right whale migration Bathy and shelf mapping
Large scale	Imagery- photo interp	St. Johns St. Mary's Basins- not mapped thoroughly Seagrass Oysters Benthics Also invasives like green mussels Area north of St. Johns River
	All areas need detailed bathy	

No comments following report on northeast region

GROUP A: Indian River region

Small group work:

Scale	Technology	Management needs minimum
Large	High resolution imagery Lidar bathy Photo interp	Detailed bathy Exotic species? (Calerpa, green mussels)

	Field work	Map halophila Johnsonii
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Comments after report:

1. We need data going south from Indian River proper to St. Lucie Inlet, more data needs south than in Indian River proper
2. Bathymetry, seagrass
3. Bob Virnstein had detailed information, we should go to him
4. Equipment may be a problem

GROUP A: Southeast region

Small group work

Scale	Technology	Management needs minimum
Large	Sonar Lidar Digital imagery	Reef mapping, Martin and Dade Counties

Comments after report:

1. FGS is working in this area
2. Nova is in this area and should have information on reef track
3. Into Martin and down into Dade, also go inshore
4. Get worm reefs
5. How far off is critical?
 - a. 35 meters and it really drops off
6. Some deep water turbines may be considered for that area, so deep water may be of concern

GROUP A: Oculina Banks region

Small group work:

Scale	Technology	Management needs minimum
Large detailed	AUV	Map outer banks
Large	Multi-beam AUV	Lophelia reefs not mapped

Comments after report:

1. Inshore was mapped; deeper portions need mapping

GROUP B: Charlotte Harbor region

Small group report:

What is the mapping scale needed to meet the resource management needs of the agencies that	What are the mapping technologies needed to provide the information with the most impact for this priority.	What is the minimum data needed to address the management
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identified this area as a priority? Q1	Q2	questions for this priority? Q3
1:12,000-1:24,000 scale benthic habitat landscape scale 50 m- transect, species composition and seagrass bed depth 0-100 m depth	Fisheries monitoring Color imagery Multi-beam and back scatter Lidar and back scatter IFS and side scan sonar In situ, field data, water quality and flow Transects for mangroves and SAV and grab samples (sediments)	bathymetry benthic habitat sediment type water quality HABs Flow/stage

Comments following report:

1. SWFWMD: they handle Charlotte Harbor and split with SFWMD, further south not as well mapped

GROUP B: Florida Bay region

Small group work:

What is the mapping scale needed to meet the resource management needs of the agencies that identified this area as a priority? Q1	What are the mapping technologies needed to provide the information with the most impact for this priority. Q2	What is the minimum data needed to address the management questions for this priority? Q3
1:12,000-1:24,000 scale benthic habitat landscape scale Δs 0-20 meters depth	Bathymetric Lidar Grad students with pole and differentiated GPS and kayak Water quality/flow/circulation data Fisheries monitoring (F/M) Grab samples in selected areas/gaps	Bathymetry Benthic habitat Water quality Sediments Hard bottom

Comments following report:

1. Digital Ortho Quads (DOQ) over the whole Bay

GROUP B: Tampa Bay region

Small group work:

What is the mapping scale needed to meet the resource management needs of the agencies that identified this area as a priority?	What are the mapping technologies needed to provide the information with the most impact for this priority.	What is the minimum data needed to address the management questions for this priority?

Q1	Q2	Q3
1:12,000-1:24,000 scale benthic habitat landscape scale Δs 0-30 meters depth	Multi-beam and back scatter Lidar and back scatter IFS and side scan sonar Grab samples (sediments) Water quality, flow, stage and circulation data Atmospheric deposition data Resistivity SAV transects	Benthic habitats Water quality

Comments after report:

1. I'm baffled; we've mapped Tampa Bay so much
 - a. We are going off shore now
2. This is just a listing of the kinds of data that is good to have, much of this is already available
3. Better hard bottom mapping needed
4. Area outside of Tampa Bay there is huge hole south of Bay offshore where bathymetry is needed, high powered sonar would be good
5. Spatial and temporal scales don't exist that I need (Charlie)
6. Whole west shelf, isn't there a fisheries problem? (grouper?) issue south too.

GROUP B: 10,000 Islands region

Small group work:

What is the mapping scale needed to meet the resource management needs of the agencies that identified this area as a priority? Q1	What are the mapping technologies needed to provide the information with the most impact for this priority. Q2	What is the minimum data needed to address the management questions for this priority? Q3
1:12,000-1:24,000 scale for benthic habitats-capture landscape scale Δs 0-250 meters depth 0-10 meters in estuaries	Grab samples (sediments) QTC and side scan sonar Underwater video In-situ, autonomous, field data/salinity, flow and stage data	Benthic habitats Other Water quality and flow data Sediment type, bathymetry

No comments following report

GROUP B: Keys/Tortugas

Small group report:

What is the mapping scale needed to meet the resource management needs of the agencies that identified this area as a priority? Q1	What are the mapping technologies needed to provide the information with the most impact for this priority. Q2	What is the minimum data needed to address the management questions for this priority? Q3

1:12,000-1:24,000 with minimum mapping unit =0.4 hectare (1/2 ÷ 1 acre) 0-250 meters depth	IFS and side scan sonar In-situ, autonomous, field data Multi-beam and backscatter Lidar and backscatter Color imagery	Benthic habitat Bathymetry Data to support hydrodynamic models
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Comments:

1. Q1: First answer is minimum all the way up to Biscayne
2. Q1: Some elements of it are available in some places
3. Already been an investment in this area from NOAA, keep this in mind and is available

GROUP C: Big Bend and Springs Coast regions were grouped together by this small group

