

**Gulf of Mexico Habitat Monitoring and Mapping User Workshop and Mapping Summit**  
**NOAA Disaster Response Center**  
**April 3-5, 2018**

*Hosted by the Gulf Coast Ecosystem Restoration Council Monitoring and Assessment Program (RESTORE CMAP) and the Gulf of Mexico Alliance (GOMA) Data and Monitoring Priority Issues Team (PIT)*

**Minutes of Workshop**

**~ Objectives ~**

- Share the structure, desired outcomes, and timeline of the RESTORE Council's Monitoring and Assessment Project (CMAP)
- Identify how CMAP can address user needs for Gulf of Mexico habitat monitoring and habitat mapping information and tools
- Get feedback from users on the products of CMAP, including identifying processes or products that could enhance the utility of the project
- Coordinate with regional stakeholders to continue gathering Gulf-wide information on existing baseline assessments, monitoring and mapping efforts, and monitoring and mapping standards
- Identify and discuss how to prioritize gaps in mapping and monitoring that CMAP might be able to help fill, considering the monitoring program attributes needed to achieve desired outcomes for the region
- Identify strategies for implementing the Gulf of Mexico Alliance's Master Mapping Plan

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**Tuesday, April 3<sup>rd</sup>**

## **Welcome and Review of Agenda**

Objective: Welcome attendees, set expectations for the three days, outline what hope to accomplish.

### **Summary Notes:**

This workshop is designed to begin sharing and coordinating information to support the RESTORE Council Monitoring and Assessment Program (CMAP) and Gulf of Mexico Master Mapping Plan (MMP). By highlighting our common objectives we will discuss the best ways to move forward.

This community of users should look at CMAP as a stakeholder and framing in context of what the community needs or wants. This workshop could be a kick-off at forming a mapping community of practice. We also want your opinions and thoughts on direction CMAP is moving. NOAA and USGS staff will present the development and status of the monitoring program inventory and would value participant's feedback. We will also discuss MMP and frame where the user fits within that activity and how MMP integrates with CMAP.

## **Master Mapping Plan (MMP): History and Future Directions**

**Objective:** Provide a summary of MMP history. Presented by Dave Reed.

### **Summary Notes:**

Identifying and classifying habitats was start of Data & Monitoring Priority Issue Team in Action Plan I. Seagrass came out as one of first habitat priorities. Action Plan II – developed Priority Issue Teams and birth of MMP through Ecosystem Integration and Assessment PIT – identifying mapping needs and requirements and develop collaborative strategy to acquire data.

Master Mapping Plan to Date:

- lack of funding resulted in slow progress
- want to establish baselines in the Gulf
- gaps
- MMP contributions
  - JALBTCX has developed a Federal mapping coordination tool using SeaSketch:<https://www.seasketch.org/#projecthomepage/5272840f6ec5f42d210016e4/forum/5580b2f2ac2dddd42976b4e6/topic/5761cfb2e50086fb190544e9>
  - USGS Storm Change
  - Mississippi Coastal Improvements Program (MsCIP)
  - MS/AL SeaGrant
  - Florida Coastal Mapping Program
  - LA COASTAL PROTECTION AND RESTORATION AUTHORITY
  - Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA)

Priorities now:

- Need a full inventory of what exists in the Gulf
- Long term vision: to identify gaps and secure funding to fill
- Work with a community of practice to facilitate coordination of regional mapping
  - GOMA is a coordination body not directing hard science/filling gaps. Focus of this workshop is to review work that has been done and to build on that.

## **Introduction to the RESTORE Council Monitoring & Assessment Program**

**Objective:** Share the structure, desired outcomes, and timeline of CMAP: Presented by Steve Giordano

### **Summary:**

CMAP Goals

- Comprehensive plan for healthy Gulf ecosystem using science-based decision making, measure and deliver results, adaptive management (AM)
- Will build on existing work
- Improve coordination
- Recommend consistent methods and protocols
- Develop data quality, management, and accessibility standards
- Make information gathered usable by community
- Evaluating Restoration Outcomes - how and what to monitor and how to monitor restoration activities?

Program Activities:

- Inventory existing habitat/water quality monitoring programs
- Identify minimum standards or attributes across programs
- Evaluate suitability of programs to support needs
- Data portal-georeferenced tool for program metadata discovery
- Gap analysis
- Inventory baseline condition assessments
- Developed a governance structure
  - Program Advisory Team (PAT)
  - Council Monitoring and Assessment Work Group (CMAWG)
  - Monitoring Coordination Committee (MCC)
  - Monitoring Community of Practice (CoP)

Future Program Activities

- Fill gaps
- Look at other data types beyond habitat and water quality, such as natural resources

Monitoring Community of Practice

First Workshop June 11, 2018 prior to Gulf of Mexico Alliance All-Hands meeting

- Visioning exercises
- Identify stakeholder needs

- Stakeholder input/feedback
- CoP is larger than CMAP, but will support
- Coordination effort for all needs Gulf wide and into the future
- Good starting point is working with SAV CoP that just started meeting

#### Discussion Comments

- What is meant by levels of overlap? There is designed overlap between CMAP and NRDA efforts; taking advantage of every opportunity for cross-communication. The council and NRDA have different mandates, but there is the intention to cross over where possible; in the CMAWG we're going to try and build off of the work NRDA did with the cross--Trustee Implementation Group (TIG) Monitoring and Adaptive Management (MAM) manual version 1.
- How is baseline defined? The National Estuary Program (NEP) status reports could be a good start. Need to work on the definition
- Coordination: All these moving parts is going to be a challenge; A similar effort took Louisiana Coastal Protection and Restoration Authority nearly 8 months to accomplish.
  - CMAP focus is to build on existing programs (such as the Master Mapping Plan; MMP) and define purpose of getting it together and frame how we use this for purpose of restoration planning and resource management.

