MANAGEMENT COMMITTEE

of the Long Island Sound Study

http://www.longislandsoundstudy.net

AGENDA

July 20, 2017
Housatonic Community College
900 Lafayette Boulevard
Bridgeport, CT 06604
Directions to Housatonic Community College

9:30 am	**Registration & Coffee**	Beacon Hall 214 A/B
10:00 am **(:05)** **(:05)**	**Welcome/Introductions/Logistics** • Link to May 11 meeting summary • Proposed agenda changes • Sound Ideas public comments	*Mark Tedesco* *From the Floor*
10:10 am **(:10)** **(:15)**	**Reports** • STAC Update • CAC Update	*Jim O'Donnell/Darcy Lonsdale* *Nancy Seligson*
10:35 am **(:5)** **(:15)** **(:15)** **(:10)**	**CCMP[1] IA[2] Progress Reports** • Abstract Highlights/Qs & As • Public Involvement & Education • Climate Change & Sentinel Monitoring • Next steps: Implementation, Tracking Reporting	*Mark Tedesco* *Robert & Judy* *Mark P & Cassie B* *Mark Tedesco*
11:20 am **(:5)** **(:20)**	**Budget Update** • Final FY17 budget • FY18 Budget Process Overview	*Mark Tedesco*
11:45 am	**Sea level rise in Long Island Sound and its implications for people and coastal ecosystems**	*Jim O'Donnell*
12:15 pm	**Lunch**	*Buffet*
1:00 pm	**Eutrophication Modeling Update**	*Pinar Balci (NYCDEP)*
1:30pm	**USGS Monitoring Summary**	*Jon Morrison (USGS)*
2:00 pm	**Updates** • Nitrogen Reduction Updates • GAO Engagement • LIS Futures Fund • CT DEEP • Save The Sound • Floor updates	*Chuck Lee/ Leah O'Neill* *Mark Tedesco* *Chris Mecozzi (EPA)* *Mark Parker* *Tracy Brown (STS)*
2:30 pm	**Next Meeting & Adjournment** • Sea Floor Mapping?	*Mark Tedesco*

1 Comprehensive Conservation & Management Plan

2 Implementation Actions

Ferry Departs at 2:30pm and 3:30pm

MANAGEMENT COMMITTEE

Rick Balla, EPA/R2
Gregory Capobianco, NYSDOS
Tom Chapman, USFWS
Mel Coté, EPA/R1
Sylvain DeGuise, CT Sea Grant
Pamela Elardo, NYCDEP
Nancy Ferlow, USDA/NRCS/CT
Peter Francis, CTDEEP/OLISP
Jason Grear, EPA/ORD
Charles Lee, CTDEEP/BWRLR
Darcy Lonsdale, STAC/NY
Dawn McReynolds, NYSDEC
Jonathan Morrison, USGS/CT
James O'Donnell, STAC/CT
Richard Friesner, NEIWPCC
Todd Randall, USACE
Nancy Seligson, CAC/NY
Mark Tedesco, EPA/LISO
Rebecca Weidman, MADEP
Gary Wikfors, NOAA/NMFS
Bill Wise, NY Sea Grant

ADDRESS

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2017 Meetings: Thursdays, January 19; May 11; July20; October 19. Meetings are open to the public.

Work Group Summaries of
Actions to support CCMP Implementation Action Areas
April 2017-June 2017
for the
Management Committee
July 20, 2017

Work Group CCMP IA Progress Reports
Management Committee
July 20, 2017

Public Involvement & Education – The Public Involvement and Education Work Group held a conference call on June 28 to discuss its first joint project: a social media campaign on preventing and cleaning up trash in Long Island Sound. The #DontTrashLISound campaign will run from July 17 through International Coastal Cleanup Day and National Estuary Day in September. PIE co-chairs Robert Burg and Judy Preston with help from PIE members have created a series of posts and tweets that will be published on social media sites two or three times a week for the duration of the campaign. Judy and Robert agreed at the meeting to send a final draft by July 11 in a Word file of the posts with instructions on when they should be published. It was agreed that work group members will have a choice on which content to post with an option to alter content for their audience. During the course of the campaign LISS staff will monitor interest in the posts.

