Long Island Sound Study (LISS) Science & Technical Advisory Committee (STAC) and Water Quality Monitoring Workgroup 11/15/2019

In Attendance:

STAC Members: James Ammerman, Diane Greenfield, David Lipsky, Darcy Lonsdale (NY Co-chair), Kamazima Lwiza, James O'Donnell (CT Co-chair), Evelyn Powers, Paul Stacey, Kelly Streich, Larry Swanson, Mark Tedesco, Nils Volkenborn, Laura Wehrmann, Robert Wilson

Others: Cassie Bauer (NYSDEC**),** David Berg (LIRPC/LINAP), Nelle D'Aversa (NYSDEC/NEIWPCC), Carol DiPaolo (CSHH), Michele Golden (NYSDEC), Mike Jensen (Suffolk DOH), Kristin Kraseski (NYSDEC/NEIWPCC), Anand Kumaraswamy (NYCDEP), Tony Leoung (NYSDEC), Peter Linderoth (STS), Bill Lucey (STS), Matt Lyman (CT DEEP), Michelle McAllister (CSHH), Jon Morrison (USGS), Bob Nyman (EPA), Victoria O'Neill (NYSDEC/LISS/NEIWPCC), Jimena Perez-Viscasillas (NYSG/LISS), Casey Personius (NYSDEC), Lane Smith (NYSG), Nicole Tachiki (EPA LISO)

Presentations (Click name for pdf document):
Tedesco
Lyman
Powers
O'Donnell
Linderoth
Morrison

On the webinar: Robin Landeck Miller (STAC Member)

Darcy Lonsdale (NY) Co-Chair, opened the meeting at 9:15 AM

Mark Tedesco, EPA LISS: "*Long Island Sound Study program plans, moving forward".* Mark focused on recent investments made with increased funding as well as current gaps and future areas for potential new investments, similar to his presentation at the October Management meeting. Increased water quality investments in 2017-2019 included expanded monitoring and modeling of both embayments and open waters and improved nitrogen loading estimates. Additional recent investments included land acquisition, habitat restoration, and expanding the Futures Fund. Gaps which need additional attention include accountability and management as well as valuation of ecosystem services. Project tracking and reporting, while sufficient, needs additional detail as suggested by the GAO report. Several other areas for potential future investment, including data management, additional EPA coastal assessment sites, and nuisance species control were also mentioned. Mark concluded with the improved

picture for point source nitrogen loading and hypoxia in LIS but the mixed picture for nitrogen inputs from the Connecticut River watershed and other Connecticut watersheds.

Matt Lyman, CT DEEP: *"LIS Water Quality Monitoring by CT DEEP".*
Matt reviewed the LIS watershed and the history of nitrogen monitoring and reductions in LIS as well as the vision statement and four major themes from the 2015 CCMP. He then provided background information on the extent of the hypoxia problem in LIS, the monitoring goals in relation to hypoxia, and the station locations, timing, and measurements made. Matt showed a map of the WWTPs in the western Sound as well as a plot of the declining area of hypoxia in LIS and comparisons with declining total or Connecticut-only waste nitrogen loads from WWTPs. He concluded with various scenes from the monitoring cruises as well photos and brief descriptions of LIS research projects which have participated in cruises for sample or data collection.

Evelyn Powers, IEC: *"Western LIS Water Quality Monitoring by IEC".*
Evelyn gave an overview of the IEC monitoring program in western LIS which started in 1991. She described the scope of the study, the parameters measured and the location of the stations. This study focuses on hypoxia in the western sound, with 12 weekly surveys in the summer and monthly surveys the rest of the year. A contractor recently developed an Access database for the first 25 years of their data which has now be updated through 2018. (It was noted that the NYC Department of Environmental Protection samples throughout the harbor including the East River and has water quality data back to 1908 available on its website.) Evelyn reviewed the data for the 2019 season, with the lowest bottom water oxygen (greatest hypoxia) on the July 30th and August 13th surveys. She noted the collaboration with other monitoring groups including an overlap of two stations with CT DEEP with whom an annual joint hypoxia report is prepared. IEC also runs the chlorophyll *a* and nutrient analysis for the Unified Water Study (UWS), a collaboration with Save the Sound which runs the UWS. Evelyn concluded with discussions of future monitoring, including current measurements of BOD, and potential measurement of alkalinity and well as potential pathogen monitoring in select embayments.

Jim O'Donnell, U Conn.: *"LIS Water Quality Monitoring by the Long Island Sound Integrated Coastal Observing System".* Jim O'Donnell (with co-authors) presented a talk about the LISICOS buoy array and its role in monitoring water quality and hypoxia. He described how the different buoys are instrumented and showed a detailed timeline of 2018 data from the western LIS buoy, with a focus on carbon and oxygen-related parameters. His main focus, however, was to use the continuous dissolved oxygen data from the buoys to evaluate the variance in the interpolated hypoxic area measurements by CT DEEP. He determined that the variability in the measured area of hypoxia is 40% due to measurement uncertainty, 40% due to interannual variability, and 20% due to the decrease in nitrogen discharges from wastewater treatment plants. Jim also discussed the important parameters which determine the area of hypoxia and their measurement, including mixing vs. stratification and production vs. respiration. In response to questions he suggested that the impact of stormwater carbon loading on hypoxia in the western sound may be underestimated. He also briefly discussed data management, including the open access and broad agency uses of ERDDAP.

