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

December 1, 2017, 9:00 am to 12:00 pm

DNREC Lewes Field Facility

Attendees:

STAC MEMBERS	CIB STAFF	OTHER
Scott Andres, Chair	Bob Collins	Clinton Gill, DDA
Jennifer Volk, Vice Chair	Andrew McGowan	Frances Hart, IBF
Chris Brosch	Michelle Schmidt	A.G. Robbins, CMP
Andrew Homsey	Gary Taylor	Jason Davis, DFW
Douglas Janiec	Marianne Walch	Roy Messner, Lewes
Chris Main		Tye Pettay, UDel, Lewes
Kelly Somers, EPA		Kathy Coyne, UDel
Bob Stenger		Ed Lewandowski, UDel
Kari St. Laurent		Karen Beck, Lewes
Bill Ullman		Debra Rosales, UMES
Cathy Wazniak		Roy Miller, Lewes
Ed Whereat		George Junkin, South Bethany
Richard Watson, Secretary		Alice Casey, Rehoboth
		Tony Casey, Rehoboth
		Michael Bott
		Kent Messer, UDel
		Kristin Regan, EPA
		Frank Piorko, Maryland Coastal Bays

Meeting called to order at 9:05 am,   Scott Andres (DGS, STAC Chairperson)

- Round robin introductions were made.
- Marianne Walch introduced Michelle Schmidt, new CIB employee who will be working as a Watershed Coordinator. Michelle formerly worked for the American Forest Foundation on projects to reduce the threat of wildfires and to improve water quality. She has a BS in Environmental Studies and Physical Geography from Salisbury State and is currently working on her master's degree in Natural Resources at Virginia Tech.
- The Holiday Tree planting will take place at Angola Neck Preserve on December 14th though the 16th. Bob Collins is managing this effort and he can provide additional information. He needs approximately 100 volunteers.
- The Annual Appeal for donations for the CIB is currently underway.

Developing Evidence-Based Educational Programs to Improve Homeowner Behavior to Protect the Inland Bays, Kent Messer, Unidel H. Cosgrove Chair for the Environment, Department of Applied Economics and Statistics, University of Delaware (Co-authors – Jacob Fooks, USDA Economic Research Service; Paul Ferraro and Collin Weigel, Johns Hopkins University; and Tongzhe Li, University of Windsor - Presentation Provided)

Introduction

Environmental Problems are generally problems with human behavior. Therefore solutions will inevitably involve changes to human behavior. Dr. Messer discussed recent research that he and the co-authors at the University of Delaware that illustrates how experimental design and behavioral economics can be used to develop an evidence- base to guide effective educational programs to improve water quality in the inland bays.

Discussion

How do we educate residents about water quality issues? Dr. Messer indicated that he is a behavioral economist and that most of the environmental problems that we face are behavioral in nature. *How do we effect behavioral changes?* He believes that current environmental programs are of the "spray and crave" types; we spray out good information out and hope that it works. Unfortunately, we do not have good controls to see if our efforts work or not. Dr. Messer is trying to build an evidence based approach to build best practices using scientific method.

His studies have received significant financial support for the William Penn Foundation, USDA Center for Behavioral and Experimental Agri-Environmental Research (CBEAR), Delaware EPSCoR, National Science Foundation, and NEWRnet. He is currently working on several studies nationally including one in Amarillo Texas and other locations. They have put in a $24,000,000 funding request and are optimistic that they will receive approval.

The concern to be addressed today is pollution from several sources such as industry and local, residential sources. Dr. Messer believes that we have not paid enough attention to local resident sources of pollution. *How do we educate the public to correct this problem? How do we communicate the issues?* He wants to accomplish this by implementing scientific methods to find out what works. Look at several key questions about landscape level practices:

1. Can we get people to take steps to reduce pollution from their landscape;
2. How can we use Behavioral Nudges to get people to do more environmentally friendly practices
3. Does residents Willingness to Pay (WTP) vary according to demographic characteristics

Question – *Will Dr. Messer talk about regulations such as impervious surface tax and ordinances?* No, he prefers to use "nudges" but understands the need and effectiveness for regulations.