During the conference call, Judy and Robert also mentioned that they will be interviewed by staff from the US Government Accountability Office on behalf of the PIE Work Group as part of the GAO's review of restoration efforts in Long Island Sound. Judy and Robert requested work group members to provide them with any comments on the pre-interview questions the GAO provided to the work group. Judy and Robert will share the comments to the GAO staff during the interview.

In this quarter, we have been working on the following Implementation Actions:
SC-6: Produce informational materials that can be distributed through multiple formats to encourage stewardship and increase the public's understanding of the ecological, cultural, and recreational value of Long Island Sound.

Water Quality Monitoring - The WQMWG held a recent conference call (June 22, 2017). There were 12 participants from around the Sound. (See workgroup page on website for complete discussion notes.)

In this quarter, we have been working on the following Implementation Actions: WW-24 Enhance the utility and efficiency of water quality monitoring. WW-31 Assess sources of nutrients to LIS embayments. Summer hypoxia monitoring by CT DEEP has recently begun and IEC monitoring will start the week of June 26. Embayment Monitoring: In the STS Unified Water Study 11

citizen's groups are monitoring 20 embayments in LIS for Tier 1 parameters. Two embayments, Mamaroneck and Little Neck Bay are being monitored for Tier 2 parameters. Data Archiving and Analysis Activities and Updates: IEC—awarded a recent contract to Industrial Economics, Inc., for a data archiving and analysis of 26 years of Western LIS monitoring data. Tetra Tech—under the EPA Nitrogen Strategy is archiving data from Western LIS, LIS embayments, and large riverine systems with the goal of determining allowable nitrogen thresholds for different ecological endpoints. Connecticut Blue Plan-- has LIS GIS mapping information on the NY State's Information Gateway. LINAP--conducted a series of recent successful meetings of the fertilizer workgroup with diverse representatives of the consumers and producers of fertilizer. GIS in LIS: Discussed the uses and needs for GIS analysis in LIS starting with the 2013 GIS Needs Assessment. Discussed current and planned implementation of GIS with Sound data and possible strategies moving forward. Modeling needs, budget, and funding issues: Discussed current efforts of LISS and NYCDEP to develop a joint proposal to begin the next generation of LIS modeling and needed measurements. Jim Ammerman recently gave a presentation on LIS monitoring and modeling to the NY/NJ Harbor Estuary Program's Water Quality Workgroup Meeting. The next workgroup meeting will be in September.

Nitrogen/TMDL – Update provided at meeting

Watersheds & Embayments – The last work group meeting, held on May 17th, consisted of updates on the LISS budget, the nitrogen strategies, ecosystem target webpage development, and current grant/job opportunities. The WEWG co-chairs also developed a CCMP Implementation Action progress spreadsheet and reviewed it with the workgroup. This spreadsheet will be used to track annual progress on all the WEWG related implementation actions. The next work group meeting is scheduled for August 16th, 2017.

Climate Change and Sentinel Monitoring – Presenting at meeting.

Ecosystem Indicators – In May, Taylor Design, LISS's web developer, received feedback from the Indicators Work Group on the types of charts that will be needed for the web-based presentation of 20 CCMP ecosystem targets. In July, Taylor Design is expected to complete the content management system to generate the charts and publish content for the presentation as well as update the existing indicators presentation. When the content management system is completed, the Indicators Work Group and other LISS staff will able to start entering data and content. The IWG is looking to have the ecosystem targets as well as a reorganized indicator section completed by the fall.

In this quarter we have been working on the following Implementation Actions:
SM-39: Refine and communicate information on the Long Island Sound ecosystem and watershed using environmental indicators.

