Delaware Center for the Inland Bays Scientific and Technical Advisory Committee Meeting
July 27, 2018, 9:00 AM to 12:00 PM
DNREC Lewes Field Facility

Attendees:

STAC MEMBERS	CIB STAFF	OTHER
Scott Andres	Chris Bason	Bill Ritter
Jennifer Volk	Marianne Walch	Maddy Lauria
Douglas Janiec	Andrew McGowan	Ashley Norton
Chris Main	Michelle Schmidt	Alison Rogerson
Ed Whereat	Amy Barra	Kenny Smith
Kari St. Laurent	Katie Young	Chris McMahon
Rob Garo		Michael Bott
Richard Watson, Secretary		Kathy Coyne
		Mark Nardi
		Anne Riley
		A.G. Robbins
		Kent Stephens
		Josh Moody
		William Graves
		Sergio Huerta
		David Wolanski
		Katherine Phillips
		Andrew Homsey
		Robin Tyler
		Lew Podolski
		Mark Warner
		Jack Martin
		Roy Miller
		Debbie Rouse

The Meeting was called to order at 9:04 AM by Chairman Scott Andres

CIB Announcements – *Dr. Marianne Walch*

1. Marianne noted the passing of STAC Member John Austin who had made significant contributions to the committee.
2. The Delaware Center for Inland Bays will have its annual fundraiser "Decked Out – 2018" on Thursday August 2, 2018 from 6:00 PM to 9:00 PM. This is the DCIB Major Fundraiser and she encouraged all members to attend. She also indicated that they are still looking for corporate sponsors.

Ribbed Mussel Habitat Restoration for Water Quality Benefits, Dr. *Josh Moody, Partnership for the Delaware Estuary (PDE)*

Dr. Moody discussed the magnitude of ribbed mussel ecosystem services, in the form of total bulk and particulate nitrogen removal, and how they vary across space and time. He presented data integrated with information regarding the spatial distributions of ribbed mussel populations to identify areas deficient in these services. He showed that based on reference sites, an estimated population maximum and the resulting ecosystem service uplift potential can be calculated for restoration techniques (i.e. living shorelines) aimed at enhancing ribbed mussel populations.

The Partnership for the Delaware Estuary (PDE) has been involved with the Living Shoreline Initiative in New Jersey, Pennsylvania and Delaware since 2008 and has participated in seventeen projects from initial site selection, project design, monitoring plan development, adaptive management and data analyses. The other two main programs of the PDE have been wetlands creation and shellfish habitat development. They have focused on the shellfish impact on the living shoreline because of the variety of benefits that the shellfish can provide.

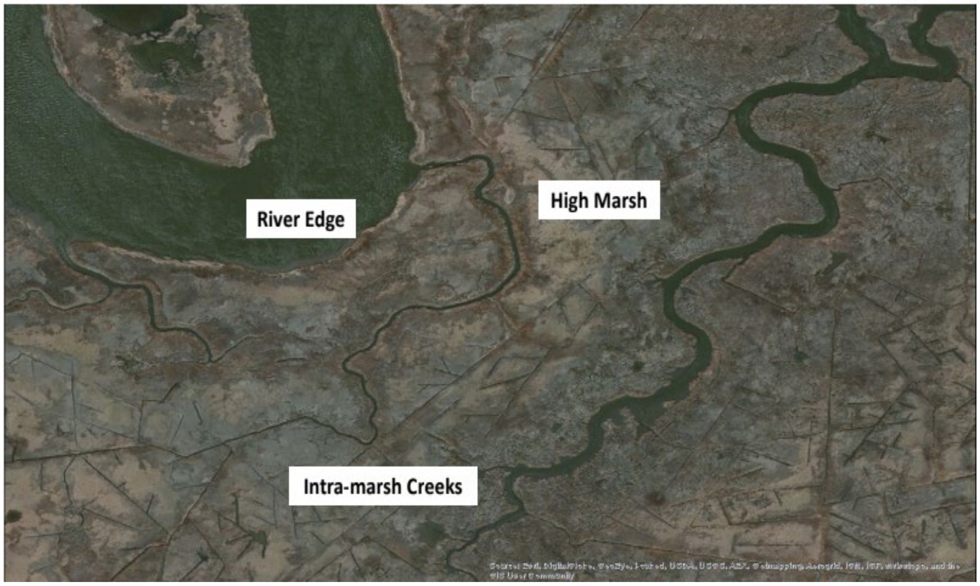
He explained that the goals for constructing Living Shorelines was to establish erosion control and to develop natural habitat. They have been focusing on development of shellfish because of the many additional benefits that this type of habitat can provide in addition to the structural benefits of the Living Shoreline itself ("More bang for the buck"). The Delaware Estuary is "shellfish rich" in that it is has 13 different species including oysters (primary – most talked about) and ribbed mussels all of which have different benefits. If you examine all of these animals, you will find many similarities for shoreline stabilization, bio-filtration, bio-assessment, watershed indicator and cultural value. The main difference with ribbed mussels is that it is not commercial species which relieves the FDA oriented red tape concerning poaching and fishing that you would get with commercial species. The ribbed mussel is also one of the dominant bivalves in the salt marsh ecology and helps promote the development of the overall ecosystem.