Dr. Messer does not like surveys but prefers to look at actual behavior. He believes in the "putting the money where their mouth is" approach. He prefers to be subtle in his approach to affect change. Research has shown that nudges actually work (Richard Thaller, Nobel Prize). He described the following reasons why behavioral approaches such as nudges do work:

1. Many of the things related to behavioral science are relatively small adjustments and are within the control of the program administrator. They do not require additional funding or new legislation to be passed and work well with voluntary programs;
2. Nudges are non-political. By helping programs work better, customers are better served, and programs are more cost effective with taxpayer money;
3. Testing is embedded within the programs and market settings and there is strong external validity.

Dr. Messer likes behavioral economic methods because he can test the effectiveness. He described the program that he has initiated in Delaware, where he has recruited over 1500 residents from the Delaware River Watershed. Each participant is given $25 for participating in the 15 minute study; they

can keep the money or they can "bid" on one of the following "BMP" products that could help minimize the residential stormwater runoff problem:

1. Native Plants;
2. Biochar soil amendment;
3. Soil Test Kit;
4. Soaker hose; or
5. Scott's Turf Builder slow release fertilizer.

There are three approaches that are evaluated in the study:

1. **No Framing** where the information about the product on the box is simply provided;
2. *Positive Framing* where additional information is provided to the participant which describes the positive benefits to the environment of using each product; and
3. *Negative Framing* where additional information is provided to the participant which describes the continued negative effects of not using such products such as continued stormwater pollution.

Question – *Were the participants allowed to see the information on the boxes in the "No Framing" option?* Yes and these descriptions obviously have an inherently positive bias.

Dr. Messer presented the results of the study (provided in the paper) including summary statistics for demographic variables. He indicated that the study encompassed a fairly representative population. He provided a bar chart showing the overall results for the bids by BMP. Several key points that were discussed are as follows:

1. The highest average Willingness to Pay (WTP) was for the soaker hoses ($7.34);
2. The lowest average WTP was for native plants ($4.55); and
3. Positive framing had the highest WTPs with Negative Framing generally higher than the No Framing.

Question – *Why was "Negative Framing" higher than "No Framing" option?* Dr. Messer was not sure and indicated that a larger sample was needed to evaluate this further. A brief discussion was held on this issue during which it was stated that the reason might be that "salesmanship" works. If you say anything about the product, even if it is negative, it will have an effect.

Question – *What effect, if any, did the labor intensity needed and ease of use for the product have on the bids?* Dr. Messer was not sure; he is focusing on what people will do and not why they do it. He cited the personal example of where he and his wife obtained a rain barrel from DNREC. Rain barrels require minimal attention to operate and maintain (clean leaves from the filters and drain the tanks). Unfortunately, he and his wife would often forget to perform these simple tasks. He indicated that they will look at dis-adoption practices in a future study.

Question – *What effect did location have on the selection of BMP?* In the study, they try to use all BMPs in all locations.

He indicated that he was concerned about getting people to bid on the BMPs and not just taking the money home. Positive framing clearly encouraged people to pay more. In looking at the demographics he noted the following:

1. Women will generally pay more for the BMPs;
2. As you get older, you will generally pay more;
3. If you own your own residence, you will pay more;
4. People in rural areas are more likely to pay less; and

5. People concerned about risk such as water quality are more likely to pay more.

Dr. Messer then discussed ways to speak to public on scientific issues. Do you simply present the scientific facts by identifying the problem, describing the nutrient loadings, and here are the challenges that we face. Or do we approach it as the psychologists suggest by citing examples of how the problems impact the public and in particular identifying the victim? He cited an example of an individual who contracted vibrio after cleaning his crab traps and subsequently died. A member of the audience (Mike) noted that vibrio is naturally occurring and is not a result of nutrient loading. The member of the audience suggested that this was "fear mongering to suggest that there was a direct correlation. Dr. Messer indicated that it was his understanding that vibrio is more likely found in polluted (bad) waters and that he obtained his information from the Chesapeake Bay Foundation. A brief discussion ensued about vibrio in which it was agreed that vibrio was not a good example. However, Dr. Messer stated that his intent is to establish that in order to solve the overall pollution problems you need to modify human behavior.

Question/Comment – *Some of the BMPs have a secondary visual indication that they are working. The soaker hose uses less water and still provides the necessary irrigation. The Biochar provides soil improvement which produces better a crop growth. The soil test kit only functions as a data collection device and does not provide direct improvement.* Dr. Messer agreed but stated that the soil testing was an intermediate step that is very necessary for the final improvement to the soil.