Habitat Restoration & Stewardship – The LISS HRSWG met on May 9th at the Urban Field Station at Fort Totten in Bayside, Queens. A total of 29 members attended the meeting, including 4 members of the U.S. Government Accountability Office (GAO). The group was welcomed to the Field Station by Dr. Ruth Rae (Project & Facility Manager) and heard presentations on *Upland Forest Restoration near the Long Island Shoreline in Pelham Bay Park, Restoration Update for*

Alewife and American Eel in the Bronx River, NYC Tidal Marsh Assessment: Condition, Vulnerability and Opportunities for Restoration and Protection, and *Pilot Tidal Marsh Restoration Projects in Alley Pond Park.* Following the presentations, the group traveled to the Alley Pond Nature Center in Douglaston, Queens for an outdoor lunch and a tour of the tidal wetland restoration efforts at Alley Creek. Our next meeting is tentatively scheduled for September 12th at Connecticut College. In addition to the meeting, the LISS HRSWG co-chairs drafted the Ecosystem Indicator summaries for River Miles Restored, Protected Open Space, Coastal Habitat Extent, Eelgrass Extent, & Tidal Wetland Extent for the LISS website. Lastly, the LISS HRSWG co-chairs, CTDEEP staff, and NYSDEC staff have been interviewed by the GAO to discuss LIS restoration priorities.

Proposal for Advancing LIS Modeling Efforts
(Scope Development and Hydrodynamic Modeling Development)

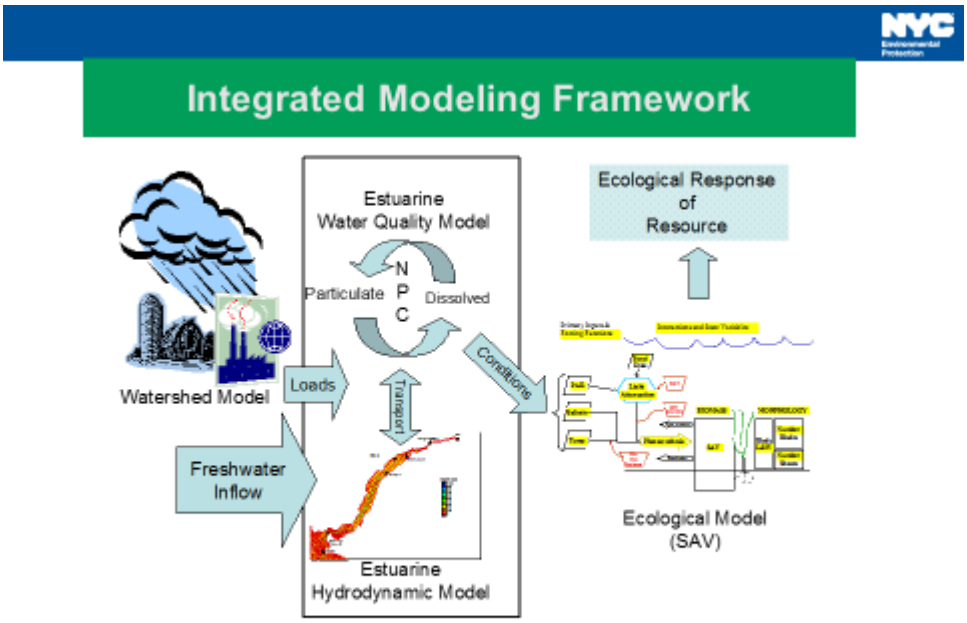
Background:

The System Wide Eutrophication Model (SWEM) was originally developed as a tool to perform preliminary screening of potential engineering alternatives focused on assessing changes in dissolved oxygen concentrations in the harbor and western Long Island Sound (Western Sound). The SWEM was original calibrated and validated using sampling data sets from October 1988 through September 1989 and October 1994 through September 1995. Simulations from the SWEM were also compared to the period of 1999 through 2002. SWEM has two major modules. Circulation and mixing are simulated by solving the equations describing the hydrodynamics of the coastal ocean with boundary conditions that represent river flow, winds and the state of the ocean at the model boundaries. This component is called the Estuarine, Coastal and Ocean Model (ECOM). The model grid uses a horizontal orthogonal curvilinear system to accommodate complex coastlines and areas of interest with finer grid elements. It consists of 1,616 surface elements, with 10 layers in the vertical for a total of 16,160 elements. The products of this module (velocities and vertical eddy coefficients) are passed to the water quality module, known as RCA, with a computational network that uses a grid of 49 elements by 84 elements, which computes the evolution of nutrients, plankton, dissolved oxygen etc.

