Mobile Bay National Estuary Program
Science Advisory Committee Meeting
Killian Room, International Trade Center
250 N. Water Street, Mobile, AL 36602
Friday, July 18, 2014
10:00 a.m. – 3 p.m.

Telecon: 1-888-848-0190 Passcode: 6307392

Tentative Agenda

1. Approval of minutes from the June 13 SAC meeting.

2. Tim Thibaut (Barry A. Vittor & Associates) - Development of Biological Indicators and a BCG Model Framework for the MBNEP Study Area – a continuation of a presentation describing conceptual approaches to BCG development and discussion (through lunch)

3. Tom Herder (Mobile Bay National Estuary Program) – NFWF Gulf Environmental Benefit Fund Proposal – Coastal Alabama Restoration Program – Phase 1- melding the products of these efforts into the process of constructing a BCG

4. Maury Estes (University of Alabama – Huntsville) – Remote Imaging as a tool to assess biological condition and ecosystem health and define relationships between stressors and biological condition

6. Discussion

7. Adjourn

Minutes of the Meeting of the MBNEP Science Advisory Committee (SAC)
Killian Room, International Trade Center
Friday, July 18, 2014

In attendance: Dr. Becky Allee, Dr. Steve Ashby (Northern Gulf Institute), Dr. Alex Beebe (USA), Renee Collini (DISL), Mike Dardeau (DISL), Dr. Dennis Devries (Auburn University), Maury Estes (University of Alabama at Huntsville), Meg Goecker (Restore Ecosystems), Josh Goff (for Just Cebrian, DISL), Patric Harper (US FWS), Steve Heath (ADCNR-MRD-Retired), Lisa Huff (ADEM), Steve Jones (GSA), Julien Lartigue (NOAA), Tim Thibaut (Barry Vittor and Associates), Dr. Bill Walton (Auburn University), Dr. Rusty Wright (Auburn University), and Tom Herder (MBNEP)

Mike Dardeau called the meeting to order (after brief technical difficulties resolved by the ASPA IT staff) at 10:10, asked if there were any revisions to the minutes of the June 13, 2014 SAC meeting. Hearing none, the minutes were approved.

Tim Thibaut assumed the floor to finish the PowerPoint presentation begun on June 13. He reiterated three levels of assessment for wetlands: landscape assessments (like applications of Land Development Intensity (LDI) indices to predict levels of habitat degradation), wetland assessment methods (like the wetland rapid assessment procedure [WRAP] used by the Corps and ADEM for permitting and mitigation), and intensive assessment (like the hydrogeomorphic model [HGM] derived from mathematical indices).

In his example, he reduced the number of condition classes to three (from the six conventionally employed in biological condition gradients [BCGs], and provided values for high (=1), medium (=2), and low (=3). He used proportions of habitat rated at each of the three condition values to calculate a condition index. In his example, he assessed 100 acres of wetlands, with 50 acres rated good, 35 acres rated "medium," and 15 acres rated "low:"

50/100 acres = 0.50 X 1 = 0.50
35/100 acres = 0.35 X 2 = 0.70
15/100 acres = 0.15 X 3 = <u>0.45</u>
Condition Index = 1.65

On the BCG curve, 1.65 would fall below "one" (the level describing good habitat) and above "two" (the level describing medium habitat). There was general agreement upon the determined value describing the condition of the assessed habitat. The question of total area was raised, and Tim made a case against including area, but several participants argued its importance.

Bill Walton argued that if 31 acres of low quality wetlands was paved, the value of the remaining wetlands parcel would be scored higher than the intact marsh, pre-pavement. Others argued that as a communications tool, people will see ways around numbers. Steve Heath said that the BCG will be a benchmark for biological resources and that it needs to be able to withstand scrutiny from the general public and from developers who will not miss opportunities like the one to which Bill alluded.

Lisa Huff wondered why paved-over habitat would not be considered a "6" (which, in established BCG protocols means: "Extreme changes in structure and ecosystem function; wholesale changes in taxonomic composition; extreme alterations from normal densities).