#### Logic Model

**Objective:** Share the integrated logic model with attendees

#### Discussion Notes:

- What do you mean by logic model?
  - Purpose and Need, big picture, process steps, crosswalk of CMAP and MMP objectives. Developed to give users an idea of "where they fit in to this process".

#### Large Group Discussion: Questions and Reactions

**Objective:** Address attendees' questions and get initial / overall reactions to plans for CMAP and the MMP

#### Discussion Notes:

- What do you mean by "accurate" map?
  - Accurate representation of what is being mapped. Scale is a huge issue. This was a huge discussion at the Florida Coastal Mapping Program Workshop.
- Is the goal here to combine with existing efforts (i.e., Gulf of Mexico Coastal Ocean Observing System (GCOOS) or DIVER) or are you trying to make something new?
  - CMAP is integrating with other activities as appropriate, not going to duplicate effort.

- Long-term maintenance is a big question.
  - Need an action item or memorandum of understanding (MOU) that keeps this relevant and the place to go to after funding is gone.
- What is a habitat map?
  - We want to figure out what the participants definitions are and what you use. This project is a metadata project, in that sense we aren't too hung up on the definition. We will identify commonalities across programs to allow for more efficient coordination. Scale will be the driver, estuary- or basin-scale.

### Large Group Discussion: Overall Reactions

**Objective:** Get overall reactions to plans for CMAP and the MMP. Start to learn how attendees use habitat mapping and monitoring information, and how MAM are being or should be incorporated in restoration efforts.

### Discussion Notes:

***Who do you represent? How do you see this effort helping you? What kind of near-real time information do you see as important for making resource decisions in your state/area?***

- **The Nature Conservancy:** Monitoring oyster reef breakwaters; density, WQ, depth, etc.; CMAP is important to compare what is happening in project to what is happening in the Gulf; specifics include knowing what is being monitored in the Gulf and to ensure consistency; trying to strategize AM.
  - **Q: Do you do any pre-project monitoring?**
  - Yes, we're required to do pre-restoration monitoring; we have to do habitat mapping prior to restoration and SAV mapping and shoreline position; etc. and will monitor post-construction for 5 years
  - **Q: Where is your data? Is it accessible to others?**
  - Should be accessible soon, through Dauphin Island Sea Lab
- **USGS Coastal Mapping Program:** LiDAR and bathymetry data coordination across the United States needs temporal and spatial information from others on their needs; knowing what standards are needed according to target habitats (i.e., corals); CMAP is important to know how to support users and get the data they need.
- **NOAA/Dauphin Island Sea Lab:** Access to high resolution DEMs and habitat maps will be better through a project like this. Expense often occurs at knowing where you're starting; need access to high resolution DEM and habitat maps as starting point.
- **Texas Parks & Wildlife:** A lot of the TX mapping has been reactive; mostly doing oysters, structural, SAVs for management decisions; CMAP might help us reduce duplication and be more proactive. Just had first TX wide CoP mapping meeting; had good turnout of state agencies but lacked federal participation. CMAP might help us unify with the State folks.

- **LA Coastal Protection and Restoration Authority:** We monitor at the basin and project level. Where AM plays a huge role is the MS delta because there's not a historic level to restore. CMAP will help us know what to do to move forward regarding gaps. Science doesn't respect political boundaries; we have to look at the GoM as a whole.
- **Univ. Southern Miss/Centers of Excellence:** Having access to these data allows the development of research questions. As an administrator this would allow us to reduce duplication.
- **MS/AL SeaGrant:** Red Snapper abundance estimates; significant portion of budget is data mining and investigating bottom type/consolidated reefs. Non-monitoring organization needs a place for data housing and currently no single place to find these data.
- **USGS:** One thing that CMAP can do is proactively connect the dots across the Gulf and put people in touch with each other for future efforts.
- **Ocean Conservancy:** develop science based planning tools for restoration community. We don't do onsite restoration activities, but are interested in integration of Gulf-wide restoration and ecosystem assessment efforts. we want to see at the high level a successful effort and to do that we need to tell success stories; we need access to monitoring data to communicate and synthesize that data for dissemination to the broader community

***If you're going to be doing true AM, do we need different types of data/information than what is available?***

- **NOAA Restoration Center:** NRDA AM can happen at different scales; looking at larger scale, we need some sort of agreement regarding what are the most important things that we can collect from every mapping dataset.
- **US Dept of Agriculture:** Private/developed land context; start to incorporate the kind of monitoring/mapping data into what we're doing; need to look at the trends of urban and agricultural contexts.
- **NatureServ:** Scale is important; are we moving the needle at the Gulf level is a different question than site-level questions and needs to be taken into account
- **NOAA/Dauphin Island Sea Lab** This is a platform that will bring together things other than just mapping; inclusion of habitat monitoring and assessment as well should capture additional information many of the mapping inventory efforts have missed.