Some potential deficiencies were identified with SWEM including low rates of dissolved oxygen production and respiration and the arbitrary adjustments of the vertical eddy flux coefficients predicted by the ECOM module in the Western Sound to reduce near-bottom dissolved oxygen in the western Sound as central weaknesses. Some other deficiencies included that much of the code in the model wasn't well documented and the model didn't include a wind forcing function that could significantly impact dissolved oxygen in some cases. The University of Connecticut made some modifications to the model including implementation of the Jassby-Platt formulation of the algal production and introduction of Network Common Data Form (NETCDF) output. UCONN also provided some documentation to original and revised code, input files, and solutions at the SWEM.UCONN.EDU web site. However, it is impossible to modularize the entire code without rewriting it and adjusting the water quality model calculation of the dissolved oxygen balance with vertical mixing. Given some of these potential deficiencies and the significant advancements in computer processing over the last 20 years since the SWEM was developed, it is prudent to develop a more robust water quality model that could include these advances: a finer grid resolution; incorporate embayments and tributaries into the water quality model; newer software and programs to pre and post process data; open source coding standards and interoperable data exchange standards to ensure broader access and ability to contribute to model; and consider upgrades to computers such as large single machine processors or multiple machine processors, using Graphical Processing Units rather than Computer Processing Units, and moving the model onto the cloud web service.

Proposed Scope of work:

The New York City Department of Environmental Protection (DEP) aims to develop an integrated model for Long Island Sound (LIS) to assist the DEP in integrated water management planning and assessment activities. This effort is an interdepartmental initiative including staff from the Bureau of Wastewater Treatment, Bureau of Design and Construction and Bureau of Environmental Planning and Analysis. The integrated modeling framework is outlined in Figures 1 and encompasses 4 major elements: watershed modeling, estuarine hydrodynamic and water quality modeling and ecosystem modeling.



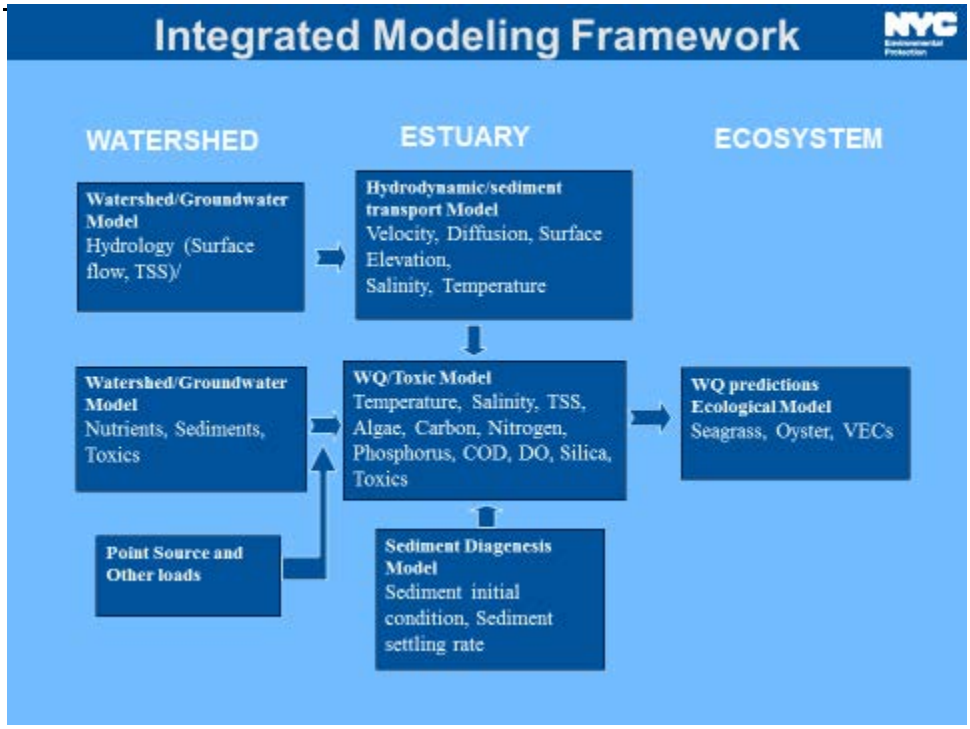


Figure 1. Integrated Modeling Framework

There have been several models developed for LIS to support the total maximum daily load (TMDL) efforts and other scenario planning as described above, however, a comprehensive integrated modeling approach is needed for LIS that can be verified by field data for developing additional strategies for estuary protection and other ecosystem restoration efforts. Accordingly, DEP plans to develop an

integrated LIS model in phases in coordination with stakeholders, academics and regulators in the region, as described in more detail below. It is expected that the LIS integrated modeling will encompass a system-wide model that includes the LIS estuary and sets a boundary condition for the NY-NJ connected system. However, it should be noted that a selected panel of modeling expert team could provide additional approaches for the spatial extent of the integrated modeling effort including cost benefits and additional funding opportunities.

