Delaware Center for the Inland Bays
Scientific and Technical Advisory Committee Meeting

May 10, 2019 - 9:00 AM to 12:00 PM
DNREC Lewes Field Facility

Attendees:

STAC MEMBERS	CIB STAFF	OTHER
Scott Andres, Chairman	Marianne Walch	Andrew Bell
Susie Ball	Bob Collins	Jennifer Walls
Ed Whereat	Victoria Spice	Andrew Bell
Sergio Huerta	Andrew McGowan	A. G. Robbins
Chris Main		Steve Britz
Claire Simmers		Nayani Vidyarathna
Jen Volk		Mike Greco
Robin Tyler		Amanda Zahorik
Andrew Homsey		Jennifer Walls
Bill Ullman		Tye Pettay
Tyler Monteith		Mke Duffy
Ellen Dickey		Mark Freedman
Kathy Coyne		Roy Messner
Bob Stenger		Aaron Givens
Kari St Laurent		Art Trembanis
Kelly Somers		Doug Massachusetts
Ed Hale		
Richard Watson, Secretary		

The Meeting was called to order at 9:08 AM by Chairman Scott Andres

STAC Announcements – Dr. Scott Andres - None

CIB Announcements – Dr. Marianne Walch

Aquaculture Extension Activities & Research Initiatives in the Inland Bays - Ed Hale, DE Sea Grant

Ed described his role as a Marine Advisory Specialist as follows:

1. Work with government officials, industry representatives and academic researchers to engage in outreach and extension work across the state for programmatic focus areas

2. Conduct applied scientific research on issues associated with fisheries, aquaculture and seafood in the state of Delaware.

He described the functions of an Extension service as follows:

1. Connect university resources and expertise with local communities and user groups;

2. Develop new information through original applied research, gather existing information for user needs, transmit information and skills through pamphlets, courses, workshops, lectures and meetings; provide technical reviews of research and policies; and stimulate new research to meet perceived needs; and

3. Take complex information and show people how to use it to solve a problem.

What does fisheries and aquaculture extension look like in Delaware?

1. Electronic warnings (email and text) of Atlantic Sturgeon occurrence in Delaware Bay based on satellite derived predictive indices to commercial fishers. Messages are delivered via Blackboard Connect System to email and phone numbers.

2. Partnering with DESU to conduct DE Shellfish Growers Forums to generate information exchange among industry representatives

3. Connecting aquaculture industry stake holders with necessary researchers, regulatory agents and other industry representatives based on their own interests to help facilitate economic growth using sustainable and environmentally beneficial techniques.

Applied scientific research on issues associated with fisheries, aquaculture and seafood in the state:

1. Spurring economic growth and enhancing the environment through the development of an oyster remote setting system in Delaware -Open

2. DE Shellfish Aquaculture: Training to Support an Emerging Industry –Open

3. Staging a Spiny Dogfish (Squalus acanthias) Renaissance by Examining Potential Markets for an Underutilized Fishery- Denied

4. Thermal Control of Dermo Disease on Oyster Farms –Open

5. Conservation of juvenile Atlantic Sturgeon in the Delaware River Basin-Denied

6. Examining the effect of soak time on the at-vessel and post-release mortality of Dusky and Sandbar Sharks in mid-Atlantic gillnet: can soak time limits reduce mortality?-Open

7. Characterizing the ecological role of apex predators in the Delaware Bay Ecosystem and their potential impacts on managed species-Open

8. Improving and deploying an electronic warning system for Atlantic Sturgeon to commercial fishers in Delaware Bay-Open

9. Fueling Economic Investment by Kick-starting Oyster Aquaculture in the DE Inland Bays-Denied.

Ed described a fishery as an activity leading to harvesting of fish. It may involve capture of wild fish or raising of fish through aquaculture. It is usually a unit determined by an authority or other entity that is engaged in raising or harvesting fish. Typically, the unit is defined in terms of some or all of the following: people involved, species or type of fish, area of water or seabed, method of fishing, class of boats, and purpose of the activities (FAO).

Ed described the Economic 2016 Value Added as follows:

1. Commercial fishery value added $16 million,
2. Recreational fishery value added $110 million, and
3. Total economic impact $126 million

Ed noted that there were few commercial aquaculture producers in DE. This is an industry historically dominated by fin-fish production (ex. Tilapia, Striped bass, Hybrid striped bass). Until 2013 DE was one of two coastal states that lacked a shellfish aquaculture industry. He noted that increased numbers of shellfish will also positively impact water quality.

Ed discussed the status of aquaculture in the area and noted the following:

1. Blair View Farm in Houston, Delaware - they produce tilapia in closed, recirculating systems for live markets. They are the only farm in this sector

2. Delmarva Aquatics in Smyrna, Delaware - Production of eggs, fry and fingerlings of hybrid and straight striped bass and yellow perch for domestic and international markets - Distributor/hauler of other cultured and wild fish

He also indicated that he believes that it is a young, evolving industry that is poised for growth.

