Long Island Sound Study (LISS)
Science & Technical Advisory Committee (STAC) 6/15/2018

Presentations:

- LISS Budget and Work Plan Discussion (Tedesco)
- Suffolk County Subwatersheds Wastewater Plan: STAC Update (Zegal)
- Status Update: LIS Model Technical Guidance Report (Grieco)
- Synthesis and Analysis of Historical Hypoxia Data in the Western Narrows of Long Island Sound (Friedman)
- Chlorophyll a Measurements in Long Island Sound (Ammerman)

In Attendance:

STAC Members: James Ammerman, Paul Anderson, Beth Lamoureux (for John Connolly), Sarah Deonarine (for Sarah Crosby), Charles DeQuillfeldt, Anthony Dvarskas, Stuart Findlay, Laura Grieco (for David Lipsky), Darcy Lonsdale (NY Co-chair), Anne McElroy, John Mullaney, James O'Donnell (CT Co-chair), Evelyn Powers, Paul Stacey, Kelly Streich, Larry Swanson, Mark Tedesco, Laura Wehrmann, Bob Wilson, Charles Yarish

Others: Cassie Bauer (NYSDEC/LISS), David Berg (LIRPC), Nelle D'Aversa (NYSDEC/NEIWPCC), Charlie Flagg (SoMAS/SBU), Kristin Kraseski (NYSDEC/NEIWPCC), Bill Lucey (Save the Sound), Jon Morrison (USGS), Nancy Seligson (CAC), Anna Weshner-Dunning (NYSG/LISS), Kaitlin Willig (SoMAS/SBU), Ken Zegel (SCDHS)

On the webinar: Sylvain DeGuise (STAC Member, CTSG/UConn), Audra Martin (NEIWPCC), Robin Miller (STAC Member, HDR)

Darcy Lonsdale (NY) Co-Chair, opened the meeting at 9:15 AM: She introduced three new STAC members, Dianne Greenfield, Paul Stacey, and Laura Wehrmann. Paul and Laura were in attendance.

Mark Tedesco, EPA/LISS: ***"****EPA LIS 2017-2018 Investments and Nitrogen Strategy Updates"*. Mark reviewed the recent budget increases for the Long Island Sound Study to $8 M ($8.6 M total) in FY2017 and $12 M ($12.6 M total) in FY2018 from the Clean Water Act (CWA) Geographic Program. The additional $0.6 M in the totals is from the CWA National Estuary Program. He reviewed the increased FY2017 funding including an additional $1.0 M for the Futures Fund and $1.4 M for the partnership with NYCDEP for the next generation of LIS modeling. Decisions for use of the increased FY2018 funding focused largely on monitoring enhancements, including nitrogen management in embayments, addressing benthic community conditions, and how to support community monitoring for pathogens. He also discussed the current progress of the Tetra Tech contract, which is identifying water quality targets and nitrogen endpoints to meet desired water quality conditions. The EPA nitrogen reduction strategy will customize the application of these nitrogen endpoints for each of the three main watershed groupings (embayment watersheds, tributary watersheds, and open waters with discharging WWTPs). Mark concluded with a summary slide illustrating other nitrogen reduction efforts around the Sound.

Ken Zegel, SCDHS: "*Suffolk County Subwatersheds Wastewater Plan: STAC Update".* Ken Zegel reviewed the current progress of the Suffolk County Plan including an overview, examples of modeling and an update on the current status. The plan will support the development of a County-wide wastewater management strategy through the establishment of 'priority areas' for nitrogen reduction, establishment of nitrogen load reduction goals for each priority area, and the development of a recommended wastewater upgrade strategy to meet nitrogen load reduction goals. A total of 191 subwatersheds (27 of which flow into LIS) have been delineated, groundwater contributions to these watersheds have been modeled, and a database of surface water quality has been compiled and gaps filled. In addition, groundwater nitrogen simulations for both current and buildout have been completed, and surface water modeling to estimate residence times is finished. A major task ongoing task is to rank and group waterbodies with respect to current ecological condition and vulnerability to nitrogen loads in order to assist in funding and resource allocation. Marine and freshwater matrices are used in the waterbody ranking process and focus on primary ecological response criteria like dissolved oxygen, chlorophyll *a*, and water clarity. A load reduction goal approach to nitrogen reduction will be applied to these waterbodies based on (1) local reference waterbody comparisons, (2) local stress-response relationships, and/or (3) use of existing guidance values. The current schedule calls for final adoption of this plan by the County legislature by the end of 2018.

