

Science & Technical Advisory Committee
TEAMS Online Meeting
June 21, 2024 – Meeting Summary



In Attendance:

STAC Members: Jim Ammerman, Christian Conroy, Sylvain De Guise, Kristin DeRosia-Banick, Melissa Duvall, Michele Golden, Dianne Greenfield, Jim Hagy, David Hudson, Shauna Kamath, Kamazima Lwiza (New York Co-chair), Robin Miller, Jim O'Donnell, Paul Stacey, Kelly Streich, Mark Tedesco, Craig Tobias, Maria Tzortziou, Penny Vlahos (Connecticut Co-chair), Nils Volkenborn, Laura Wehrmann, Chester Zarnoch

CAC Liaisons to STAC: Sarah Crosby (The Maritime Aquarium), Mickey Weiss (Project Oceanology)

Others: Zosia Baumann (UConn), Mel Cote (EPA), Emma Cross (SCSU), Holly Drinkuth (TNC), Chris Eagler (NYSDEC), Alex DuMont (NEIWPC), Anya Grondalski (LISS/NEIWPC), Sarah Healy (NYSDEC), Kathleen Knight (CTDEEP), Abi Lawal (UConn), Peter Linderoth (STS), Jiayu Liu (NYCDEP), Matt Lyman (CT DEEP), Cara Manning (U Conn), Jon Morrison (USGS), Katie O'Brien-Clayton (CTDEEP), Jimena Beatriz Perez-Viscasillas (NYSG), Matthew Pruden (Cornell), Kaylan Randolph (UConn), Emlyn Resetarits, Sarah Schechter, (UConn), Rebecca Shuford (NYSG), Youngmi Shin (EPA ORISE), Samantha Siedlecki (UConn), Lane Smith (NYSG), Cayla Sullivan (EPA), Nikki Tachiki (EPA), Andrew Thuman (HDR), Samantha Wilder (IEC), Gregory Wilkerson (NYCDEP), Kimarie Yap (NYSDEC)

Introductions, Updates: Penny Vlahos started the meeting noting that the next meeting will be in person on September 12th in Port Jefferson and joint with the CAC. The focus will be on the new CCMP but suggestions for other topics are welcome, the sooner the better. Mark Tedesco followed and noted that Mel Cote (EPA R1) was participating in this meeting but is retiring at the end of June, though he will be participating in person in the NEP review net week. Mark thanked Mel for all his contributions to the LISS over the years. Mel noted that he had been involved in the LISS since 1992 and thanked everyone for all their efforts in providing sound science for management. He particularly thanked Kamazima for participating in his sendoff from across the Atlantic.

Mark continued with a brief update on the CCMP revision. He noted that the public engagement portion of the process had recently been completed after three in-person meetings and two virtual sessions. A summary report of the input received will be shared with all the writing teams. He reviewed the next steps in the process including the overall structure of the document, focusing on Section 3 with the four themes, each with an active writing team. He also listed other sections, including those required by EPA, and a schedule for writing which should be completed by the end of July. An internal review will be conducted in August, followed by public release of the plan on September 1 with a 60-day review period and a joint STAC/CAC meeting on

September 12th to review the CCMP. Comments from STAC members and others are welcome and will be reviewed during the fall comment period. Final approvals by EPA Regional Administrators and State Commissioners will stretch into the spring of 2025 with a possible event with State Governors on Long Island Sound Day in late May.

Discussion:

-Jim O'Donnell asked about the major differences in the new CCMP vs. the current one. Mark replied that it was more concise and publicly friendly. The themes were different, with science and management integrated throughout and sustainable and resilient communities separated from public engagement. Each writing team is still working with a commitment to developing quantifiable objectives within a "SMARTIE" structure. Each objective will have to document that structure.

-Paul Stacey noted that a Governors' signing event would be a great outreach tool and perhaps coupled with a new Long Island Sound agreement and Mark agreed.

-Penny Vlahos added that her experience with the watershed writing group had emphasized conciseness and goals that are achievable within the time frame of the CCMP, even if addressing only small parts of long-term goals. Mark added that this was a challenging process but was important in increasing accountability.

-Paul Stacey added that LIS has never had endpoints and so interim goals are difficult to place into context. The LISS has always focused on reductions and not results, and this seems likely to continue. Penny added that this was important for the writing teams, most of whom are represented here, to keep in mind as they finish their drafts.