The typical habitat for the ribbed mussel is the river bank on the edge of the salt marsh but they actually live through out the salt marsh. The research questions that they wanted to address for the RARE Grant EPA-ORD were as follows:

1. Where are our current services located?
2. Are they maximized?
3. If not, can they be enhanced, and how?

This led their work along two paths. First they wanted to determine what effect the animal actually has on the ecosystem. How much food does it consume? How much water does it process? How much material does it remove from the water column? How do these services change over space and time? Shellfish activity is very temperature dependent. They conducted seasonal physiological experiments which are summarized below: Typically these types of experiments are conducted under optimal conditions where the organism has more than enough food available to consume, overeats and then the results become overestimates of actual conditions. Their approach was to use actual site conditions over several geographic areas.

Ribbed Mussels Live Across the Salt Marsh Landscape



They chose three sites in New Jersey and three sites in Rhode Island to determine geographic variability.

Task 1: Seasonal Physiological Experiments

Rate Function on Natural Seston Diets

1. Clearance Rate (l/hr-gDTW)
2. Concentration of TSS or PN (mg/l)
3. Filtration Rates (mg/hr-gDTW)
    a. Fall: 7.2-8.2°C (6-10°C)
    b. Spring: 14.6-16.2°C (14-18°C)
    c. Summer: 20.5-25.6°C (>20°C) (RI Summer Only)

Task 2 - Marsh Specific Data

1. Ribbed Mussel Biomass Across Habitats
2. Relative Percent Habitat Area
3. Inundation Time
4. Local Erosion Rates
5. Existing Living Shoreline Recruitment Data

Dr. Moody then reviewed the data summaries - refer to the following sheets in the presentation:

1. "Marshwide Gross Filtration Rate";
2. "Ribbed Mussel Mediated Ecosystem Service – Net Particulate Nitrogen Removal";

3. "NJ: Services Concentrated in Creeks – RI: Services Concentrated in Creeks and Rivers";
4. Ribbed Mussel Filtration Services were Vastly Underrepresented along NJ River Habitat"; and
5. "NJ River Habitat Experiences High Rates of Erosion"

Findings

1. Ribbed mussel water processing was consistent across space (habitats and marshes) but differed through time.
2. Seston was variable across space and time.
3. Annual filtration rates dependent upon water processing and food availability (refer to Table below).
4. Mussel activity was dependent upon temperature.
5. NJ had low density of mussels along the river edge while Rhode Island had high density.