Kelly Streich, CTDEEP: *"Connecticut Second Generation Nitrogen Strategy"*. Kelly outlined recent and current activities in Connecticut (CT) related to nitrogen (N) reduction. She noted that the large nitrogen reduction targets for wastewater treatment plants (WWTP) in the 2000 TMDL have been met and that the hypoxic area in LIS has declined. Nitrogen loading to the Sound from atmospheric deposition and agriculture have also declined significantly, but input from urban stormwater, septic systems, and turf fertilizer has increased modestly. With the decrease in WWTP N loading in CT, the proportion of urban N loading (33%) now slightly exceeds that from WWTP (30%). The remaining third comes from forests (30%) with only 7% from agriculture. These shifting priorities led to the Connecticut Second Generation Nitrogen Strategy and its focus on three components (1) WWTPs, (2) Non-point sources and stormwater, and (3) and Embayments. A further 3% N reduction from WWTPs is planned by 2022, 95% of N reductions to an aggregate target concentration of 4.0 mg/L has already been completed. The additional 3% N removal from WWTPs will come from projects that are currently in progress. For non-point sources and stormwater, second generation efforts will address both regulated and non-regulated urban stormwater, analysis of and improvements in sewers and septic systems, and nutrient management plans and outreach to address turf and agricultural fertilizer runoff. Much of the remainder of the talk focused on embayments, starting with the University of Connecticut's embayment study (J. Vaudrey) which estimated the N load (including major sources) to 116 LIS embayments and identified 16 CT embayments of concern. Together with the results of Vaudrey's study and other social and ecological indicators, CT DEEP prioritized its waters for protection and restoration efforts using the Integrated Water Resources Management Process. A total of eight embayment complexes were prioritized. Details of the Integrated Water Resources Management Process and a map of priorities can be found at http://www.ct.gov/deep/cwp/view.asp?a=2719&Q=580936&deepNav_GID=1654. Last year, CT DEEP completed a project with CLEAR/NEMO to communicate the results of Vaudrey's study, priority embayments, impacts of nitrogen pollution, and provide the public with tools that can be used to reduce their contribution of nitrogen. An outreach website is available at http://nemo.uconn.edu/tools/nitrogen/index.htm. Currently two detailed embayment studies are underway in the Pawcatuck River and the Niantic River Estuary. Embayment and watershed

sampling and model development have been being initiated this summer in the Pawcatuck River. Analysis of physical data is complete, and biological and chemical data analysis is underway in the Niantic River Estuary. The Niantic River Estuary project includes the development of an estuarine water quality model to determine ecological endpoints and nitrogen targets. Determining hydrodynamic equations to feed the ecological model has been challenging and is currently being addressed.

Bob Wilson, SoMAS/SBU: *"Nassau County North Shore CVLGrids for EFDC Hydrodynamic Model"* (CVLGrid is commercial software which generates the model grids for the Nassau County North Shore Bays). Bob Wilson discussed the hydrodynamic modeling of the north shore of Nassau County. The project is funded by NYSDEC through LINAP and employs the EFDC model on the north shore. He showed the model grids for the four embayments, from west to east, Little Neck, Manhasset, Hempstead, and Oyster Bays. The model uses a NYSDEC shape file for the coastline and NOAA National Ocean Service high quality single and multi-beam bathymetry. It includes open boundary conditions and surface and groundwater flows, the latter from a limited resolution USGS groundwater map. Hydraulic residence times were estimated for the embayments.

Charlie Flagg/Bob Wilson, SoMAS/SBU: *"Modeling of the Alexandrium Bloom in Northport Harbor".* Charlie Flagg described modeling of an *Alexandrium* bloom in Northport Harbor supported by NYSDEC through the LISS. He used a 3D FVCOM model with an *Alexandrium* component based on a past HAB model done elsewhere. The model grid is shaped like a "flying elephant" and the model incorporated 2 meters of tidal flushing, atmospheric forcing with a temperature-dependent bloom, and the benthic *Alexandrium* cyst distribution from 2008. Based on modeled dye studies, Northport Harbor had a mean residence time of 4 days (with a maximum of 7) and the outer harbor (the larger Huntington Bay Complex) also had a mean residence time of 4 days (with a maximum of 20). Comparison of modeled and measured dissolved inorganic nitrogen (DIN) and *Alexandrium* concentrations were made and the impacts of 50% and 90% DIN reductions on algal growth were modeled. Insights included the limited impact of the Northport WWTP on nitrogen concentrations and the stability of benthic cyst numbers.

Laura Grieco, NYCDEP: *"Status Update: LIS Model Technical Guidance Report"*. Laura provided an update on the Technical Advisory Committee (TAC) which is developing the Technical Guidance Document for the next generation of LIS modeling and the modeling RFP to be released. This is a joint effort of the LISS and NYCDEP and Laura was substituting for David Lipsky of NYCDEP. She reviewed the TAC membership and past meeting schedule; the final Technical Guidance Document is scheduled to be delivered on June 30. EPA's objectives for the modeling effort include (1) an open-source modular design, (2) a capability to be built in stages, and (3) a capacity for external review and GUI development. NYCDEP's goals and objectives include to (1) model water quality parameters and accurately capture hypoxia and dissolved oxygen/water quality in the LIS, (2) create a more refined framework that enhances responsiveness and represents physical characteristics and processes in LIS waters including embayments, (3) develop a robust model framework that is linkable, scalable, and updatable to future environmental conditions and new data, (4) establish a framework that facilitates evaluation of multiple planning and management scenarios, and (5) provide a

transparent, open, and user-friendly framework. The TAC was asked to evaluate these objectives and the recommended approach to achieving them, as well as to identify existing data that could fill the preliminary data gaps identified as well as to identify additional data gaps. They were also asked to evaluate the proposed time schedule for meeting these objectives and identify concerns with the schedule.