To assist with this work, a panel of modeling experts will be convened to provide input on the scopes of work to be developed. In addition, a team of reviewers will also be convened to aid in ultimately developing the final integrated LIS modeling scope of work that will later be implemented and used to forecast how LIS may respond to changes in human and natural drivers impacting the system. It is intended that a panel of modeling experts and the team of reviewers be formed to provide input during each phase of the work. The integrated LIS model to be developed will also serve to evaluate potential impacts of point and non-point source discharges as well as sediment fluxes on water quality, evaluate responses to events that have taken place in order to compare with observations, and/or forecast outcomes and future events. This LIS integrated modeling approach will be comprised of the following major elements:

Watershed Models:

- Linking sources of pollutants to receiving waterbodies (estuaries) as point and nonpoint source loads.
- Non-point sources will be driven by precipitation, land use, impervious areas, slope, soil types and drainage areas.
- Predict both water and pollutant runoff from managements zones within the watershed

Estuary Hydrodynamic and Water Quality Models:

- Integrate inputs from point and nonpoint sources (watershed model outputs) to determine impacts on water quality in receiving water bodies (estuaries).
- Determine assimilative capacities of the waterbody, when linked with ecological responses, determine level of best management practices, or predict the time required for a system to recover after being altered.

Ecological Models:

- Predict the pollutants effects on the ecosystem, including fish, invertebrates, and aquatic plants.
- Perform ecological risk assessments for aquatic ecosystems.
- Valued Ecosystem Component (VECs) approach
    - health indicators for the ecosystems
    - Management objectives are attained by providing a suitable hydrological and water quality environmental for the VECs

DEP intends to use existing watershed monitoring and modeling outputs, including stormwater, tributary and groundwater flows and nutrient loads from LIS communities as inputs to the hydrodynamic and water quality models. NYCDEP will use the NYC Infoworks model outputs as input to the hydrodynamic model for the NYC portion of the LIS hydrodynamic model. For other parts of the modeling domain, other existing watershed monitoring and modeling outputs will be used, such as those resulting from ongoing Long Island Nitrogen Action Plan-related groundwater modeling or USGS tributary monitoring and modeling estimates.

It is important to note that prior to executing any monitoring, sampling, calibration or data management necessary under this proposal, a Quality Assurance Project Plan (QAPP) will be submitted for approval.

Phase I.A – Development of a statement of work for an integrated modeling approach

As discussed above, DEP intends to develop the integrated LIS model in phases. Under phase I.A, the retained consultant will be tasked with providing the following services to DEP:

Task 1. Prepare scoping document detailing modeling objectives, goals and requirements for a Technical Advisory Committee (TAC) to review. The Technical Advisory Committee (TAC) will consist of Selected Water Quality modelers and experts.
Task 2. Present the detailed scope of work to the TAC. Convene the TAC, which will provide comments on the initial detailed scope of work and will propose revisions to come up with scopes of work to be reviewed by the Reviewing Committee. The Reviewing Committee will consist of selected stakeholders and regulators in the region.
Task 3. Convene a Reviewing Committee that will evaluate the received scopes of work. They will make a recommendation on a modeling approach based on their review and will come to an agreement on a final scope of work.
Task 4. The consultant, along with the TAC, will finalize the scope of work based on input from the Reviewing Committee, and develop cost estimates and schedules.

