Long Island Sound Study (LISS)

Science & Technical Advisory Committee (STAC)

Meeting Summary | 2/15/2019

Presentation links:

- Barrett
- Orton
- Parker

In Attendance:

STAC Members: James Ammerman, Sylvain DeGuise, Stuart Findlay, David Lipsky, Darcy Lonsdale (NY Co-chair), Kamazima Lwiza, Anne McElroy, John Mullaney, James O'Donnell (CT Co-chair), Suzanne Paton, Larry Swanson, Mark Tedesco, Craig Tobias, Jamie Vaudrey, Laura Wehrmann, Robert Wilson

Others: Juliana Barrett (CT Sea Grant), Cassie Bauer (NYSDEC/LISS), Tracy Brown (Save the Sound), Sarah Deonarine (Manhasset Bay Protection Committee/CAC), Holly Drinkuth (TNC/CAC), Kathleen Fallon (NY Sea Grant), Alexa Fournier (NYSDEC), Kristin Kraseski (NYSDEC/NEIWPCC), Jeff Levinton (Stony Brook), Peter Linderoth (Save the Sound), Paul McIsaac (Playback LI), Jon Morrison (USGS), Charles Muller (Salonga Wetland Advocates Network), Vicky O'Neill (NYSDEC/LISS/ NEIWPCC), Mark Parker (CTDEEP), Casey Personius (NYSDEC), Kyle Rabin (Long Island Regional Planning Council/LINAP), Nancy Seligson (CAC), Lane Smith (NY Sea Grant), Krista Stegemann (NY Sea Grant), Phil Trowbridge (CTDEEP), Anna Weshner-Dunning (NYSG/LISS), Rick Winfield (USEPA)

On the webinar: Carmel Cuomo (STAC Member), Diane Greenfield (STAC Member), Robin Landeck Miller (STAC Member), Kelly Streich (STAC Member), Penny Vlahos (STAC Member)

Darcy Lonsdale (NY) Co-Chair, opened the meeting at 9:20 AM

Malcolm Bowman, Stony Brook: *"Rationale and Potential Plans for New York City Storm Surge Barriers".* Malcolm discussed the need for storm surge barriers in New York City after Hurricane Sandy, as well as the currently proposed plans, and provided examples of storm surge barriers in other locations around the world. He noted that losses from Hurricane Sandy were about $100 Billion as well as lot of human misery, but you rarely hear about it anymore. A huge unknown question is whether Sandy was an extremely unusual occurrence or will happen again. Malcolm showed Sandy flooding maps and noted that in addition to flooding in New Jersey, New York Harbor and the Battery, and the South Shore of Long Island, the storm surge came down Long Island Sound. National Weather Service Data showed a maximum water level over 14 ft. at Kings Point (almost 6 ft. tide and over 8 ft. storm surge, a storm surge almost as high as at the Battery). Malcolm discussed the Thames River Barrier in London, which he has

visited, and showed its location and the four different positions it can occupy. He also noted that following the 1938 hurricane, three barriers were built in the Northeast, in Stamford CT, Providence RI, and New Bedford MA. He briefly mentioned the expensive proposed Sandy Hook to Breezy Point barrier in the lower Hudson River as well as the strong opposition to both the barrier and the US Army Corps of Engineers process by several NGOs. He then discussed the Shinnecock Canal between Shinnecock and Peconic Bays on Long Island as an introduction to how similar sea gates might work near Throgs Neck in Western Long Island Sound. Malcolm noted that the Western Sound has weak tidal currents and also gets about 50% of New York City's wastewater treatment plant discharges, both conditions which favor hypoxia. He described a 1989 SWEM model by HydroQual (now HDR), in which Throgs Neck sea gates could provide both storm surge protection and also enhance Long Island Sound water quality. The latter would result from closure of the gates when the tides cause flow to the east from the East River into the Sound, when the flow reversed from the Sound to the East River, the gates would open. The SWEM model showed that this would decrease surface nitrogen concentrations and increase bottom oxygen concentrations in the Western Sound. Malcolm concluded by stating that the two sets of barriers discussed are necessary for storm protection, the Throgs Neck one may also improve water quality. He noted design of the barrier should minimize obstructions to river and tidal flows during calm weather to allow adequate flushing and then responded to numerous questions and concerns.