Annual Filtration Rates Dependent on Water Processing and Food Availability

Marsh	n	Annual Clearance Rate ($l\ hr^{-1}\ gDTW^{-1}$)	TSS ($mg\ l^{-1}$)	PN ($mg\ l^{-1}$)	Filtration Rate TSS ($mg\ hr^{-1}\ gDTW^{-1}$)	Filtration Rate PN ($mg\ hr^{-1}\ gDTW^{-1}$)
DC	79	0.27 ± 0.04	71.26 ± 8.84	0.59 ± 0.08	19.37	0.16
DN	93	0.29 ± 0.02	107.12 ± 14.83	0.89 ± 0.12	30.95	0.17
MR	79	0.34 ± 0.04	91.44 ± 5.81	0.77 ± 0.04	31.47	0.27
RI	96	0.28 ± 0.03	13.12 ± 2.34	0.11 ± 0.01	2.95	0.02

From the data they obtained, they developed the following relationship:

GHSF = AMGFR * IT * MBM * %HA * Scaling Factor

Where

GHSF is the Gross Habitat Specific Filtration Rate per site (kg/ha-yr)

AMGFR is the Average Marsh Gross Filtration Rate (mg/hr-gDTW)

IM is the Immersion Time (hr/day)

MBM is the Mussel Biomass (gDTW/m^2)

%HA is the Percent Habitat Area

Scaling Factor (kg-m^2-day/mg-ha-yr)

Using this relationship, they developed the following marsh specific filtration rates (not looking at nutrient removal yet):

Marsh	**Gross Filtration Rate-TSS (kg/ha-year)**	**Gross Filtration Rate-PN (kg/ha-year)**
DC	**17813 +/- 6694**	**148.71 +/- 55.88**
DN	**33354 +/- 5638**	**277.41 +/- 46.84**
MR	**13538 +/- 6454**	**114.14 +/- 58.63**
RI	**11504 +/- 2640**	**92.80 +/- 21.30**

In looking at the net Particulate Nitrogen (PN) removal via mussel ingestion, there was some absorption of Byssal Threads/Gametes and ammonia as well as bio-deposition. For the New Jersey sites, this occurred primarily in the creeks; for the Rhode Island sites, it occurred in both the creek and river sites. It appears that the erosion rates along the river habitat in NJ is much greater than that in Rhode Island which would lead to lower biomass along the river in NJ and thus affecting the PN removal rate. The following table summarizes the data collected.

Estimated Net Particulate Nitrogen Removal (kg/ha-year)			
Marsh	**Total**	**Bio-Deposition**	**Growth**
DC	**89.22 +/- 33.53**	**74.35 +/- 27.94**	**14.87 +/- 5.59**
DN	**166.46 +/- 28.13**	**138.72 +/- 23.45**	**27.74 +/- 4.69**
MR	**68.49 +/- 35.18**	**57.07 +/- 29.32**	**11.41 +/- 5.86**
RI	**39.90 +/- 9.16**	**26.91 +/- 6.18**	**12.99 +/- 2.98**

Dr. Moody stated that shellfish habitat takes a long time to establish; he indicated that you are constructing a complex ecosystem. Overall it takes about three years to get a system established that can start to effectively provide filtration. Oysters can develop much faster than ribbed mussels; he presented data that compared the different growth rates of mussels and oysters from 2014 to 2016. He also provided data on the changes in population size structure and how that affects changes in services.

Dr. Moody indicated that new efforts are focusing on enhanced recruitment in Living Shorelines. He indicated that they have found that mussel density has been greater in shell bags than in coir-fiber logs in existing Living Shorelines. He also provided data indicating that there was no difference in total bag recruitment between open and closed bags. He presented data showing that only 6% to 8% of total mussel recruitment was to the bag surface indicating that substrate with only surface recruitment may suffer mussel persistence without protection.

Dr. Moody discussed the desired management approach of "Conserve and Enhance". He indicated that you should first assess the distribution and magnitude of the ribbed mussel ecosystem services. For dense populations in suitable habitat such as along NJ Creeks, you should stabilize the habitat, if compromised, and protect any existing stabilized habitat. For sparse populations in suitable habitat such as along NJ Rivers, you should provide for habitat enhancement and direct population enhancement.

In summary, Dr. Moody provided the following conclusions on considering ribbed mussels for water quality improvements:

1. Ribbed mussels are capable of filtering large quantities of TSS and PN.
2. Their services are largely concentrated in intra-marsh creek networks.
3. Prime mussel habitat along primary channel edges are under-performing due to low mussel biomass.
4. Living shoreline tactics can help stem loss and rebuild populations.
5. You can maximize biomass enhancement by protecting developing populations.
6. Two-pronged approach to ribbed mussel-mediated service maximization: conserve and enhance.