- **NOAA:** Thinking about AM and projects that might be underperforming; may have more to do with underlying processes that are driving conditions that are unfavorable to restoration than restoration methodologies.
- **The Nature Conservancy:** Reiterate understanding of system stressors; i.e. loss of shell and we don't know why despite success in the first 3 years; maybe there's something we didn't measure, but we need to look at other kinds of stressors.
- **Texas Parks & Wildlife:** Caution in scaling up because local stressors are so different; defining success criteria in some regions and not the entire GoM is going to be important for AM.
- **MS/AL SeaGrant:** Adaptive means adapting from one thing to something else because something didn't work; need to capture methods; how do we transfer best practices? Will there be an education program to teach best practices?
- **USGS:** Adaptive management means considering recurring decisions; what are those decisions? How do we communicate those across programs; RESTORE Council has a requirement for AM and CMAP will help; taking lessons learned and levels of training and making that available to stakeholders; how are monitoring data looped back in the feedback mechanisms for AM? RESTORE Council will be kicking off those discussions this year
- **Florida Institute of Oceanography:** how are you actually monitoring – possibly started without good underlying mapping information. To what extent will these legacy monitoring programs adapt with habitat mapping. Measure of this team will be if we can get change in those places.

**CMAP: How can you all use the monitoring information we gather to plan/design/implement projects? Is there some utility for that purpose?**

- **Florida Fish & Wildlife Commission:** reef fish populations in the Gulf; looking at fisheries stock assessments and monitoring occurring at the same time so the type of information collected here will be useful for our projects regarding representative habitats.
- **NOAA/NCEI:** We're here to help source data that exists in the archives; this data that you all are looking for, what does that data need to look like? What do you need to know about the data? Do we need to create derived products? What are your needs?
- **NOAA Restoration Center:** mesophotic/deep water coral habitats under NRDA; mapping will help ID restoration site planning need to collect data at very high resolution and is a sampling design challenge; DIVER/Environmental Response Management Application (ERMA) and other clearing houses of data and identifying them all is a huge endeavor in and of itself.
  - **CMAP/MMP:** We are taking into account other inventories and we're picking those inventories up and taking them further; we know that there's other information out that

we haven't gotten to yet. This program is inventorying and assessing program metadata, not actual monitoring data. We provide access to this information from one place with linkages to the actual data.

- **Q:** Is the ESRI tool we heard about at Gulf of Mexico Oil Spill and Ecosystem Science (GoMOSES) Conference still on the table?
- **CMAP:** There is some exploration with ESRI, we may be able to test it with the Alabama SAV pilot.
- **USDA:** Really looking forward to using the different screening criteria option; EPA has mandate for environmental justice and incorporate CMAP goals with that mandate
- **Ocean Conservancy:** Important for AM practitioners to characterize as value added benefit; The Ocean Conservancy just finished case study for how AM has benefitted restoration programs <https://oceanconservancy.org/restoring-the-gulf-of-mexico/take-deep-dive/adaptive-management/>

***Are you aware of monitoring currently taking place for RESTORE, NRDA, etc. restoration projects in your state and how is monitoring enforced for these efforts?***

- **NOAA Restoration Center:** Most of the NRDA data are stored in DIVER; looking to automate so system can send data update reminders; mostly early restoration.
- **LA Coastal Protection & Restoration Authority:** restoration programs with program-wide monitoring but don't know how individual projects affect the larger system; what to do with the data, e.g., Louisiana Sand Resources Database (LASARD); trying to synthesize data to assess how much and what is really needed via AM.
- **The Nature Conservancy:** monitoring 1.7 mile reef tract with NOAA; we are required to monitor some things (USACE permitted project requirements) but most of what we do we do on our own
- **CMAP:** USACE has requirements for monitoring and AM for mitigation and ecosystem restoration projects.
- **RESTORE Council:** RESTORE funded projects; documentation for project success is done on a project by project basis; data is reported out to databases of the practitioner's choosing; one of the goals of the CMAP project is to come up with recommendations for what should be collected/monitored.
- **NatureServe:** Has a Restore Science Program project that developed key sets of ecosystem indicators for 5 ecosystems - has a draft list available.
- **NOAA Restoration Center:** Cross-fertilization should help with coordination and duplication