Question – *The clearly dominant issue is home ownership versus non- home ownership. Someone who is renting is very unlikely to pay as much attention as someone who owns the property. How does the study address this issue?* In the initial study, they did not consider this issue. In the follow-up study, they will perform an intensive screening up front to identify homeowners. He also identified the concern about homeowners who live in developments with Homeowner Associations (HOA) where the lawn maintenance is paid for separately and performed by an outside company. They will also address this issue in the follow-up study.

Question – *Was Dr. Messer aware that "cookie cutter home" developers strip the top soil from the site during site preparation and the sell the topsoil? The commenter would like the University to investigate this practice and suggested that he and Dr. Messer speak later.* Dr. Messer was not aware of this practice and agreed to speak with individual after the meeting.

Question – *The commenter noted that he liked the idea of "advertising" to promote environmental improvement and thought that it worked well on the local scale but not so much on the bigger scale. Does the "scale" of the advertising have a significant impact on the programs overall success?* Dr. Messer stated that what they were trying to do was nothing more that applying "Marketing 101" principles to environmental programs. He used the example of McDonalds where they use various types of advertising to address different market sectors.

Comment – *The commenter stated that the DNREC MS4 Regulations included a public education component and that the ideas discussed in the study could be utilized by the DNREC staff. It was noted that the scientists developing the regulatory programs are not always the best suited or capable to effectively deliver the information to the public.* Dr. Messer agreed and stated that the nudge approach could be very effective ion helping to bring polluters into compliance.

Question – *A program was initiated in a town in NJ whereby the stormwater basins were "naturalized" to reduce the grass cutting and maintenance needed by the Public Works Department. This program was developed with personnel from Rutgers University Department of Water Resources. Information was provided to the public in the form of handouts and write-ups on the township webpage. Upon implementation of the program, there was a strong negative reaction from the adjoining property*

owners. They indicated that they were "promised" that the basins would always be maintained and that the grass in the basin would look like their lawns. What could have been done to avoid the negative reaction? Dr. Messer suggested that focus groups or survey could have been initiated prior to the start of the project to gauge the resident's concerns. They did some studies for offshore wind projects to determine at what distance was the view of the turbines unacceptable. A general discussion on project aesthetics then ensued.

Dr. Messer's presentation was concluded; he was available for further discussion during the break.

Hydro-acoustic Survey of Submerged Aquatic Vegetation in the Delaware Estuary, Kristin Regan, Kelly Somers, USEPA

Introduction

Submerged Aquatic Vegetation (SAV) is an essential habitat for fish and other wildlife. It provides spawning, nursery, and protective habitat to ecologically important species. SAV is known to remove nutrients from the water column and increase dissolved oxygen concentrations. It also provides sediment stability and wave attenuation, aiding in both decreased erosion and turbidity. Despite these ecologically important attributes, the extent of SAV in the Delaware Estuary has not been quantified. In the summer of 2017, researchers from the USEPA began a multi-year survey to observe and quantify SAV in the Delaware Estuary. Hydro-acoustic monitoring was used to determine the presence and extent of SAV in the system, species composition, density, and how these factors relate to the water quality and sediment characteristics.

Discussion

Kristin Regan, USEPA made the presentation. The primary objective of this presentation is to describe the methodology that was developed for the quantifying of the SAV in the Delaware Estuary. SAV is very important for providing marine life nursery habitat and improving water quality. The SAV helps to increase the dissolved oxygen content of the water while also stabilizing the sediment in what can be a very turbid environment.

The study was initiated by conducting a very extensive literature to determine what information was available about the extent of the SAV in the Delaware Estuary. Very limited information was found on a study conducted during the 1980's near the Philadelphia industrial corridor but not much else throughout the estuary.

It was determined in order to establish a baseline for the SAV, a Tier 1 rapid assessment of what species inventory and densities were needed. This baseline assessment would be used in the review of dredging permit applications. Contractors were asked to survey for SAV but often did not know where to look for it and usually did not find it. By establishing a baseline of the SAV, regulatory personnel could provide guidance to the contractors regarding where to look for the SAV and thus produce more accurate surveys.

Kristin indicated that there have been extensive studies on sediment characteristics, mussel habitat, salinity, and general water quality; they were hoping to establish correlation between the historical data and locations of the SAV.