Question Have you looked at persistence of of surface area of attachment site? Yes, but we are not seeing good recruitment at COIR Log Sites.

Question If there is no shoreline then there is no place for the mussels to develop - Is the living shoreline working to prevent erosion? Yes, primary goal is to stabilize the interface using water quality improvements for biomass stabilization project.

Question Were the mussels affected by the salinity variations in the rivers? Ribbed mussels can tolerate a wide range of salinity conditions. Hurricane Irene wiped out oyster population but did not affect the ribbed mussels which are hardier than oysters.

Question Have they looked at creating ribbed mussel populations along bulk-headed shorelines? No.

Question Can Ribbed Mussels live in the intertidal areas? Do they grow at different rates? Yes but after three days, there will be physiological changes; they won't be able to clear the water as easily. This single experiment has not been replicated. He believes that the service value will eventually return. A discussion continued on this issue

Findings of Mountaire Pollution Committee *Chris Bason, Executive Director, CIB Scott Andres, DGS*

Chris began by summarizing the 2018 accomplishments to date:

1. Rehoboth Bay WWTP no longer discharges to the Lewes and Rehoboth Canal. This reduces the phosphorus loading to the Rehoboth Bay by at least 33%. We have now met our Pollution Control Strategy for phosphorus. The Nitrogen loading has also been significantly reduced.
2. Oysters are being farmed in Rehoboth Bay. There is at least one farmer actively working.
3. Submerged Aquatic Vegetation is increasing as well.

In November of 2017, the Delaware Department of Natural Resources and Environmental Control issued an extensive notice of violation of wastewater and wastewater sludge application permits for the Mountaire Poultry Processing facility on the north side of Indian River. This pollution has been long term and severe. The Center's Board of Directors formed an ad- hoc committee to develop findings and recommendations regarding the pollution at the facility. The following findings of the report regarding the condition of the local groundwater, Indian River, and the compliance history at the facility were presented in April and will be presented here for discussion. The Board is still awaiting additional information from DNREC and will release their recommendations at a later date.

Chris provided a general overview of the facility and the creeks surrounding the facility that discharge into the Bay. The Bay are economically and environmentally important and supports the $7 billion coastal economy. There are 59,000 jobs created and $711 million in tax revenues generated. The boating community generates some of the highest sales in power boats in the country. There are numerous recreational and fishing boat activities (250,000 fishing trips annually) available throughout the bay area. The bays have the highest level of regulatory protection; they are located in the Coastal zone. Dischargers are subject to the highest level of protection under the Clean Water Act. Many pollution issues are being addressed such as nitrogen and phosphorus loading form the Rehoboth WWTP and the discharges from the Indian River Power plant. However, we still have a long way to go and it is important that we to continue to focus on the Indian River.

The facility began in the early 1900's as the Townsend Plant which was the first company to vertically integrate the poultry processing industry by providing the grain through delivery of the final product to the market. Mountaire acquired the facility in 2000 and the facility converted its wastewater discharge from a direct discharge to the Swan Creek to a spray irrigation/land application system.

Groundwater flow in this area moves fairly quickly through the sandy soil flowing towards Swan Creek and Indian River at a rate of 4-39 inches per day (122-1000 feet per year) in the vertical and horizontal directions (based upon work that Scott Andres performed in this general area). It is important to remember that the actual rates may be higher since the area is under high wastewater loading rates which could also cause the flow to go in all directions. The wastewater that is discharged moves slowly through the aquifer and may take days to decades to ultimately reach the surface water bodies. Once the water reaches the water body it tends to stay there a long time (limited flushing) and with it any pollution that is in the water. Based upon hydrodynamic model results, this area of the Indian River has the longest residence time. This river is extremely sensitive to pollution. Chris reviewed dissolved oxygen data taken since 2009 which shows the diurnal cycle with extremely low minimum oxygen levels. He compared the values to the Mullica River (NJ) data which reflected a more natural unpolluted condition. He acknowledged that this was not a perfect comparison since the Mullica River has a forested watershed but it provides a reasonable representation of what we would like to achieve.