- Cross-TIG MAM isn't just feds, does have heavy state participation. Good source for knowing what is going on
- 2 region-wide TIGs would be relevant
- Nature of activities for the different groups could be quite different
- **NOAA/Dauphin Island Sea Lab:** AM reflection; Alabama Real Time Coastal Observing System serves data for over a decade; it's important to remember lessons learned of ease of access, relevancy, trust, and bringing something into the culture of decision making; setting realistic expectations for incorporation of this project into the field of AM is important
  - important to highlight success stories and failures/challenges
- **FL Dept of Environmental Protection:** Statewide assessment of coastal and aquatic resources - same hubs that NatureServ used - starting with OC datasets and creating a database that will link with other databases for each of the indicators.
- **Nova SE Univ:** Habitat mapping on west FL shelf; a lot of discussion about monitoring/mapping data and want to caution/have folks assembling the data provide data limitations as part of the assembly to prevent inappropriate use of the data or out of context use
  - Where applicable, inventory can note quality controls and use limitations

**Breakout Groups: How Can CMAP and the Master Mapping Plan Address User Needs for Gulf of Mexico Habitat Monitoring and Habitat Mapping Information and Tools**

**Objective:** Get more detailed information on users' objectives, challenges, and needs

**Discussion Notes:**

**Question 1. What are the top habitat issues of your organization, and what monitoring/mapping data do you use and/or need to make informed decisions and meet your management goals? Participants answers were grouped by general topical areas to better capture the information.**

**ISSUES**

**Habitat Related**

- |   |                            |
|---|----------------------------|
| ● Sea level rise                            | ● MS/LA delta              |
| ● Shoreline/wetlands erosion/accretion      | ● Beach management         |
| ● Living shorelines/breakwaters             | ● Unpermitted reefs        |
| ● Lack of high resolution mapping products  | ● Cost prohibitive surveys |
| ● Poor SAV, Oyster, Wetlands, Mangrove maps | ● Funding for mapping      |

### **Habitat Use limitations**

- Birds
- Fish
- Sponges
- Sturgeon
- Corals
- Mammals
- Turtles

### **Activities**

- Restoration planning/prioritization/siting
- Land use
- Regulatory vs Restoration issues
- Poor management
- Conservation prioritization
- Conflicts with stakeholders
- Lack of education/outreach
- Funding

### **Data**

- Availability
- Quality
- Storage
- Funding
- Resolution issues
- Standards
- Habitat classification issues
- Too many gaps
- Inconsistent mapping schedules
- Scale
- Modeling
- Lack of baseline for decision making, siting

### **Coordination**

- Lack of
- Duplication of effort
- Funding

### **Other**

- Cultural resources
- Restoration monitoring

### **Uses of Monitoring & Mapping data**

#### **State and Federal monitoring programs**

- Oysters
- Seagrass
- Mangroves
- Wetlands
- HABs

#### **Mapping data**

- Aerial imagery
- LiDar
- Multibeam/backscatter
- Topobathymetry
- BOEM submeter data

## Infrastructure

- Vessels
- Aircraft
- Drones
- ROV/AUV

## Other Programs

- National Estuarine Research Reserves (NERRS)
- NOAA Archive
- LA SWAMP
- Gulfwide SET data
- EPA

## Needs

### Mapping

- Higher resolution multibeam w/backscatter
- More topobathymetry
- Higher resolution DEMs
- Consistent temporal/spatial resolution
- More recent mapping data
- Substrate
- Sub-meter info in mesophotic/deep
- Mangrove
- Light pollution
- Coastal, urban and riparian forest
- Offshore sand distribution
- Tide and current information
- Coastal LiDar
- Storm surge inundation
- Land use
- Inventory of whats available

### Habitat use information

- Birds
- Sturgeon
- Fish
- Deep coral communities
- Living marine resources
- ROV data for characterization/ground-truthing

### Other informational

- Wave energy
- HABs
- Affects of turbidity to mapping
- Water quality trends
- Cultural resource surveys
- Sea level rise scenarios

### Planning & Management

- Educating public/stakeholders
- Outreach
- Research and Development
- Monitoring information integrated with models
- Downstream effects from upstream events
- Watershed management planning
- Restoration planning
- Better coordination/communication

**Question 2. What has been the biggest challenge to developing/implementing MAM in your organization?**

- no prior knowledge; learning by experience
- working with other agencies
- scale
- lack of guidance?
- time to develop MAM for ecosystem restoration
- Politics/state needs
- communication break down
- AM for data management and protocols; not restoration
- limited by governance structure
- Ability to use legacy/historical data for current issues
- “we’ve always done it this way”
- local/state coordination is limiting
- Management and science disconnects

**Recommendations:**

- NEP has a good MAM model; suggest compiling NEP and look at min mon data requirements and best management practices (BMPs)
- Goals should relate to ecological integrity; recommendations for design, monitoring, and restoration
- Lack of guidance for artificial reefs; could look at monitoring or BOEM's rig removal program
- Use existing restoration/monitoring information if it exists, no need to reinvest in data collection
- Ensure data collection methods are consistent
- Need to account for natural variability with respect to adaptive management

**Question 3. How can CMAP/MMP address user needs?**

Who are the users?