Peter Linderoth, Save the Sound: *"LIS Embayment Water Quality Monitoring by the Unified Water Study".* Peter described the Unified Water Study (UWS) embayment monitoring program which is directed by Save the Sound with support from the LISS. The UWS had convened a summit of its many monitoring groups just the day before the

STAC meeting. Peter described the history and the current UWS as well as plans for the future. He listed the local groups involved and the embayments sampled, Tier 1 and Tier 2 measurements and sampling schedules. There are currently 22 diverse groups involved monitoring 39 different embayments for Tier 1 parameters and 7 groups monitoring 13 embayments for Tier 2. Peter also discussed the QAPP process, instruments used, equipment loan program, and data entry and management.

Input from Other Monitoring Programs:

Jon Morrison, USGS: *"Surface Water Quality Monitoring Network in New England".*
Jon gave an impromptu talk about the USGS New England monitoring network. He listed the cooperating state agencies and showed a map of the 67 stations with discrete monthly sampling. He also mentioned the 10 stations with continuous water quality monitoring for dissolved oxygen and other routine parameters and described the instrumentation involved. Some of these stations also measured nitrate, chlorophyll *a*, and colored dissolved organic matter continuously. Automated nitrate measurements agreed closely with discrete measurements. The nitrate load in the Connecticut River increases downstream and also varies annually. Jon concluded by noting that the Connecticut River watershed is a USGS focus going forward and talked briefly about monitoring in the Pawcatuck River watershed and estuary, the three major tributaries to LIS (Housatonic, Lower Connecticut, and Thames Rivers), and fall line monitoring in Connecticut.

Mike Jensen, Suffolk County: Mike briefly described the water quality monitoring on the north shore of Long Island conducted by Suffolk County. Six north shore embayments (Huntington/Northport Bay Complex, Stony Brook Harbor, Port Jefferson Harbor, Nissequogue River Estuary, Mt. Sinai Harbor, and Mattituck Creek) are monitored monthly and the first three have sondes in place.

Other Programs: Michele Golden (NYSDEC) mentioned the Long Island Nitrogen Action Plan (LINAP), the Suffolk County Subwatersheds Plan, and related efforts in Nassau County and the Center for Clean Water Technology at Stony Brook University. She also described the LIQWIDS Project with USGS as a portal for data use and analysis.

David Berg (Long Island Regional Planning Commission) noted that Hofstra University and the Town of Hempstead have 50 years of water quality information. He added that the Bay Park sewage treatment plant outfall is being diverted to the ocean and will remove 19 million pounds of nitrogen.

Nelle D'Aversa (NYSDEC, NEIWPCC), the LISS Bioextraction Coordinator coordinates closely with LINAP and is involved with seaweed nitrogen bioextraction in Oyster Bay.

Panel Discussion: "*Water Quality Monitoring".*
The meeting ended with a wide-ranging discussion about current and future water quality monitoring issues among the meeting participants.

1. **Methods, methods comparisons, and the most useful parameters:** It was noted that some of the monitoring programs use different chlorophyll *a* methods and that field comparisons can be difficult to coordinate though they have been successfully done in the lab. There was concern about what chlorophyll *a* measurements mean, especially given the variability of carbon to chlorophyll *a* ratios. Chlorophyll *a* has shown major changes in LIS, such as the decline after 2002 due to changes in community structure

and planktonic biomass. It was suggested that we need more measurements of things that models use, such as production and respiration rates. Are such measurements research or should they be conducted as part of routine monitoring? A question was raised about the usefulness of nitrogen measurements, noting that they were not as variable as dissolved oxygen. Nitrogen concentrations are often not good forcing factors, nitrogen loading rates can be much more useful. The Suffolk County subwatersheds plan provides nitrogen loading information which will hopefully be extended to Nassau County through LINAP. The complete carbon and carbon loads to LIS, including those from CSOs and stormwater have never been nailed down but need to be.

2. **Data management:** A long discussion about data management ensued. USGS has recently unveiled its Nation Water Information System (NWIS), which has been a major transition and puts all USGS data online. For example, it includes Connecticut River streamflow data back to 1928. USGS also issued a 2016 nationwide report on data management and integration. There was also a lot of discussion about various data systems including WQX, where EPA-supported data must be archived, and those like ERRDAP, which better facilitates analysis, and how to better connect them. (Note: LINAP uses the Long Island Water Quality Integrated Data System [LIQWIDS] in collaboration with USGS.) There is a need to better integrate various different types of data without having to centralize them in one place, it is better to facilitate easy data sharing among different groups over the web. Guidelines would include: 1. Standards for data sharing, 2. Distributed data access and development of tools. 3. No central database but data standards (metadata and consistent field names in data tables) to facilitate sharing. There were also questions about accessing model data from available databases and it was noted that the modeling RFP calls for development of a graphical decision support tool.

3. **Embayments, ecosystem indicators, and related:** With the increasing interest in embayments there were questions about whether we have enough data to model the embayments of interest. Also, whether we need to collect embayment data differently, with better information on the rates of nutrient delivery, as well as production and respiration. Others thought that investigations of LIS indicators beyond hypoxia were needed. Sentinel monitoring studies have been useful in assessing other ecosystem processes and drivers and should be continued. The contribution of groundwater to nitrogen fluxes, as is well-documented in Suffolk County, is not always appreciated. Also, as part of LINAP, seaweed bioextraction is being examined a potential nitrogen removal process in Cold Spring Harbor and Oyster Bay. There were also questions about whether our current water quality sampling protocols are optimal. Do we need BOD data as currently measured by IEC? Was the data from the FIRe Fluorescence Unit collected on the CT DEEP cruises of use? Is our current monitoring scheme perhaps oversampling in space but undersampling in time to address the natural variability? Finally, the issue of data analysis and synthesis was raised. CT DEEP is already developing methods for measuring hypoxic volume as well as area, such volume could also be integrated over time. Should additional data synthesis be supported through base funding or an RFP? More specific details of current data synthesis needs should be articulated.

The meeting was adjourned about 2:15 PM.