Mike Dardeau suggested an index/number that captures both quality and acreage, since in terms of ecosystem service provision, 25 acres of high quality habitat might be equivalent to 50 acres of medium quality habitat, which might be equivalent to 100 acres of low quality habitat.

Bill Walton suggested using real acreage (not proportions) to develop indices and having multipliers that correlated to habitat quality. Rusty Wright responded that boundaries are important, and if they don't change, then there is no problem using averages or proportions.

Renee Collini agreed with Dr. Walton and suggested that we switch value attribution, to let higher numbers represent greater habitat value. She felt that this would enhance the value of the framework as a tool to communicate condition. Bill Walton expressed that going with just averages for condition was risky, and Mike Dardeau said that he wanted to know about both area AND quality. This would allow 1) comparisons of one watershed to another with accuracy or 2) comparisons of condition within a single watershed over time.

Dennis Devries supported integrating acreage within the number or index. The index could use real acreage or "normalized" acreage. He challenged that this number does not represent a real BCG, but instead an index. Lisa felt that it represented a prediction or presumption of biological condition rather than a real measure of biological condition. She provided some background on the development of a BCG for northern Alabama streams and rivers and how condition was based upon attributes like fish and invertebrate taxonomic distribution based upon tolerance. She said that what we have developed is more of a "watershed condition gradient."

Rusty Wright revisited Bill Walton's assertion that by removing the "31 acres" of low quality wetlands, the score would increase. He said that if the 31 acres was left in the accounting, we would see a downward shift in the score, reflecting the loss.

Bill Walton expressed that he felt that the method was improved by 1) letting the condition index correlate directly (and not inversely) to habitat quality and 2) summing real habitat acreage rather than using proportions or normalized values. He then asked whether it is easier to create high quality wetlands or to improve low quality wetlands to a high quality condition. Patric Harper and others responded, indicating that creating high quality wetlands posed less challenges than improving low quality wetlands.

Mike Dardeau suggested using total area to determine indices for comparing watersheds across the two-county area and normalizing them for discrete management within sub-watersheds. Lisa Huff and Steve Heath both suggested dividing condition by the maximum possible condition for that acreage.

Heading towards lunch, Mike Dardeau suggested:
1) Reversing the scale to reflect condition and not stress,
2) Using total acreage multiplied by condition values in one set of indices, and
3) Using proportionate acreage multiplied by condition values in another set.

Some description about BCGs was provided for Meg Goecker, and it was agreed that they are useful and comparable even across difference regions for describing condition. The committee broke for lunch around 1145.

During lunch, Mike Dardeau and Renee Collini experimented with numbers based upon an initial assessment of a 1,000-acre wetland with 400 acres of high quality (6 pts.), 200 acres each of medium-high quality (5 pts.) and medium quality (4 pts.), and 100 acres each of medium-low quality (3 pts.) and low quality wetlands (2 pts) (See Table 1, below). Their initial assessment provided indices based upon proportions (4.7) and based upon total area (4,700). When each of the five habitat classes was reduced by half, assessment based upon total area reflected that loss, but

Initial Assessment of Habitat						Assessment not Accounting for Habitat Loss				
HabQual	**Pts**	**Acreage**	**Prop.**	**Score(:)**	**Score (TA)**	**Pts**	**Acreage**	**Prop.**	**Score(:)**	**Score (TA)**
High	6	400	0.4	2.4	2400	6	200	0.4	2.4	1200
Med-Hi	5	200	0.2	1	1000	5	100	0.2	1	500
Medium	4	200	0.2	0.8	800	4	100	0.2	0.8	400
Med-Lo	3	100	0.1	0.3	300	3	50	0.1	0.3	150
Lo	2	100	0.1	0.2	200	2	50	0.1	0.2	100
		1000		**4.7**	**4700**		**500**		**4.7**	**2350**
Assessment Accounting for Habitat Loss										
HabQual	**Pts**	**Acreage**	**Prop.**	**Score(:)**	**Score (TA)**					
High	6	200	0.2	1.2	1200					
Med-Hi	5	100	0.1	0.5	500					
Medium	4	100	0.1	0.4	400					
Med-Lo	3	50	0.05	0.15	150					
Lo	2	50	0.05	0.1	100					
HabLoss	0	500	0.5	0	0					
		1000		**2.35**	**2350**					