The hydro-acoustic techniques that are available come in three tiers; they selected a single beam eco-sounder from Bio-sonics which is the simplest level and is relatively affordable. It is specifically designed to detect vegetation while other eco-sounders are more suitable for locating fish. The equipment comes with very user-friendly software. They also used the USEPA Scientific Dive Team for ground truth surveys to verify the results of the eco-sounders. They performed quadrats to sample

species composition and density. They also have Go-Pro cameras so that they recorded video of transects that they ran and whether they encountered mussels.

There are several ways that they can monitor for SAV. Remote sensing is a great way to perform it and very cost effective. However, it is not as effective in very turbid waters and the other conditions that exist in the Delaware Estuary. Very specific conditions of low tide, wind and sun are required to allow aerial methods to be effective.

Eco-sounder works by mounting a transducer on the side of the boat either fixed to the hull or dropped off of the side like they are doing and is sitting just below the water line. A single ping of sound is sent down into the water column to the substrate and then we listen for echoes. The speed of the echo return determines the depth; often the density of the substrate can also be determined by the quality (different amplitudes) of the echo sound. The plant SAV material disperses the sound.

Question – *Will the acoustics that you are using tell you what the different substrates are (e.g., mud, sand, or gravel)?* Yes, the different substrates return different amplitudes; each different substrate is indicated by a different color. They input several (usually 3-5) known substrates with their characteristics into the software, usually during the post analyses.

They were faced with a very large area to be analyzed (100's of miles of shoreline) and had to determine what was the most cost effective and efficient method for rapid assessment. They started by developing transects parallel to the shoreline at the five foot mean high water line but soon realized that SAV does not grow in significant quantities at that depth. They then moved the sampling to the ten foot mean high water mark and obtained the results that they were looking for since that appeared to be the depth where the SAV was growing in the Delaware Estuary. Wherever SAV was present, they would conduct perpendicular transects approximately five feet apart going as far inshore as they could and then as far offshore as they detected SAV. They would conduct the surveys at high tide in order to maximize the area that they could survey. After completing the survey, they would send the dive team in to perform and ground truth surveys collecting specie density and composition data to confirm the results that had been obtained during the rapid assessment. The divers would establish three to five perpendicular transects with three sampling point per transect.

Question – *What was the average depth of the surveys? Is ten feet deep for SAV? How far below the water surface are SAV found?* The Delaware Estuary has a tidal range of approximately five feet. The deepest that we found SAV was 16 feet; the shallowest depth that we found SAV was 7 feet.

Question – *Were all the readings taken at high tide?* Yes, all readings were taken within a two hour window around high tide. The minimum depth limit for the eco-sounder was 3-4 feet below which it could not accurately detect the substrate (there was too much signal scatter at lower depths). They worked strictly at high tide to maximize the area that they could sample.

Question – *You are not suggesting that SAV does not grow in shallow depths are you?* No, it is just that we could not effectively use the rapid assessment equipment at shallow depths. They could get almost to shore at high tide but not at low tide. Generally the SAV was found in a very narrow corridor parallel; to shore from 9 to 13 feet deep.

The results of the rapid assessment surveys were that they found a "lot" of SAV particularly in areas where they were not expecting. They had been concerned about the turbidity of the water and the flushing of the estuary with its fast currents and high energy. SAV appeared to promote sediment accretion. They noted that they found SAV along types of shorelines including bulkheads, sandy beach, concrete structures and pretty much everywhere that they looked for it. They also indicated that SAV favored locating in low energy areas.

They were able to begin delineation of the various species of SAV; they found approximately nine different species including:

1. Najas guadalupensis;
2. Najas minor;
3. Zannichellia palustris;
4. Ceratophyllum demersum; and
5. Hydrilla vertillata.

It was also noted that they found a large amount of wild celery.

Question – *Did the different species have different eco-signatures?* Yes they were able to make some distinctions between various species.

Question – *What was the range of their survey?* For 2017, they surveyed from Trenton to North Wilmington by the Delaware Memorial Bridge.

Question – *Did they find SAV over the entire range of the survey?* Yes, but it was sparser towards the Delaware Memorial Bridge which they hope to investigate further during 2018.

Question – *Were you able to distinguish the signals between SAV and micro-algae?*

Question – *Did you find whether SAV preferred hardened versus non-hardened shorelines? There was a study on Chesapeake Bay which found that it didn't affect whether SAV was found there but it did affect which species located on the hardened shorelines with invasive species predominating.* They saw more species to the north of the study area which could probably be extrapolated to the types of shorelines.