DEP will direct the retained consultant to develop a detailed scoping document under Task 1 that will include specific details regarding Model requirements as well as other criteria necessary to be included in the modeling approach. In general, some of the required criteria will include:

1. Open-source modular design
2. Capability to be built in Stages. Each stage of the model development should be generally independent of the other.
3. Capability to be externally reviewable with some level of remote/graphical user interface to facilitate reviews as well as:
    a. Ease for code reviewing by inclusion of user guides
    b. Full undisclosed access to data, code, running time, etc.
4. Ability to work with other models

The detailed scoping document that the consultant will prepare under task 1, will include a description of the level of effort needed to develop the integrated model which will consist of the following:.

- Hydrodynamic Model Development, Calibration, Validation and Data Needs, including conducting additional observations as needed
- Water Quality Model Development, Calibration, Validation and Data Needs, including conducting additional observations as needed
- Remote/Graphical User Interface
- Ecological Model Development, Calibration, Validation and Data Needs, including conducting
- additional observations as needed

Phase I.B Development of a Hydrodynamic Model

Phase I.B consist of development of Hydrodynamic Model, Calibration, Validation and Data Needs, including conducting additional observations as needed.

Phase I.B will be implemented as part of the initial effort. Phase II of this proposal is intended to be completed at a later date under a separate contract, as described below. Upon request by the DEP Project Manager and after the modeling scope of work is finalized, under Phase I.A, Task 4 described above, and

depending on estimated cost and projected schedule, Phase I.B will be implemented as part of this proposal. It is estimated that Phase I.B will be funded under this proposal with a total cap of $1.275M.

Phase II.A – Development of a Water Quality Model

Implementation of Phase II.A is expected to be initiated under a separate contract. Procurement for implementation Phase II.A will commence upon finalizing Phase I. The procurement process for Phase II.A will commence with the pre-solicitation phase and conclude with project award, as described in the proposed schedule shown below. It is initially estimated that the project duration under Phase II.A will be 3 years. However, the timeline for this effort will be revisited based on the outcome of phase I.

Phase II.B – Development of a Remote/Graphical User Interface

Implementation of Phase II.B is expected to be initiated under a separate contract. Procurement for implementation of Phase II.B will commence upon finalizing Phase II.A or earlier. The procurement process for Phase II.B will commence with the pre-solicitation phase and conclude with project award. DEP intents to secure funding for implementation of Phase II.B, however, appropriation of funding for this effort will be dependent upon OMB's approval.

Phase II.C – Development of an Ecological Model

Implementation of Phase II.C is expected to be initiated under a separate contract. Procurement for implementation of Phase II.C will commence upon finalizing Phase II.B or earlier. The procurement process for Phase II.C will commence with the pre-solicitation phase and conclude with project award. DEP intents to secure funding for implementation of Phase II.C. However, appropriation of funding for this effort will be dependent upon OMB's approval.

Proposed Schedule:

Phase I would commence pending approval of this proposal. Assuming a July 1st commencement of Phase I, the Consultant will prepare an initial scoping document with detailed information on modeling needs and requirements that will be necessary for the TAC to review.

The expected schedule for Phase I.A is presented below. However, it may be extended to the end of the year depending on TAC convening and other factors:

Milestone	Start	End	2017
			Jun Jul Aug Sept Oct Nov Dec
Phase I Select a Modeling Approach	7/1/2017	7/1/2017	
Consultant to prepare initial scoping document	7/1/2017	7/15/2017	
Kick-off meeting to distribute initial scoping document to TAC members for review	7/15/2017	7/15/2017	
TAC review and development of revised scope of work	7/15/2017	8/31/2017	
TAC presentation of revised scopes of work to the reviewing committee for evaluation	8/31/2017	8/31/2017	
Reviewing committee evaluation and selection of proposed final scope of work/modeling approach	8/31/2017	10/15/2017	
Consultant and TAC to finalize proposed final scope of work/modeling approach document	10/15/2017	11/15/2017	

Phase I.B is estimated to commence on 11/15/2017, upon completion of Phase I.A. Phase I.B is estimated to be completed on 11/15/2019, within approximately 2 years of commencing.

Implementation of Phase II.A will be developed under a separate contract, assuming approval of funding by OMB. Due to the procurement time required to establish the contract, as shown in the schedule below, it is estimated that Phase II.A is expected to be completed on 11/15/2022, within approximately 3 years of issuance of notice to proceed/order to commence work (NTP/OTCW). However, this timeline will be revisited based on the final scope of work development at the completion of Phase I.A.