Based upon the fish surveys being conducted by Andrew McGowan, this is where the juvenile fish (summer flounder, weakfish, blue crabs) develop. Clearly, this is a nationally, regionally and locally important river.

The DNREC wastewater permits for this facility limits application of wastewater to 2.6 MGD to the fields with no more than 320 lbs of nitrogen per acre year including any supplemental fertilizers. The effluent must also meet the drinking water standard of no more than 10 mg/L of nitrate.

Because of the ongoing investigation, they were unable to obtain all of the data so there are some data gaps. In general, the data reflected extreme variability with many high, non complying data point. Since 2015, it has been very high, exceeding 300-400 mg/L. The existing background levels of nitrate have been very high as compared to other areas within the state. Onsite monitoring wells have values of 30-50 mg/L of nitrate with the highest levels recorded close to the creeks. Looking at the time history of nitrate levels, shows that the values were declining over time until 2005 when they began to start increasing again and presumably are continuing to increase.

The nitrogen concentration in the river shows no trends but is 2-3 times above the water quality standards (extremely high). The following is a brief summary of regulatory actions:

1. In 2003, the EPA required the company to address drinking water problems and the company provided an alternate drinking water source (bottled water) for local residents with wells with high nitrate levels. They were also required to address the nitrate contamination via a compliance order.
2. In 2005, the company requested closure of order which was denied by EPA since the water quality standards were not met. Order to remains open. No enforcement action was taken.
3. In 2009, the company over applied nitrogen to the fields by 78,465 lbs which was 32% over its permit. This rate alone was three times the level allowed into Swan Creek to maintain healthy water quality conditions (over half of total TMDL). No DNREC penalty was issued.
4. In 2016, DNREC completed a five-year compliance review of facility's wastewater permit and found a long list of non-compliances with the permit. Only three out of five annual reports were available and the values for nitrate were under calculated. In addition, several groundwater monitoring wells were not working and the wastewater operator logs were not prepared.
5. In July 2017, DNREC re-issued the permit.
6. The above violations place the facility ion violation of their Coastal Zone permit as well.

Was this an isolated incident? In 2013, the EPA prepared a report on DNREC permit enforcement activities in which they noted that DNREC failed to properly escalate the enforcement for wastewater violators (similar to 2004 and 2008). A review of other wastewater dischargers indicated that other facilities were being fined.

He noted that a new draft consent decree has been issued which is being challenged by several groups in court. DCIB is continuing to follow up by asking questions of DNREC.

Question Dr. Ritter asked about the 320 lbs per acre per year Chris indicated that the Mountaire is required to have a nitrogen management plan. There was a general discussion about this issue.

Question Mountaire has indicated that this was an existing problem and that they did not cause it There was a general discussion about this issue. Several comments about Stormwater problems and treatment plant storage capacity were discussed. It was apparent that Mountaire is also violating their General Stormwater Permit.

Treatment Options for Food Processing Wastewater .... *Bill Ritter, Univ. of DE*

Dr. Ritter provided the following overall description of the wastewater treatment process for meat processing industries. All systems usually provide a primary treatment for gross solids and BOD_5 removal. This process consists of either a circular or rectangular settling tank(s) with a weir system to control the flow rate. The process is designed based upon a regulatory specific loading rate (GPD/ft^2). The tanks include a sludge removal system which usually consists of scrapers located at the bottom of the tank.

The wastewater is then discharged to the secondary treatment system. All wastewater is required to meet NPDES Secondary Standards of 30 mg/L (monthly average) for total suspended solids and BOD_5 and various other limits for pollutants such as ammonia, pH, temperature and oil & grease. Additional site specific requirements may be imposed. As an example, Maryland has imposed very restrictive requirements for Total Nitrogen (3 mg/L) and Total Phosphorus (0.2-0.5 mg/L) for systems discharging into the Chesapeake Bay.

Question Do these limits apply to meat processing facilities? Yes, if they discharge to the Chesapeake Bay.

Question Does Maryland have spray irrigation systems and are the limits the same? Yes, they have spray irrigation systems but the limits would be different. Delaware has promoted spray irrigation in the past but would now like to eliminate these types of systems because of the problems that have occurred.