Questions

1. Are there any Kelp-Shellfish co-farming benefits being implemented? - No, not yet but shellfish farming does have many benefits such as water quality improvements.

2. Maryland Oyster Farming status? There are juveniles developing and recent stock assessments are positive.

3. Sugar Kelp Farming status? Sugar kelp is grown in the northerly areas (e.g., Maine) in winter.

4. What was the logic for banning shellfishing 1979? A general discussion followed.

5. Are there programs to prevent shellfish poisoning? Yes, monitoring programs. There is a biotin contingency plan although it is not likely that there will be a significant problem in Delaware.

Improving Resolution and Accessibility of Real Time Water Quality Data Using Low Cost, High Frequency Sensors Maintained by Citizen Scientists - Tye Pettay, University of Delaware

This presentation focused on the use of continuous monitoring of water quality parameters which is quickly becoming the standard for dynamic aquatic environments like coastal bays and estuaries.Unfortunately, the equipment needed for this monitoring can be prohibitively expensive to deploy at numerous sites over a large geographic region.

Tye indicated that an interdisciplinary approach was needed combining molecular basis of the system, the complex physics and the environmental monitoring tools. He stated that bio-monitoring of the impacts to micro algae is critical. He further stated that the advantages of using high frequency sensors are that they provide better data collection and generally avoid “dead spots”.

He discussed the monitoring work being done in the Murderkill Watershed area. The Murderkill watershed is located in southern Kent County, Delaware and has a drainage area of approximately 270 km2. Water quality sampling in the Murderkill watershed and estuary by DNREC established that a number of streams and estuarine segments have high levels of nutrients, low levels of dissolved oxygen, high bacteria counts, and/or impaired habitats and ecologies. These deficiencies are inconsistent with their state designated uses (contact recreation, fish, aquatic, and wildlife, and water supply) and are therefore are in need of nutrient management to meet the requirements of the Clean Water Act.

Tye went to discuss Harmful Algal Blooms (HAB). When the environmental conditions are ideal for a particular organism, cells will begin to grow or divide. Phytoplankton are photosynthetic autotrophs. They only need light and inorganic nutrients such as phosphate (PO_4), nitrate (NO_3), ammonium (NH_4), carbon dioxide or carbonate (CO_2 or CO_4) to grow. Of the thousands of phytoplankton species, less than hundred or so are considered harmful. Those that produce toxins (poisons) or cause physical damage with sharp spines are members of groups called diatoms, dinoflagellates and raphidophytes.

Tye's research suggests that increased farm irrigation within the watershed reduces groundwater discharge and increases pond residence time. This would promote bloom creation and growth.

He then discussed acidification within the watershed. Increased atmospheric CO2 concentration leads to acidification via proton cycling; effective monitoring requires monitoring the protons. The USGS conducts continuous monitoring within the inland bays of salinity, temperature, depth, nitrate (NO3-), phosphate (PO43-), chlorophyll, Colored Dissolved Organic Matter (CDOM), dissolved O2, turbidity.

Tye then discussed the use of open source sensors tailored specifically to your needs. This method can obtain the necessary data and be performed at low cost (<$1000). He also discussed the feasibility of using citizen scientists to augment formal monitoring and studies.

Questions

1. Are there any monitoring systems in operation yet? No, the prototype needs calibration.

2. Sensor Maintenance - High cost since work is labor intensive - system should be designed with back-ups

3. A general discussion on sensor comparisons this summer was held

4. How confident are they in degree of acidification without carbonate measurements? There was a CO2 that was providing data. SeapHox was used which is a continuous, stable, high frequency pH sensor for estuarine and marine applications. It is a solid state, ion-selective, field-effect transistor (ISFET) technology developed by Ken Johnson (MBARI) and Todd Marz (SIO). Now available commercially from Hach/Seabird Electronics.

5. General discussion was held - Sergio offered his people to assist in sampling and analyses

Search for the unseen: Are derelict crab pots prevalent in Delaware's Inland Bays? - Kate Fleming and Art Trembanis, University of Delaware

This presentation focused on the results of a scoping project that was completed in February 2019 in which low-cost, side scan sonar was used to search for derelict crab pots in portions of Rehoboth Bay.

A growing problem in coastal areas is the abandonment or loss of crab pots. The implications of this problem are as follows:

1. Ghost Fishing - Blue Crabs: Starvation, cannibalism, infection, disease, exposure to poor water quality - Terrapins: Drowning
2. Navigation Hazard, and
3. Habitat scouring.

Kate indicated that this is a very common coastal problem with the Chesapeake Bay having an estimated 145,000 derelict crab pots. North Carolina has recovered approximately 35,000 since 2003 and Louisiana has recovered approximately 37,000 since 2004. In Delaware Bay, approximately 500 derelict pots have been detected off of Woodland Beach.