Initial Assessment of Habitat						Assessment not Accounting for Habitat Loss				
HabQual	**Pts**	**Acreage**	**Prop.**	**Score(:)**	**Score (TA)**	**Pts**	**Acreage**	**Prop.**	**Score(:)**	**Score (TA)**
High	5	400	0.4	2	2000	5	200	0.4	2	1000
Med-Hi	4	200	0.2	0.8	800	4	100	0.2	0.8	400
Medium	3	200	0.2	0.6	600	3	100	0.2	0.6	300
Med-Lo	2	100	0.1	0.2	200	2	50	0.1	0.2	100
Lo	1	100	0.1	0.1	100	1	50	0.1	0.1	50
		1000		**3.7**	**3700**		**500**		**3.7**	**1850**
Assessment Accounting for Habitat Loss										
HabQual	**Pts**	**Acreage**	**Prop.**	**Score(:)**	**Score (TA)**					
High	5	200	0.2	1	1000					
Med-Hi	4	100	0.1	0.4	400					
Medium	3	100	0.1	0.3	300					
Med-Lo	2	50	0.05	0.1	100					
Lo	1	50	0.05	0.05	50					
HabLoss	0	500	0.5	0	0					
		1000		**1.85**	**1850**					

Table 1 Initial assessment of 1000-acre wetland based upon proportion and total area, assessment of the same wetland reflecting 50% loss of each habitat class without accounting for losses and accounting for losses in calculation of indices based on proportions.

without accounting for the habitat loss, the index based upon proportions reflected no difference. However, when the assessment including accounting for lost habitat (with a value of 0 applied to lost habitat), the indices based upon proportion of habitat class and total area each reflected 50% loss in value.

The second set of tables scaled habitat classes continuously between five and zero, rather than six to two with zero representing habitat loss, the difference was simply arithmetic but still representative as discussed above.

With continued discussion of components of habitat assessments, including habitat quality, quantity, loss, restoration, enhancement, and degradation, there was general agreement that changes in any could be easily communicated using this index.

Tom Herder provided a PowerPoint presentation and overview of MBNEP's proposal to the National Fish and Wildlife Foundation's Gulf Environmental Benefit Fund for a Coastal Alabama Restoration Program – Phase I. MBNEP, guided by the Science Advisory and Project Implementation committees, proposes producing high-resolution maps of Alabama's coastal habitats, including SAV, to determine types, conditions, and areal extent; develop comprehensive watershed management plans for priority intertidal watersheds, and develop a habitat restoration plan coupling data from maps with recommendations from CWMPs to prioritize restoration and conservation activities.

The proposal comprises four individual tasks:

- Task One: High-resolution habitat mapping and spatial database development using GAP, NWI, and C-CAP data refined using native imagery at higher resolution to update and improve the Habitat Mapper to provide highly accurate location data for coastal Alabama habitats. Field surveys will be used to validate boundaries and collect biological data and facilitating delineation of upland-wetland boundaries and categorization of wetland systems as "good," "fair," or "poor."
- Task Two: SAV Mapping in Mobile Bay, the Mobile-Tensaw Delta, Mississippi Sound, and other coastal waters of Baldwin and Mobile counties. Color aerial imagery will be acquired using NOAA C-CAP methods, ESRI polygon coverage will be created and visually assessed, field surveys will be used to determine species composition and bed density, and SAV distribution will be compared to 2002 and 2009.
- Task Three: Comprehensive Watershed Management Plans, conforming to the EPA's nine key elements, for seven priority watersheds (representing 16 12-digit HUCs) to improve water quality to support healthy populations of fish and shellfish, improve habitats to support them, protect continued uses of biological resources, improve watershed resiliency to sea level rise and climate change, and expand opportunities for access to promote stewardship and protection. Priority watersheds targeted for planning include Bayou la Batre, Bon Secour River, Dog River (including Lower and Upper Dog River and Halls Mill Creek), Fish River (including Upper, Middle, and Lower Fish River), Tensaw-Apalachee (including T-A, Grand Bay, and the Basin), West Fowl River and Delchamps Bayou, and Wolf Bay (including Perdido Pass/Frontal Gulf of Mexico, Graham Bayou, Mifflin Creek, and Sandy Creek).
- Task Four: Development of a Watershed-based restoration planning program based upon habitat condition, vulnerability to stressors, and cost-effectiveness. The updated Habitat