Secondary treatment is usually provided by either activated sludge or lagoon treatment systems with activated sludge the industry standard. Activated sludge systems have been in use since 1920 and are of two types: complete mix and plug flow. They include the following types of configurations:

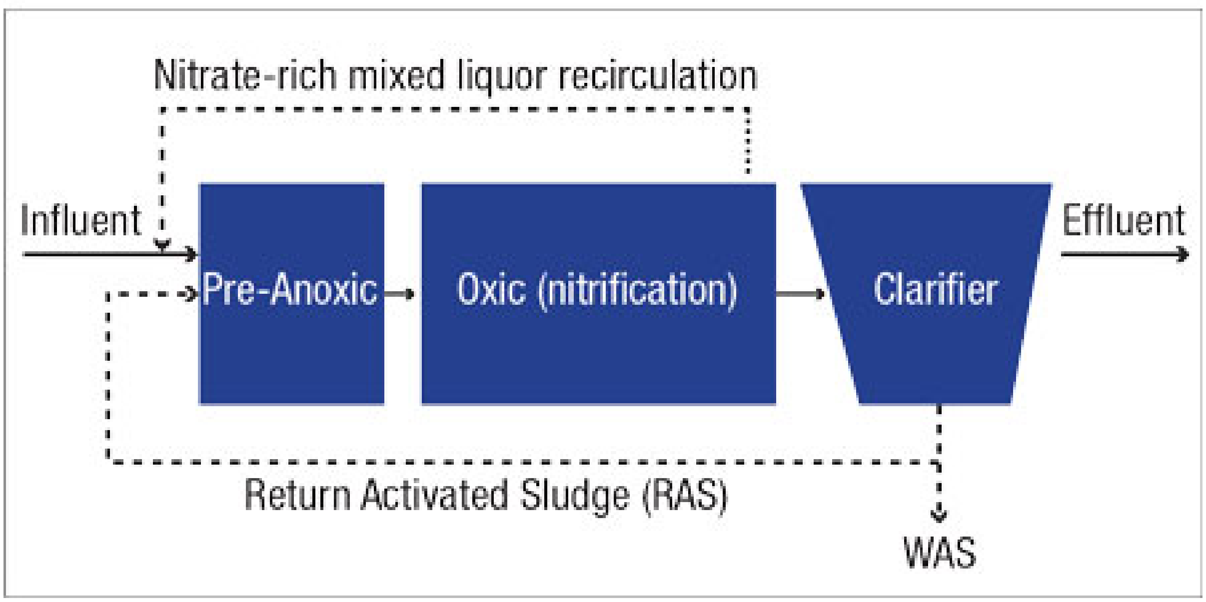
1. Contact stabilization;
2. Extended aeration;
3. Oxidation ditches;
4. Membrane bioreactors (mostly used in municipal applications); and
5. Sequencing batch reactors (newly used in food industries)

For contact stabilization and extended aeration, air diffuser systems are used to aerate the wastewater. In oxidation ditches, a paddle wheel or surface aerators are used for aeration. For sequencing batch reactor systems (SBR), the wastewater flows into an aeration tank where it is aerated. The treated solids are then allowed to settle out of the wastewater. The wastewater is then discharged and the settled sludge is removed for further treatment. SBRs can be operated to remove nitrogen. The SBRs have been in operation for some time now and have the advantage of requiring a small foot print area for the equipment.

Oxidation ditches can be operated aerobically and anaerobically with the anaerobic operation more common in the food waste industries. Anaerobic lagoons can remove some of the organics. Most lagoon systems consist of several lagoons in series or in parallel arrangement. In Delaware, a common municipal wastewater arrangement would be an aerated lagoon followed by a partially aerated lagoon which discharges to a facultative storage lagoon. The facultative lagoon has a naturally aerated surface layer, a facultative (anoxic) intermediate layer and anaerobic lower layer. This type of system is quite widely used for rural towns. The primary operational problem with this type of system is that it has trouble meeting the TSS and BOD_5 limits due primarily to the growth of algae. For this reason, sand filtration is often used to treat the pond effluent. Dr. Ritter believed that the original system at the Mountaire facility (Townsend) had sand filtration. The original lagoon systems were usually unlined; current groundwater regulations require that these ponds be lined.