- RESTORE COUNCIL Staff and Members
- Resource managers at all levels
- Congress/State Governments
- Academics
- Public
- Citizen scientists
- Restoration practitioners

Ranked CMAP/MMP benefits:

- Leveraging opportunities/funds/equipment
- Preventing duplication of effort
- Restoration planning/prioritization
- Highlight gaps
- Help with trend detection
- CMAPs recommendations and guidelines
- Adaptive management
- Reference sites from other projects
- Enhancing communication

- Data discovery
- Help update monitoring design
- Baseline standards
- Damage assessment

**Question 4. Does your organization have a process for adaptive management that incorporates monitoring and are there any additional challenges?**

- No process: USGS, Ocean Conservancy, FL DEP, TPWD, other FL, LA System-wide assessment and monitoring program (SWMP)
- Yes to process: Sea Grant, CPRA, FL Reef Program, EPA, NRDA, USDA, Governor's Oyster Action Plan, Mobile Bay NEP
- Similar process: NOAA Sanctuaries, The Nature Conservancy, Sentinel Site Cooperative

**Challenges**

- Consistency
- Continuity
- Application of collected monitoring data
- Need better monitoring
- Loss or not transferring institutional knowledge
- Are we asking the right questions? More thorough objective delineation

**Question 5. What scale of monitoring and mapping is needed for what you do?**

- FL: bathy/topo for shoreline to 20 m preferred 1-3 m resolution
- FIO: 1 m bathy resolution; could be multiscaled in a nested framework
- FDEP: field work done at 10m resolution
- MS/AL Sea Grant planning occurs at sub regional scale
- MS COE & DMR operate at the scale of the MS sound, but some finer resolution at project scale
- TX: 100-2500 m<sup>2</sup> is acceptable at state resolution, 1 m<sup>2</sup> preferred for habitat mapping or resource utilization
- LA CPRA, SWMP, CRMS basin scale, but many project scale require finer resolution
- USDA: HUC12 level to detect changes from restoration
- USGS: elevation mapping 1 m<sup>2</sup> DEM
- NOAA fisheries: 1 km<sup>2</sup> for highly migratory species, high resolution for benthic species
- NOAA Coastal Change Analysis Program 15m resolution, also county and watershed level
- Ocean Conservancy and Nature Conservancy: mostly Gulf-wide, state and finer depending on objective
- NatureServ: regional to national
- EPA: estuary to regional

### How does the use of monitoring and mapping vary at different scales?

- Spatial and temporal scale varies according to needs/application
- Need reference materials that outlines acceptable resolution based on project scale and target user group
- Best available data typically used-preferably high resolution, most cost effective
- Needs for both high and low scale application
- Broad planning level can have low level scale; project/monitoring level needs higher resolution, sometimes sub-meter
- Council: Multiple scales to inform adaptive management; Finer scale (temporal and spatial) projects important to informing bigger picture
- Gulf bathy mapping 10x10 m<sup>2</sup> is ok; too coarse for fisheries assessments
- Examples
  - Sub-meter needs (inshore, oysters)
  - USACE: regional sediment management requires use of highest resolution data available
  - TNC: needs for high resolution data for habitat mapping, habitat change assessments, and decision-making at a regional scale
  - Apalachicola NERR habitat delineation - highest resolution available
  - LA: 30-500 m grids for modeling hydrodynamics, vegetation
  - USACE regional sediment management – highest resolution available
  - USFWS habitat mapping (sub-meter), other non-habitat work at 30 m
  - FWRI fisheries surveys (1-10 m)
  - TNC habitat mapping, change assessments, decision making

### Temporal Issues

- event based scales (hurricanes)
- project/needs dependent
- tidal, seasonal, environmental factors
- NERR monitoring done 4 times per yr
- TX mapping? Updated every 10 yrs

***BREAKOUT 5: What web tools, web sites, or web services do you use for discovering or identifying habitat mapping and monitoring data? In searching for data, what functionality do you find most useful. What types of queries do you use or would you like to use to help find data resources (e.g. spatial query, keyword search, temporal search)?***

#### Needs:

- map with data/metadata that are available for restoration monitoring (footprints vs single dots)
- Python code access
- REST Services
- all land acquisition NRDA
- digitizing legacy data
- Web sites for discovery (see attached spreadsheet)

**Functions:**

- time series of change
- structure of habitat
- visualize
- ability to download data/modify
- good system to view data
- good metadata
- raw and processed data (different needs for different projects)
- Python code access
- REST Services
- Species occurrence over time and map (e-Bird but better)
- planning and coordination
- spatial queries
- immediate output to get data
- responsiveness
- webmap, sensor obs services (how data gets to GCOOS)
- user friendly
- intuitive

**Websites/portals/tools:**

The breakout group listed 93 sites that provide tools or data discovery. This list is provided as an attachment to this summary.