Milestone	Start	End	2017				2018				2019				2020				2021				2022				2023			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pre-Solicitation Phase	11/15/2017	2/15/2018																												
Solicitation Phase	2/15/2018	5/15/2018																												
Release of RFP	5/15/2018	5/15/2018																												
Award Phase	5/15/2018	5/15/2019																												
Registration Phase	5/15/2019	11/15/2019																												
NTP/OTCW	11/15/2019	11/15/2019																												
Project Execution	11/15/2019	11/15/2022																												
Project Completion	11/15/2022	11/15/2022																												

Proposed Budget:

Estimated Budget for Phase I.A: $125,000
Estimated Budget for Phase I.B: $1,275,000
Subtotal Phase I: $1,400,000

Estimated Budget for Phase II.A: $1,400,000
Estimated Budget for Phase II.B and II.C: TBD

Estimated Total Budget for this Proposal (Phase I and II.A): $2,800,000

Sea Level Rise and Coastal Flood Risk in Connecticut: An Overview

James O'Donnell,
Connecticut Institute for Resilience and Climate Adaptation,
University of Connecticut

Measurements of sea level by instruments in the water and satellite altimeters provide unambiguous evidence that the annual mean level of the ocean surface is rising. Coastal communities should, therefore, anticipate that the frequency of flooding will increase. The National Oceanic and Atmospheric Administration (NOAA) report CPO-1 (Parris et al. 2012) provided guidance on the magnitude of potential changes in the global mean sea level based on analyses of both models and data. Four projections were shared so that managers could select what they judged to be appropriate. To provide more local guidance for Connecticut we have reviewed and modified the projections to include the effects of local oceanographic conditions, more recent data and models, and local land.

We examine four different approaches for forecasting possible future annual mean sea level in Long Island Sound. Analysis of tide gages in Long Island Sound show an increasing trend and decadal time-scale variations in the rate of sea level rise associated with ocean circulation variability. These confound detection of changes in the rate (acceleration) of local sea level rise. Global models show that the expected changes in southern New England are significantly larger than the global mean, and that the uncertainty is also larger. Comparison of predictions demonstrate that the differences are not great until after mid-century. Further refinement of longer term forecasts are unlikely until the character of future emissions of greenhouse gases can be predicted. We recommend that planning anticipates that sea level will be up to 0.5 m (1ft 8 inches) higher than the national tidal datum in Long Island Sound by 2050. Further, we recommend that planners be made aware that it is likely that sea level will likely continue to increase to 1.0 m (3 ft 3 inches) by 2100. It is critical that global sea level and global greenhouse gas emissions be continually monitored and new assessments be reported at decadal intervals.

There will be many impacts due to the higher sea levels. The change in the annual likelihood (probability of an event per year) of coastal flooding can be predicted with considerable confidence. However, though the magnitude of sea level changes will be uniform across the Sound, the magnitude of the changes in risk are not. The eastern Sound will experience a larger change. Similarly, the frequency of flooding of salt marshes in Connecticut will change with those in the eastern Sound flooding more frequently.

References

Parris, A., P. Bromirski, V. Burkett, D. Cayan, M. Culver, J. Hall, R. Horton, K. Knuuti, R. Moss, J. Obeysekera, A. Sallenger, and J. Weiss (2012) Global Sea Level Rise Scenarios for the US National Climate Assessment. NOAA Tech Memo OAR CPO-1. 37 pp.

Computation of Total Nitrogen Concentrations and Loads from the Connecticut River at Middle Haddam, 2009-2014.

Presenter: Jon Morrison, United States Geological Survey

The talk will be a presentation on the use of sensor data in the tidal reach of the Connecticut River in enhancing estimation of total nitrogen concentration data, and the computation of daily total nitrogen loads at the Connecticut River at Middle Haddam Connecticut.

The talk will describe the methods of streamflow computation on this tidal reach of the Connecticut River. The presentation will describe the use of nitrate and turbidity sensor data to estimate 15-minute total nitrogen concentrations. The presentation will also describe the use of LOADEST models, including a model from 2011-2014 to determine daily total nitrogen loads. These loads are compared with the upstream loads from the Connecticut River at Thompsonville for the same time period.