For fruit and vegetable processing wastes (seasonal), a typical lagoon system would be an anaerobic lagoon in series with a surface aerated aerobic lagoon followed by a facultative lagoon.

Figure 2: Modified Ludzack-Ettinger (MLE) Process



Nitrogen and phosphorus concentrations can be a problem at food processing plants, which would require advanced wastewater treatment technologies for compliance. Phosphorus removal has been performed at plants discharging to the Great Lakes since the 1970's.

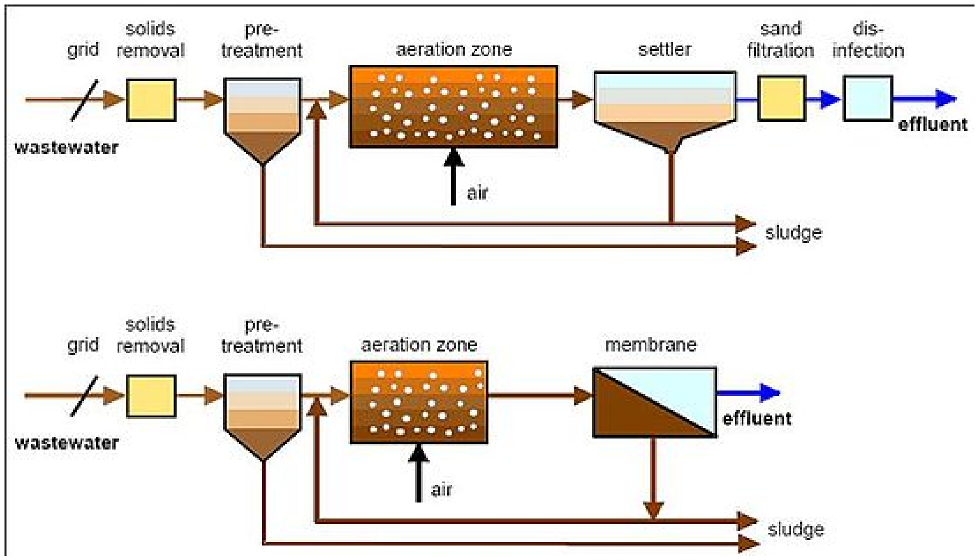
Nitrogen effluent concentration is a different situation with some plants only required to remove nitrogen for part of the year. Most of the nitrogen removal occurs in the primary stage of treatment. Advanced nitrogen removal occurs through nitrification/de-nitrification processes where the ammonia nitrogen is converted to nitrite then converted to nitrate, and finally nitrogen gas where it is released through aeration. The de-nitrification process requires a substantial amount of carbon either from the wastewater itself or by chemical addition (methanol) to the wastewater.

Activated sludge plants can be operated to maximize the nitrification/de-nitrification rate. There are several commercially available activated sludge systems that provide for nitrification/de-nitrification. There are also a number of biological filters systems that provide up-flow and down flow nitrification/de-nitrification treatment of the wastewater.

For phosphorus removal, there is a biological removal process and a chemical based removal process which is the most common. Activated sludge plants can be operated in a manner where the existing bacteria in the aeration system are "starved" under low oxygen conditions and then allowed to consume the excess phosphorus. Chemical precipitation is performed by feeding compounds such as ferric chloride, alum or lime into the wastewater ahead of the secondary clarifier. When chemical precipitation is used, it is generally followed by sand filtration for final solids removal. Dr. Ritter stated that anaerobic treatment alone is usually not sufficient to meet the effluent limits. He indicated that it is usually used at the beginning of the treatment processes ahead of the aerobic treatment system or as a pretreatment for wastewater that is to be discharged to a municipal treatment plant.