**Adaptive Management topics**

- Adaptive management process must be defined from beginning with scenarios and responses; monitoring indicates process so take corrective actions – this is not AM
- Some organizations do not have formal process or call that process AM but follow concept
- Some funding streams are starting to require AM
- Participate in discussions but no particular process
- NRDA has but no true requirement; lacks teeth; varies within TIGs
- Culture of AM across organizations but not formal AM process

**Day 2 Wednesday April 4****Review of Day 2 Agenda, Reflections from Day 1****Large Group Discussion: Ongoing Monitoring and Mapping Inventory Efforts, and Monitoring Program Attributes for CMAP**

**State representatives share status of habitat monitoring and mapping activities. *Presentations available upon request***

**Steve Jones - Geological Survey of Alabama**

- Many sources of data within the state; Websites available in presentation. Steve can be POC for further questions

**Emma Clarkson – Texas Parks and Wildlife**

- Just had a workshop to create an instate network of mapping;
  - focused on larger scale
  - product will be document outlining who, what, when, where of TX mappers

- will include unofficial set of products
- Water Development Board, responsible for aerial acquisition
- many missing orgs, including Feds, need a round 2
- Will send a list of TX programs to inventory Team

### **Syed Khalil – Louisiana Coastal Protection and Restoration Authority**

- CIMS website to access info on different programs
  - System Wide Assessment & Monitoring Program (SWAMP)
  - Coastwide Reference Monitoring Program (CRMS)
  - Barrier Island Comprehensive Monitoring Program (BICM)
  - Louisiana Sand Resource Database (LASARD)

### **Karen Clark – Mississippi Department of Marine Resources**

- most data in MS comes from Grand Bay NERR, Sentinel Site Program, and oyster program
- most data not publicly available right now but working on developing a portal for access

### **Cheryl Hapke - USGS**

- Development of FL Coastal Mapping Program
- established technical and steering committee (includes NOAA and BOEM)
- Goal: modern, high res topo bathy for entire coast of FL
- divided FL into 6 regions for gap analyses
- next steps will include bringing on state coordinator (sit at FWRI)
- 230 programs in FL related to the 5 submerged habitats of focus
- Question: What is the tie-in with CMAP? The overlap is inventory; still a work in progress; info from breakout groups from this workshop will help with direction and feed into GOMA All Hands mtg. Not just mapping, monitoring also.

### **CMAP Habitat Monitoring & Mapping Overview/Status**

Criteria to filter the inventory

- Temporal criteria
  - 1980-present
  - active and inactive monitoring
  - 5-year recurrent sampling or 2 sampling events within 5 years
  - not focusing on non-habitat forming resources
  - some exceptions (data limited area, foundation dataset)
- Spatial criteria:
  - HUC10 boundaries through EEZ
  - Programs could extend outside of GOM

#### Habitat monitoring parameters – 4 general levels:

- submerged hab building animals - population dynamics, composition metrics, health, morphometric
- plants- population dynamics, composition metrics, health, morphometric
- soli/sediment chemistry
- physical

#### Mapping

- Imagery for benthic/terrestrial habitat classification, navigation, etc.
- Programs to include:
  - Gauge the conditions or state through remotely sensed measurements
    - LiDAR
    - SONAR
    - Satellite
    - Aerial
  - Primary data used to develop habitat maps
  - Develop recurrent or foundational map products
- Parameters:
  - Area of habitat types
  - Topographic
  - Bathymetric
  - Topobathymetric
  - Imagery
  - Shoreline profile
  - Accretion
  - Subsidence

#### Status

- used Ocean Conservancy Monitoring Atlas inventory and USGS Global Change Monitoring Portal as starting points
- currently have 322 programs
- most were accepted based on criteria though some were accepted with exceptions
- will reach out to Community of Practice and program POCs to help fill inventory gaps
- Longterm maintenance is a concern

#### User Interface

- Hope to have all programs georeferenced
- Users can browse by map or tabular search
- customized or predefined options
  - programmatic or site level
  - wq, habitat monitoring, or mapping program

- aquatic setting and habitat types
- uses CMECS where appropriate for all attributes
- all parameters/attributes will have controlled vocabulary
- monitoring parameter search w/ attributes;
- also tying programs to NRDA restoration projects

Displayed examples of spatial outputs

- Q1. Why does the boundary extend to east coast of FL?
  - Using RESTORE Council boundary which extends to east coast
- Q2. CMAP seems to really be focused on benthic?
  - No CMAP includes terrestrial and water column.
- Q3. What about the deep water?
  - CMAP will also cover deep water pelagic and benthic.
- Q4. Didn't see sargassum, is it included?
  - It is included but grouped into SAVs.
  - **SUGGESTION:** Participants recommend sargassum being a stand alone category.
- Q5. why porewater and groundwater are classified as "habitat"? **SUGGESTION** Remove  
**SUGGESTION:** Should touch base with Jim Gibeaut and GRIID C  
**SUGGESTION:** would encourage recognition of urban areas as a habitat, as well as agricultural

## Breakout Group #2

### Q1. Is CMAP collecting information that is useful?

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>● Useful for siting prioritization</li> <li>● will be helpful only if it remains active/sustainable/maintained</li> <li>● Making connections with potential partners</li> <li>● CMAP has greater resources and needs broad community buy in</li> <li>● Optimizing project to benefit multiple groups</li> <li>● Connecting DWH projects</li> <li>● Building solid foundation (CoP) to increase buy-in and support</li> </ul> | <ul style="list-style-type: none"> <li>● Sets the stage for future data synthesis (modeling)</li> <li>● Challenge: capturing a wide range of domains-might lead to a complicated, clunky system</li> <li>● not useful if data isn't current and obsolete</li> <li>● may not be able to scale up for purposes other than the original intent.</li> <li>● keep information handy that doesn't make the first cut</li> </ul> |
|---|---|