Philip Orton, Stevens Institute of Technology: *"Preliminary Evaluation of the Physical Influences of Storm Surge Barriers on the Hudson River Estuary… and Long Island Sound".* See also: http://www.hudsonriver.org/download/surge_barrier_report_V8.pdf Philip described his collaborative research on the potential impacts of various proposed storm surge barriers on the Hudson River Estuary as well as brief mention of new studies on Long Island Sound. He and David Ralston of Woods Hole Oceanographic Institution conducted ROMS and sECOM-NYHOPS modeling of the Hudson Estuary and in addition U. Conn. colleagues used the FVCOM model to extend the study to Long Island Sound. The proposed barrier options for New York City include a large gateway barrier from Sandy Hook to Breezy Point or several smaller barriers at other locations. Philip then reviewed examples of existing barriers in other locations around the world and noted that few are found in partially-mixed estuaries like the Hudson. He defined the Gated Flow Area (GFA) of a barrier system as the cross-sectional area (CSA) of open barrier gates divided by the total inlet CSA in percent, 100% GFA would be completely open. He examined a well-mixed estuary, the Scheldt (Netherlands), and showed how tidal processes dominate exchange with the coastal ocean in such a system. The modeled impacts of proposed storm surge barriers for Boston Harbor were shown, with increased tidal current velocities at the gates and stagnant zones behind them arguing against their installation. Philip then contrasted partially-mixed estuaries like the Hudson, where exchange with the coastal ocean is driven by estuarine circulation, noting that the salinity intrusion is stronger during neap tides. He discussed a modeling study of two different barrier designs with different GFAs at the mouth of the Chesapeake Bay, another partially-mixed estuary. In general, the barriers caused a reduction in tidal range, stronger stratification with increased salt intrusion, and increased residence times.

Studies on the Sheepscot River estuary in Maine, where a causeway with a narrow opening was removed in 1974, showed similar impacts.

Philip then reviewed their current progress on Hudson barriers with existing models using a range of obstructions with different GFAs across the Sandy Hook-Breezy Point harbor entrance. While the sECOM-NYHOPS model provides detailed information and is well-validated for the Hudson estuary, the model resolution is coarse in the area around the barriers. A series of simulations with different GFAs were consistent with the literature and showed the qualitatively, more restrictive barriers lead to:

1. Stronger tidal currents and mixing near the barrier gate openings
2. Widespread reductions in tidal range, currents and mixing through the rest of the estuary
3. Increased stratification in the estuary due to the reduction in tidally-driven mixing
4. Greater salinity intrusion due to the stronger stratification and estuarine circulation
5. More pronounced changes during spring tides than neap tides

The talk concluded with a brief discussion of preliminary modeling of surge barrier impacts on Long Island Sound by Jim O'Donnell (U. Conn.) and colleagues using the FVCOM model. The model suggests that there is a potential for both positive and negative changes in both stratification and tide range, but more research using a wider range of conditions is needed. Additional NOAA-NERRS-supported collaborative research also continues on the proposed Hudson barriers.

Juliana Barrett, Connecticut Sea Grant: *"Climate Vulnerability Assessment for Long Island Sound".* All EPA National Estuary Programs have been tasked with the problem of assessing the vulnerability of their respective estuaries to climate change based on EPA guidance documents with four major categories (Pollution Control; Habitat; Fish, Wildlife, and Plants; and Recreation and Public Water Supplies). Juliana reported on her part of this effort which involves soliciting input from various LIS workgroups and partners on a series of Battelle-developed probability matrices for the Northeast Region, as well as different sub-regions and habitats. Juliana reviewed the various matrices and mentioned that she had met in person or on the phone with a number of different workgroups. There were numerous questions and extended discussion. Concerns were expressed about the limited numbers of stressors examined, the applicability of Northeast Regional climate assessments to more local environments (downscaling), and others. Juliana would appreciate continuing input from LIS partners.

Mark Tedesco, EPA: *"Long Island Sound Study program updates, budgets, and plans"*. Mark discussed planning for fiscal year 2019 and noted that the current LISS budget was $14.6 M. He mentioned the new research grants, the largest amount to date, and Sylvain DeGuise (CT Sea Grant) then briefly described the four newly-funded research projects. Mark also mentioned that the recent habitat discussion at the November 2019 STAC meeting would be useful for the Futures Fund RFP.

Mark Parker, CT DEEP: *"LISS Sentinel Monitoring for Climate Change Strategy Update - Volume 2".* Mark, the Connecticut Co-chair of the workgroup, described the recent Volume 2 Update of the Sentinel Monitoring Strategy in a talk postponed from the November 2018 meeting. The Strategy was originally developed in 2011 (Volume 1) to quantify local

changes in the environment brought about by climate change, and the CCMP calls for an update every five years. Mark briefly detailed the three projects conducted under the original strategy; wildlife and ecosystem change (Field and Elphick), detecting climate change impacts (O'Donnell and O'Donnell), and salt marshes and sea level rise (Fulweiler and colleagues). While the nine core parameters (precipitation, sea level, water temperature, etc.) in Volume 1, remain the same, Volume 2 identifies 20 priority sentinels in four major categories, increased from 17 priority sentinels in Volume 1. The four major categories include: 1. Water Quality/Quantity, 2. Pelagic/Benthic Systems and Associated Species, 3. Fisheries of LIS and Associated River Systems, and 4. Coastal Habitats of LIS and Associated Species/Systems. Representative priority sentinels include: 1. Hypoxia areal extent/severity/duration/timing of onset (LIS and embayments), 2. Finfish distribution and abundance, 3. Acidification impacts on shellfish, and 4. Areal extent, diversity, and composition of tidal wetlands. In Volume 2 the workgroup also suggested using citizen science to collect information on marsh trends; find new ways to identify, mine, and consolidate important data from a variety of sources; and utilizing the Long Island Sound Resource Center http://www.sound.uconn.edu/lissm/database.html.

The meeting was adjourned at 2:00 PM