Kate then briefly discussed the recreational crab industry in the Inland Bays and what efforts are being undertaken to control the problem. She indicated that in 2012, the DCIB was involved in the recovery of approximately 70 derelict traps during various cleanup efforts.

She discussed the work onboard the R/V Dogfish which is equipped with a Hummingbird SOLIX Mega SI Sonar GPS which is capable of a 50' path in two feet of water. This system is very effective at locating derelict crab traps. She also discussed the use of drones (not very effective due to visibility issues) and manual searching.

She also provided the following information:

1. Love Creek has an estimated 26 derelict crab pots;
2. Herring and Guinea Creeks have an estimated 56 derelict crab pots; and
3. Bay Cove has an estimated 78 derelict crab pots.

In concluding her remarks, Kate indicated the following:

1. There is the potential for 38,000 derelict crab pots in Rehoboth and Indian River Bays and associated creeks;
2. SOLIX systems mounted to pontoon boats worked well in locating derelict crab pots in 0.5 to 1.5 meters of water;
3. Sonar and grappling hooks worked well in recovering derelict crab pots;
4. Drones did not work well in locating derelict crab pots due to low visibility in the water; and
5. There may be Bypass Reduction Device compliance issues.

Future work efforts will include:

1. Side scan sonar surveys;

2. Removal of derelict crab pots and assessment of By-catch Reduction Devices; and

Implementation of methods to reduce lost crab pots and coordinations of work with all affected agencies.

Questions

1. There was a general discussion on licensing and training of crab pot users.

2. There was a general discussion on the re-use of recovered derelict crab pots on living shore line projects.

Report from the Model Subcommittee - Scott Andres

STAC Model Development Subcommittee Meeting April 1, 2019

The overall purpose is to develop a model to project outcome of various possible management measures and strategies. The following issues will be addressed:

1. Predict the impacts of changes in nutrient loadings on water quality in the Bays and their tributaries, including effective simulation of diel-cycling hypoxia. (Includes understanding impacts of past and future land use change and wastewater loadings).

2. Predict the most effective types and locations of BMPs and management actions to reduce nutrient loads to the Bays.

3. Understand the effects of the Indian River tidal prism volume on water quality and flooding endpoints.

4. Understand effect of climate change (SLR, extreme events, increased salinity, warming,) on water quality parameters.

5. Predict where habitats will be most impacted by climate change, including sea level rise, and pollutants.

Various modeling approaches and tools available were briefly discussed. The intent was to discuss pros and cons of each. However, it was decided that it would be most effective to discuss model requirements and needs rather than a limited set of specific tools. This list can then be used to develop an RFP to solicit ideas and approaches from multiple practitioners, along with costs.

Estuary processes that must be modeled:

1. Sediment nutrient exchange

2. Diel-cycling dissolved oxygen

3. Bathymetry/topography and hydrodynamics – particularly important in Indian River Bay

4. Wind, Salinity and temperature. and

5. Impact of tidal marshes

General model framework requirements:

1. Long-term usefulness. Would be continually validated and updated (annually or biennually).

2. Easily updated. Living/breathing modules could be replaced in future as new ones become available.

3. Should be open source and proposed by potential service provider

4. Possibly online app? This has become easy to do with many tools.

5. Scenarios can be easily run in a cost-effective manner.

6. Model maintenance agreement.

Data gaps identified during the meeting:

1. Sediment-WQ exchange (Jeff Cornwall: $100-400K had done work in 2002)

2. Inlet tidal prism and bathymetry of inlet (key issue).

3. High-frequency monitoring of DO, with better spatial coverage; Continuous monitoring of Chlorophyll a may be important in tributaries. Many new technologies appearing.

4. More tide gages for watershed loading model – currently have only two (Beaver Dam Creek and Millsboro Pond). Some of this gap could maybe be filled by water level sensors installed by DEOS four years ago. These can be moved around if needed.

5. Water exchange of the L and R and IR canals.

6. Permeability of benthic sediments. Funding:

The following 'Next steps" were identified:

1. Develop proposed project priorities, milestones and timeline to report to STAC and the CIB Board. 1-2 months

2. Begin developing RFP drafts for watershed model and estuary model, with input from subcommittee members.Review of meeting results and discussion of next steps. 3-6 months

Questions

1. **Have you talked to other national estuary programs (NEP)?** Yes

2. Any in place modeling capabilities? Yes we are way behind others - our needs are doable

3. Cost? Several hundreds of thousand dollars with follow-up

4. EPA Guidance? No official guidance

5. How about MDCoastalBays as a partner? We are in discussions with several groups in Atlantic Region

6. Models come and go millions spent at least within DNREC due to complexity - what will make this model different? We are looking to benefit from others mistakes - maintenance agreements -

Murderkill River several millions spent but DNREC did not follow up Model did address whether STP upgrade should be built

New Business

Chairman Andres adjourned the meeting at 12:00PM

Upcoming 2019 STAC Meeting Dates: July 26, November 1, 2019