Discussion: A limited discussion followed Laura's presentation. There was concern that discussions of model details ignored other important issues related to nitrogen and hypoxia in LIS. Paul Stacey noted the lack of a policy or management discussion. Laura stated that management scenarios were an important part of the discussion during the TAC meetings. Jim O'Donnell mentioned the need for more data on certain parameters important to models. Mark Tedesco mentioned the improved bathymetry from the LIS mapping project. Jeff Levinton mentioned data gaps but noted that models can increase the data density. Others mentioned that this effort was much more than models and better data was needed to accurately connect hypoxia to nitrogen loading, improving on past models. It was noted that the current LISS Sea Grant RFP calls for proposals to better quantify water column respiration.

Jim O'Donnell, U Conn: *"Developing a strategy for LIS data management"*. Jim described the current LIS data management system as well as possible future improvements. He reviewed the LISICOS database which is currently used by the LISICOS buoy system as well as the CT DEEP monitoring program. He pointed out the procedures and challenges of using this database to access LIS information, focusing on CT DEEP monitoring cruises. Jim then listed the current main LIS data sources (CT DEEP, IEC, LISICOS, NYCDEP, and any others), as well as the current models used (ECOM, FVCOM, ROMS, and SWEM). He then reviewed some of the currently used types of data management systems as well as their advantages and disadvantages. These included MetaData Standards, which just provides standards for descriptions for data files; and FTP, which is good for downloading whole data files from single types of instruments. More sophisticated management systems include THREDDS, which provides filesharing and data subsetting, and is good for large files; and ERDDAP, which includes file sharing, subsetting, discovery, primitive graphics, and supports a variety of data formats. Jim also said ERDDAP was widely used and community supported and proposed moving to ERDDAP for LIS data. He provided several ERDDAP links and examples and noted that improved LIS data management would be needed now or later as part of the new modeling effort.

Scott Friedman, Industrial Economics (by webinar): *"Synthesis and Analysis of Historical Hypoxia Data in the Western Narrows of Long Island Sound"*. Scott presented a webinar on Industrial Economics' (IEc's) synthesis and analysis of 25 years of Interstate Environmental Commission (IEC) data from Western Long Island Sound. A team from IEc reviewed the water quality data set from 1991-2105 and also reviewed IEC's historical quality assurance project plans (QAPP). Meteorological data related to hypoxia in the Western Sound was assessed and ultimately compiled along with the water quality data into relational and geographic databases. Limited analysis of the data was conducted and some examples, such as temporal trends in hypoxia and the relationship between nutrient and dissolved oxygen concentrations were presented. The compiled relational and geo databases will be very useful for more detailed future analyses, especially as more web-based analytical tools are developed.

Jim Ammerman, LISS/NEIWPCC: *"Chlorophyll a Measurements in Long Island Sound"*. Jim discussed some current concerns about chlorophyll *a* measurement methods among LIS monitoring groups, and the use of the term "corrected chlorophyll *a*". He reviewed chlorophyll structure and the pathways of chlorophyll degradation, as well as the major methods for measuring chlorophyll *a* (spectrophotometric, fluorometric, and HPLC). All of these methods can be "corrected" for pheophytin (a chlorophyll breakdown product) by taking a second measurement following acidification of the sample. EPA has two approved methods for chlorophyll *a*, a conventional fluorometric one with the acid correction for pheophytin, and a narrow bandpass fluorometric one which directly measures chlorophyll *a* directly without the need for an acid correction. This latter method does not measure pheophytin, which may be a concern for some who use it as an indicator of zooplankton grazing. CT DEEP has used the narrow bandpass filter method for decades, whereas IEC has used the fluorometric method with an acid correction since 2016. IEC previously used the spectrophotometric method with acid correction from 2011 to 2016, and before that had samples analyzed at the University of Connecticut lab where CT DEEP's are done. Limited comparisons between overlapping 2017 CT DEEP and IEC samples show some differences, though there are many possible explanations other than just analysis methods. Jamie Vaudrey (U. Conn.) recently conducted a more rigorous comparison which showed good agreement between measured chlorophyll *a* values. A second unrelated use of the term "corrected chlorophyll *a*" that has confused some is CT DEEP's correction of their CTD chlorophyll fluorescence values with extracted chlorophyll *a* measurements.

Meeting was adjourned at 2:30 PM