Mapper and spatial database and GIS layers will be used to guide ecosystem restoration and conservation planning, identify degraded habitats in priority watersheds with potential to be restored cost-effectively to improve condition and waters quality, calculate Landscape Development Intensity indices to estimate potential impacts from human uses to help identify most- and least-disturbed habitats, and develop restoration strategies that focus on actions that reduce upstream sediments, nutrients, and pollutant inputs to reduce loadings and remediate effects of land-use disturbances.

Meg Goecker favorably compared this proposal to the Mississippi planning effort that is being funded by NFWF's GEBF.

Maury Estes provided an overview of remotely-sensed data as a potential tool in the BCG framework. He summarized some issues that challenge its use and advantages that it provides. High temporal updates and historical archives provide great value, and data is generally public domain, with costs largely necessary only for data processing. Digital data is processed using mathematical operations (spatial statistics). He listed potential satellite remote sensing data that included: sea surface temperature, water clarity, chlorophyll-a, salinity, normalized difference vegetation index, land cover/land use, and climate related data through the North American Land Data Assimilation System. Maury mentioned other possible data sources obtainable through remote-sensing, including land surface temperature, leaf area index and fraction of absorbed photosynthetically-active radiation, and net photosynthesis and primary productivity.

Maury concluded by listing questions and solutions that might be considered in employing remote sensing data to determine biological condition.

Mike Dardeau asked whether data might be manipulated to determine chlorophyll a concentration from the 1980s, 1990s, or 2000. Maury responded that data from the first decade of the 2000s might be available. Before that, if good ground truthed data is available, an algorithm might be developed that could be useable.

Mike expressed his feelings that if we improve the primary habitat quality and quantity fringing Mobile Bay, that downstream values like DO, fishery landings, etc. will improve. For the sake of simplicity, he said that he would be satisfied quantity and quality of priority habitats were measured, but he thinks that downstream in-Bay responses are worth tracking. He suggested the following three:

- Chlorophyll a
- Average size of the oyster shell, as suggested in a publication by Dr. Sean Powers (further review of that paper might lead to using oyster reef habitat quality and quantity).
- SAV habitat quality and quantity

As the discussion turned towards moving forward, Tom Herder reported that a session on indicators and monitoring was being organized by Dr. Becky Allee and scheduled for the final afternoon and session of the 2014 Bays and Bayous Symposium scheduled for December 2 and 3. He expressed that there was great potential towards BCG framework development. Mike announced that Dr. John Lehrter of the EPA's Gulf Breeze Ecology lab, a NOAA expert on indicators, and a couple others who specialize in monitoring would also sit on the panel.

Mike proposed reconvening in January following the Indicators/Monitoring session at B&B. He supported continued attention to habitat quality and quantity for BCG development while looking at broader Bay metrics such as oyster shell size, SAV, or other indicators. Rusty Wright added that state agencies are doing routine monitoring of fish and fisheries along with sedimentation rates. Meg Goecker added that birds are getting a lot of attention, mentioning nesting and roosting. Patric Harper asked what is it about birds? Habitat? Food? Water quality?

Renee suggested that water quality has to be measured on very short time scales, and usually based on individual events. She added net ecosystem metabolism, with the caveat that this, too, would be an event-based measurement.

Meg mentioned U. S. Fish and Wildlife Service guidance on surrogate species as indicators, and Mike Dardeau asked if she could send him a link to that guidance. Bill Walton and Steve Heath asked if we could also provide a link to the Sean Power's paper that included oyster shell length as an indicator. Mike agreed to send that link directly.

Steve Ashby mentioned two- and three-dimensional sediment delivery models that are available through the Northern Gulf Institute. He agreed to look for a link to this product.

The meeting was adjourned at 2:45 p.m.