The data collected during 2017 will be forwarded to the Academy of Natural Science at Drexel University for post-processing. For 2018, they are planning on surveying from the Delaware Memorial Bridge to the mouth of the bay. They will also collect as much additional historical data as they can to establish a good baseline.

Question – *There were several general questions about the post processing*. A brief discussion was held on the various aspects of the analyses.

Question – *Was there species differences based upon the salinity and other differences in water quality along the estuary? What was the most abundant specie found?* _____ was the most abundant but not found everywhere. A brief discussion continued on the predominance of Hydrilla and other species. They emphasized that this initial study was merely a "snapshot" of the estuary and not a definitive baseline study. Additional long term monitoring and diver ground truth verifications are needed.

Question – *Are there any species of SAV that are indicators of overall estuary health?* SAV is low sunlight (turbidity) and high nutrient limited and could be considered indicators of general overall estuary health.

Question - *Can you determine other information about the bottom type such as is it a soft or hard bottom and are there shells versus debris there?* It will provide information from which you can infer what type of bottom exists. There are a lot of gray areas in the analyses. They plan on using additional equipment such as side scan sonar in addition to the single beam eco-sounder during the 2018 studies to obtain better bathymetry and SAV data. There are other agencies who have obtained substrate data which they hope to include in their studies. A brief discussion continued about the data that was currently being conducted by different agencies including some studies done ion NJ.

Question – *At the Coastal and Estuarine Research Federation (CERF) Meeting last month there were several presentations on SAV Monitoring and the development of a Community of Practice. Were there other techniques presented at that conference that might be applicable to shallow, turbid estuaries such*

as the Delaware Estuary. There are three methods that could be used: aerial surveys, hydro-acoustics, and ground truth surveys with divers. Based upon what the authors heard, the hydro-acoustic method would be the most suitable for turbid environments. For really shallow areas with limited boat access issues, the ground truth surveys would be needed. There were discussions about the advantages of using the side scan sonar surveys in conjunction with the hydro-acoustics. A brief discussion continued about recent surveys including macro-algae studies in shallow depth areas. The use of Autonomous Surface Vehicles (ASVs) was discussed; it was noted that these vehicles could be easily operated from shore and that they are generally available. It was noted that Delaware Estuary might not be the most suitable location.

Question – *Are there depth limitations on the use of side scan sonar? Do they have the same limitations as eco-sounders?* Not certain - There probably has to be sufficient depth so that you do not experience interference from signal scatter. They have not used it yet.

Question – *Are there associations with these beds and freshwater mussels? Yes, the divers note that mussels are encountered as part of their data collection.* The divers do use "Go-Pros" during their work. Available light is a problem in some of the deeper more turbid areas. They discussed the availability of data from the light station availability studies and whether they can use this data.

New Business

- STAC Leadership – The STAC Guidelines require that elections be held every two years. A new slate of officers has been developed by the Executive Director which will be submitted to the Board of Directors at the December Meeting. Scott Andres has been proposed top continue as Chairman and Jennifer Volk has been proposed as Vice Chairperson. The STAC Secretary is an appointed position; Richard Watson was recently appointed to this position. Once the slate of officers is approved by the Board of Directors, all eligible STAC will vote online on the slate of officer. To be an eligible voting member, you must have submitted your updated CV/resume for consideration. Updated CV/Resumes have been requested several times already and will be accepted no later than December 15, 2017. If not received by that date, you will no longer be considered a voting member.
- CCMP/Monitoring Subcommittee Formation – Updates of the CCMP and the just about to be released Monitoring Plan will require the formation of a subcommittee for review. There is now twenty years of additional data available for review. There is also discussion about the development of a new hydrodynamic ands water quality model. This will probably be a standing subcommittee which will build upon the work done previously. An active group of members is needed since there will be a significant amount of work will be required. The subcommittee will assure that the CCMP and research agenda are met and will assist the DCIB to prioritize the work to be performed are being met. The CCMP has been submitted to the USEPA for review; the DCIB staff are addressing the comments received from the USEPA. Chris Main will head up the subcommittee; Jen Volk and Richard Watson indicated that they will participate. An e-mail will be sent out requesting volunteers for this subcommittee.

A general discussion continued on the CCMP and various related studies. It was noted that a meeting would convene with the EPA and Maryland representatives after this meeting to discuss joint funding strategies.

Chairman Andres then closed the meeting.