### Q2. Is the attribution correct?

- Most agreed
- Suggest adding light pollution maps
- Add pelagic and mesophotic habitats
- Avoid too many attributes to avoid cumbersome system

### Q3. What is missing? Suggestions for discovery.

- Reach out to Christine Shepard TNC
- NERRS Sentinel Sites
- Mike Osland SET Database
- Keep FL east coast in the domain
- Prop scar mapping in FL; Texas has a discrete program
- Mobile Bay NEP has habitat mapping
- Swift track? (Renee Collini)
- touch base with all COE's
- Emma will send Texas programs
- Just Cebrian has a lot of marsh data
- DISL Data Mgmt Center
- Private industry data?
- BOEM data
- Urban/agricultural lands
- NCEI archived data

### Suggestions General

- Suggestions for better coordination?
- CMAWG should help us coordinate in state, but need to know the appropriate people. Maybe we need a key POC in each state?
- maybe put structure in place to facilitate communication?
- A lot of state reps don't participate in GOMA
- leverage frameworks with state frameworks
- need to disseminate this info back to states, all agencies
- MS AL SEAGRANT has guidance on data reporting and public access
- thought put into query capability for faceted searches
- combining searches will be important, include both habitat and water quality programs
- Policymakers are going to want to know what progress is being made – could use iterative gap analysis to show that. The inventory should be available through NCEI archive; accessibility is key.

### Q4. How to keep the inventory relevant over time?

- Link to funding sources; put data in one place
- make it as accessible as possible
- Make direct links to the data
- Need a champion
- Keep relevant with new technology
- Connect to state web mapping services
- Require new programs to be required to be part of the inventory
- Need to think beyond end of DWH funds (20-25 yrs)
- Data management plans and requirements to ensure that data is useful and accessible

## BREAKOUT #3

### GAPS

- **Monitoring**

- Reef species composition and condition
- Water quality parameters (pH)
- Gaps in SETS between NERRs/Refuges
- Subsidence
- Consistent bathy-topo "frequency/routine cycle"
- Blue water
- Lack of region wide collaboration; prohibitive to assessing baseline
- Lack of unified data management, monitoring parameters and standards
- Water quality gaps between NERRS
- Living shorelines
- Islands and dredge spoil
- Coordinated SAV maps
- Lack of comprehensive offshore water quality
- Macroalgae
- Oil platforms
- SETs
- Subsidence
- Proprietary data
- Deep benthic communities
- Concurrent fisheries/habitat data
- Components needed to build habitat suitability models
- Gulf-wide indicators
- Hydrodynamics

- **Mapping**

- Reef habitat
- Oyster reefs (present/historic)
- Estuarine (bathy/topo)
- Mangroves
- Remotely sensed data analysis (satellite imagery vs. side scan)
- Shoreline armoring/change
- Land classification (dredge/spoils)
- Oil platform mapping (BOEM)
- Benthic offshore
- Blue water
- Existing satellite data for habitat
- Cultural mapping (ancient burial sites or forests)
- Proprietary data
- High resolution sediment maps
- High resolution DEM
- Light pollution
- coordinated SAV mapping
- "unprocessed" data - existing NOAA navigation data
- high resolution bathy (prioritized)

- **Causes for Gaps**

- Coordination/redundancy
- Technology application
- Satellite application
- Access/complexity/logistics
- Political boundaries - sharing/pooling funds (MOAs)
- Data acquisition \$ (decrease) causes (increase) in programs
- Accountability/mandates

- Staff turnover/champion loss
- Legality
- Capacity and capability (collection and processing)
- Extensive coverage
- Data not readily accessible
- Dynamic resources
- Logistics/Cost
- Willingness to share
- Mandate and/or need - including awareness of need
- Data compatibility
- Coordination/communication across groups
- Technology
- State gaps
- Awareness

- **Challenges**

- Subsidence, especially in LA
- Coordination is huge gap
- Technology
- Political boundaries
- Lack of accountability/mandate
- Staff turnover and loss of champions
- Cost of data acquisition has decreased allowing for more collection but reduced coordination

- **Approach to Filling Gaps**

- Coordinate mission requirements => multiple techs on vessel/array/optimization
- Feedback/adaptive strategy
- Develop a process of implementation – short & long term
- Shared resource planning
- Inventory capacity
- Facilitate data standards
- Cross-mission training
- reprocessing existing data with modern tech
- Further application of satellite imagery
- Mini-CoPs
- Dedicated funding source for monitoring
- Marketing
- Citizen science (sea turtles, manatee, eBird)
- Private/public partnerships
- Sampling optimization for multiple user efficiency
- SET platforms/Vessels of opportunity
- Education for technology transfer from NERR
- Using modelling more effectively
- Versatility/Usefulness
- Leveraging/Efficiency (equipment)
- Political support
- Crowdsourcing