Small group work:

1. Bathymetry
 - a. State waters-9nm
 - i. 10m dem ×25 cm vertical
 - b. Federal: shelf break
 - i. 1 m contours
2. Shoreline detection and delineation change
 - a. 3-5 year
3. Landscape metrics (3-5 year), benthic habitats and emergent especially deep seagrass H.d. vegetation
4. Bottom types and sediment texture
5. Scales
 - a. Horizontal,
 - b. Vertical
 - c. Temporal
6. Issues
 - a. Land use changes in Big Bend watersheds
 - b. Need updated emergent coastal wetland maps. DEP in progress
 - c. Map nearshore freshwater springs

Comments after report:

1. Need to determine how far out, the area is very diverse
2. NOAA- go at least 200 meters
3. Invertebrate mapping needed in Big Bend area

GROUP C: West Florida Shelf region

1. Remotely -sensed water quality, SST-near real time and seasonal climatology
 - a. Includes nearshore where possible-optical limits
 - b. Deep seagrass-halophlia
 - c. Decipiens beds
 - d. Bathymetry
2. Technology
 - a. Variety of optical sensors, including Lidar, and acoustics for turbid water
 - b. Water quality buoys, sensors, sampling

Comments after report:

1. Management issue looked at was fisheries

2. Northern part of Pulley Ridge and shoreline to Madison Swanson, large swath
3. NOAA fisheries standpoint: prefer to have entire west Florida shelf included
4. Dynamic conditions on shelf, sand waves, hard bottom being covered up, etc. issue to consider
5. Repeat every 3-5 years based on shelf and near shore areas
6. Some areas don't see change until every 9 years (depends on area and environment)
7. Change aerial photography to every 3 year cycle
8. USGS working with La. Coastal, cost of doing 3 year timeframe with aerial is unrealistic, pick an area as example and use that

GROUP C: Northwest region

Small group work:

1. Inshore/estuarine seagrasses
 - a. oysters
 - b. shoreline change
 - c. subsurface geology
2. Offshore
 - a. Map sand and geology and sediment texture
 - b. Desoto Canyon
 - c. Shoreline change
 - d. Subsurface geology

No comments

GROUP C: Priorities and management needs

Small group work:

1. SRWMD: Big Bend- seagrass mapping
2. FWC- Fisheries, stock assessment, threatened and endangered species
3. NOAA/NMFS- hard bottom and spawning aggregations
4. NPS/FWS-shoreline change and subsurface geology
5. Everyone- MFL's, land use change, urban growth

GROUP D: FUNDING

This group had a different set of questions to answer.

This small group was asked to respond to the following questions:

1. **What processes can be used for money to be appropriated/leveraged for collecting Baseline Mapping Data (BMD)?**
 - a. Legislative process
 - i. LBR (legislative budget request) – need agency champion
 1. e.g. LIDAR
 - b. local government petitions
 - c. tie to a hot topic; make sure it hasn't been done already
 - d. tap into existing funding streams (e.g. beach renourishment-federal, state, local)
 - e. tie into catastrophic events
 - f. bonding for data
 - g. "penny for..." county initiative

- h. Revenues generated by licenses, user fees, permits, documentary stamps, mapping license plate!
 - i. Matching fund grant programs
 - j. NGO's
 - k. WMD (seed money)
 - l. "Friends of..." groups; local conservancies, land trusts
 - m. Message should not be "mapping for mapping sake", instead target program managers
2. **There are agencies with needs beyond that of the (BMD) for some portions of the priority area. How can funds be leveraged/combined/used for the greatest impact/good?**
- a. Piggy back projects
 - b. Optimize data collection to minimum redundancy
 - c. Share data!!
 - d. Improve communication in advance of data collection
 - e. Derive additional data products from existing data
 - f. "platform of opportunity"
3. **Are there unexplored non-traditional sources of funds? Where? How do we access them?**
- a. See answers to #1
 - b. Non-traditional partners: DOD, DOT, Agriculture, (SERPPAS), industry, utilities/energy (leverage utility corridors), ports, corporate, philanthropy (endowments), endowed university programs and institutes (e.g. FGDL, FREAC)
4. **How do we facilitate the formation of public/private partnerships to support mapping?**
- a. Explore TNC model
 - b. Explore naming rights, e.g. Tropicana Field
 - c. Communicate with C of C (?) and local government, corporate boards (find a common interest) e.g. energy and manatees
 - d. Invite private sector to provide input at planning and funding meetings
 - e. Tourism and eco-tourism
 - i. Fishing
 - ii. Boating
 - iii. Disney
 - iv. Hotels
 - v. Passive recreation
 - f. Government sells data to Google and Microsoft or exchange data for products
 - g. Shame/encourage corporate stewardship (e.g. Walmart and the wetlands)
 - h. Lease/purchase to pay for data acquisition

Comments after report:

- 1. Walmart is doing funding for Gulf area
- 2. Opportunities for private sector to lobby for mutual objective
- 3. DOD: you may not get DOD \$ all the time, if they understand your priorities they can influence what DOD does, this is very important
- 4. MMS to funnel oil and gas royalties back to the states; has not happened yet
- 5. Ships of opportunity: take advantage of that, gathering water, sediment, etc.
- 6. Realtors????

7. Sea level rise issue will impact a lot of south Florida; this will impact coastal communities

CLOSING REMARKS

At the close of the above discussions, Mr. Wolfe and Ms. Robbins gave thanks to all participants for giving their valuable time, effort and input and for helping to make the workshop a success.

EVALUATIONS

Participants were reminded to complete their evaluations before leaving.

ADJOURN

The meeting was then adjourned.