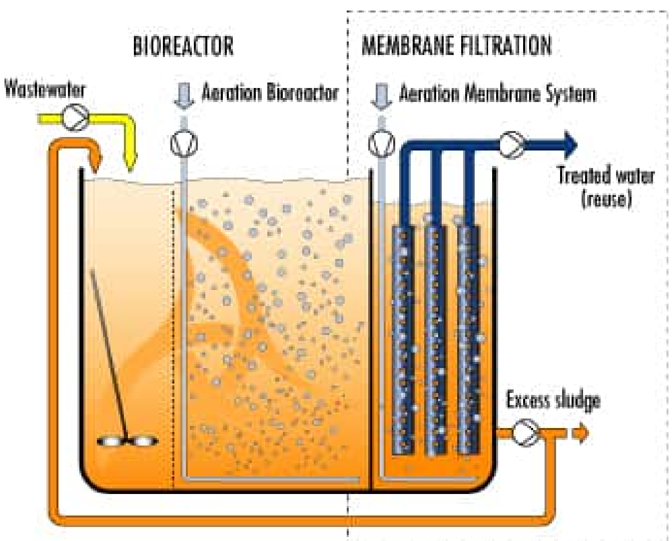
One of the advantages of anaerobic treatment is that it uses less energy than activated sludge which uses a significant amount of energy during the aeration process. There is also less sludge production in anaerobic systems and re-usable methane is produced as in other systems. The main disadvantage is that you can not meet effluent requirements with this process alone. The industry is developing more systems that may be able to produce better effluent.

Membrane bioreactors were developed in Japan and have been used in this country since around 2000. The system prices have been coming down so you are starting to see more systems being installed in municipal applications. Dr. Ritter believes that Millsboro installed an MBR system. Membranes can provide microfiltration or ultrafiltration; desalination can be accomplished with them as well as wastewater reuse. States have imposed very strict limits on wastewater reuse and MBRs are capable of meeting those limits.



Schematic of conventional activated sludge process (top) and external (side-stream) membrane bioreactor (bottom)

MBR can be used in conjunction with activated sludge plants or as stand alone treatment processes. They require much less area for equipment and are less expensive to operate. MBRs can achieve 0.1 to 0.5 mg/L TSS and BOD_5 effluent quality which is much lower than what the activated sludge plants can achieve.



After settling is complete, sludge is collected from the primary and secondary clarifiers and generally treated in anaerobic digesters. The anaerobic digesters will produce a stabilized sludge material which is referred to as a bio-solid. The digesters can be operated in series or parallel and generally operate at a minimum temperature of 95° F. The sludge digestion generates a methane rich gas byproduct which can be reused in plant operations. The primary disadvantages of digesters are that they take a long time to start up and must be operated precisely to avoid upsets.

After the sludge (bio-solids) is stabilized, it is dewatered in either belt filter presses or centrifuges. The dewatered material can then be either land applied or disposed of in another proper manner. For food processing industries, it is better for the facility to separate the human sewage from the process because of the more restrictive requirements for land application of human generated sewage sludge.

Question What do you consider the Best Available Treatment Technology for Poultry Processing wastewater for the removal of nitrogen and phosphorus? An activated sludge system which includes biological de-nitrification, chemical precipitation and sand filtration.

Question What would you expect the effluent quality to be for this system? There was a brief discussion about this issue. Dr. Ritter indicated that 3 mg/L Total Nitrogen could be achieved but is not occurring with current (older) systems. Her also indicated that effluent that was going to be land applied did not have to meet the standard as a stream discharge effluent ("it would make no sense economically").

Question Where should the treatment goal (performance) be measured? A brief discussion ensued during which it was stated that the Stormwater regulations should be followed. The sampling should occur after there has been at least 72 hours of no precipitation and should be conducted within the first thirty minutes of Stormwater discharge in order to get the worse case sample. The sampling should take in a location to assure that a representative sample of the actual discharge is obtained.

CCMP/Monitoring Subcommittee Report .... *Chris Main, Scott Andres*

The subcommittee met in April; first tasks include developing goals, work plan, and research agenda for an updated hydrodynamic and water quality model for the Bays. A lengthy discussion was held about the following:

1. What information would the mathematical model produce;
2. Would the model simulate the entire bay system as previous models had or address individual localized problems in a simpler manner; and
3. Where would the data for the model come from

It was agreed that scope of the model would be as stated in the CCMP and that a follow-up meeting will be held. Feedback on the model will be sought from STAC members.