#### **Breakout #4. Prioritizing Gaps**

##### **Q1. What are the criteria to prioritize gaps?**

- Management needs
- Multi-use
- Needs assessment
- Cost benefit analysis

- Biggest bang for the buck
  - Leverage opportunities, common objectives
  - Develop detailed scope of work with short/long term activities aka LA Master Plan
  - Use a planning portal like Seasketch
  - Develop a framework like the SET cooperative
  - Consistent standards
  - Need dedicated funding for monitoring
  - Increase capacity (people, vessels)
  - Marketing – value of monitoring
- **If ample funding was available, we could...**
    - mapping entire Gulf Coast, all sediment distribution map, divide whole map into planning units
    - all low hanging fruit, bring together all habitat monitoring and mapping data, leading to gap analysis
    - first topo-bathy map for entire Gulf
    - DEMs for southwest Florida and some in Louisiana and uncertainty
    - focus on foundation data – expanding or creating baseline
    - prepare baseline for emergency or catastrophic events
    - fill needs in data management and processing, synthesis, analysis, cataloguing, and archiving
    - training guidance for implementing protocols and standards with a communication plan
    - set up a communication network for collaboration and cooperation, i.e., former SeaSketch
    - demonstration projects for a programmatic approach, show life-cycle of process
    - identifying existing and future user needs
    - establishing instantly accessible database to users

Concerns about creating a new portal or joining an existing one:

- How to promote/solve continuity
- How will this fit into National effort
- This will be guidance for council
- coordinated with NRDA and NFWF we will adopt output of CMAP
- Provide visualization for where all of the data portals are on landscape
- Hopefully greater resources for this effort and greater community buy-in/use
- GoM-centric and responsive to funder
- Must demonstrate to council where gaps exist to guide future phases for gap filling funding
- Council-funded restoration projects that require monitoring - CMAP dev. Foundational info to guide recommendations

Thursday, April 5<sup>th</sup>

## Moving Forward Holistically on CMAP and the Master Mapping Plan

**Objective:** Reflect back on input received over first two days and how that informs the logic model, frame up discussion for day 3

CMAP and MMP staff summarized some of the recommendations and feedback that were received.

Ali Robertson talked about the upcoming Monitoring Community of Practice workshop to be held June 11, 2018 prior to the Gulf of Mexico Alliance All Hands meeting in St. Petersburg, FL.

### Questions

- *How are the COPs (larger and sub) meant to be organized? Are the subgroups meant to be a part of the larger group or separate?*  
Because the larger COP is so broad, the idea would be for the subgroups to feed the larger one. There's one COP we're trying to organize to serve the needs of the Gulf at large; allows the opportunity to engage a broader group; the community as a whole will determine if/when/how any self-organization of subCOPs are needed.
- *The MCoP seems large and overwhelming. Thinking about GoMOSES and how large, unwieldy it is, how will this be different?*  
The difference here is that we actually have funding to develop the COP and define its structure. One thing to note is that we aren't starting from scratch, the GOMA PIT teams are also involved.
- *What is the level we'd be targeting with the subgroups?*  
Follow the NRDA 13 restoration types as "targeted" sub communities of practice and then build out from that. Self-organization is one thing and is helpful, but it's also important to have some overarching governance type of structure. Having a champion for each subCOP is super important
- *Standards. Where do we agree on how things are going to look?*  
Hard to establish standards after work has been conducted. Should talk about common attributes rather than standards. DIVER has some core parameters that need to be filled. CMAP can operate the same way. CMAP intends to develop this list of standards or attributes once we look through the inventory and assess the commonalities.

### Communication Suggestions

- emails for updates and reminders when there is progress
- Public facing report?  
There are deliverables for each task. RESTORE Council will place deliverables on their website.
- Document sharing site?  
Perhaps a one-stop-shop for that sort of thing. May have utility in the future.  
BaseCamp has been successful, might be limited in utility. Needs to be a platform everyone can use
- Need mechanism for maintaining contact lists and circulation lists as current especially for CoP

**Potential Habitat Subgroups:**

- Mesophotic deep benthic
- break up by technology type
- let the data drive it
- let it be needs-driven
- let it be functional versus topical.
- Will start the process at GOMA

**Data Management and Product Delivery Issues**

**Objective:** Discuss issues related to data management and delivery of products

**Discussion Notes:****Query Suggestions**

- Products
- Data Accessibility
- Software requirements – suggestion to use open data standards, open platforms to avoid issues
- Query by date
- Data type (e.g. elevation) – would be under parameters
- Taxonomy – not to that level
- **ACTION:** Add controlled vocabulary and schema to items that will be sent out

**Good Examples of data discovery platforms**

- Marine CADASTRE (BOEM/NOAA)
- Gulf TREE
- LASARD
- MS MARIS – open source templates

**Ongoing Communication/Meetings**

- MCoP
- GOMA All Hands

**Meeting Adjourned**

Appendix E. Habitat monitoring and mapping workshop participants.

Habitat monitoring/Mapping Workshop		Mobile, AL
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