CAC Updates: Washington DC Trip, September Joint CAC/STAC Meeting: Holly Drinkuth, CT CAC Co-chair

Holly started by noting that the completion of the new CCMP next year should be an occasion for celebration. Regarding the upcoming CAC trip to Washington to "educate" our legislators, she said that they were working to set up appointments with all the members of the LIS congressional delegation starting at 9 AM on July 10 following breakfast together. They will meet with the NY and CT Senators in the afternoon. The Jeniam Foundation has provided generous travel support, which will primarily be used for hotel rooms. They are traveling by train the day before and invite STAC members to participate. Holly said they had a great group of about 18 people last year and asked Penny and Sarah Crosby to comment on their experiences. Penny said that it was a privilege to be there, and that the CAC was well-organized and obviously had garnered a lot of respect on the Hill because of their past success. She encouraged anyone on the STAC, even if just curious about the process, to participate. (Contact Francine Gordon at Citizens Campaign for the Environment to arrange for the trip). Penny, Sarah Crosby, and Craig Tobias will all be participating this year. Holly said that their focus would be on continued and increased funding for the Restoration and Stewardship Act and the new CCMP, as well as protecting Plum Island. Sarah Crosby said that her experience last year was interesting and fun, and she felt it was far more impactful than she had originally imagined. Holly added that she and Nancy were excited about planning the joint CAC/STAC fall meeting with Penny and Kamazima. She added that the recent CAC meeting had reviewed the draft CCMP and that the joint meeting would be

September 12 in Port Jefferson at the Community Center. Mark Tedesco added that the joint meeting would include ERG contractors as facilitators with a focus on reviewing, commenting on, and improving the draft plan.

LIS Research Conference Survey Results: Becky Shuford, NY Sea Grant

Becky presented the survey results, thanking Lane Smith for compiling the survey results and developing the slides. The conference was well attended with 180 attendees, the largest in a long time, predominantly from academia, but also including government and NGO staff. Of the 31 organizations represented, the University of Connecticut and Stony Brook University had the greatest number of attendees, with smaller numbers from numerous other universities and other organizations. The survey received 76 responses, twice the number of from the 2019 conference. Attendees were generally satisfied with the conference and found it relevant to their work or education, the plenary was highly rated, the panel just slightly less, but the poster session was downgraded because of the lack of time for it. The logistics were rated favorably, except for the lunch options. There was significant support for holding longer conferences (1.5-2 day) in the future, and limited support for single instead of current sessions. Other common comments were that the monitors used for slides were too small and had glare, the poster session and networking breaks between sessions were too short, and the vegetarian/dietary restriction options were limited. The venue was generally well-liked though the ballroom was close to capacity and sessions in the grill room were particularly challenging. Not enough talks made the science to policy connection, which was the theme of the conference, though the plenary speaker did a good job of that. There were several suggestions for future conferences, including fewer concurrent sessions, longer talks, more time for posters and networking, possible breakout sessions with panelists, or sessions focused on early career investigators. Overall, the strong interest in the conference and the quality of research presented bode well for the future.

LISS Research Program Update: Sylvain De Guise, CT Sea Grant

CT and NY Sea Grant are managing the LISS Research Grant Program and received 37 pre-proposals, 20 from Connecticut and 17 from New York, requesting a total of \$17.7 M. The average proposal size was just under \$500k. A pre-proposal review panel was held on June 4 with outside academics to avoid conflicts of interest, as well as local agency staff. Forty percent of the pre-proposal rating focused on the engagement of end users and usefulness to management. Thirty percent of the rating was the rationale and adherence to the CCMP, and the other thirty percent was the likelihood of the project succeeding. At the end of the panel, 22 full proposals were invited, 9 from New York and 13 from Connecticut, representing five different universities and one aquarium. The total requested was \$11.7 M and \$6.5 M is available, so the success rate will probably be just over fifty percent. Full proposal topics include salt marshes, fish and birds, nutrients and hypoxia, coastal resilience, and one on human health. Full proposals are due August 5, followed by outside peer reviews and a panel review in the fall. The start date for newly funded projects will be January 1, which facilitates the inclusion of students in the projects at the beginning of the semester and allows for QAPP development and approval before the start of the summer field season.

Discussion:

-Penny Vlahos asked Sylvain if he was pleased with the proposals, based on prior experience. Sylvain replied that they had pushed hard for hypothesis-driven proposals which were responsive to management and stakeholders. He said that the proposals varied, but that the top-ranked ones did address these issues. The successful pre-proposals ranged from just over \$100k to \$1M, with an average of just over \$500k. There has been a shift towards larger proposals in the last few years since the budgets have allowed it, proposals greater than \$500k were required by the RFP to be interdisciplinary, and 10 of the 22 invited full proposals are in this category.

-Paul Stacey added that the research supported by the research program is impressive as was shown at the research conference. But technical implementation of academic research remains a problem which requires increased emphasis. If the research is not applicable to management, it is not useful to the LISS. Perhaps Mel Cote could serve as a “volunteer technical advisor” in his retirement. Sylvain responded that not only have the requirements that research be applicable to management been increased, but there is also a greater emphasis on the engagement of end users. These are emphasized even at the pre-proposal stage and are the largest component of the scoring. Paul added that managers, not just scientists, needed to evaluate the pre-proposals and Sylvain replied that both state and federal managers were involved on the review panel.

Systemwide Modeling Status Update and Timeline: Andy Thuman, HDR

Andy outlined his presentation as follows:

1. Modeling Progress Update
 - a. Preliminary ROMS-RCA calibration to 2005-2006
 - b. Full ROMS-RCA calibration 2005-2014
 - c. Embayment modeling
2. Model skill assessment
3. LIS Model GUI/DST
4. Project timeline

The ROMS hydrodynamic model and the RCA water quality model have been coupled and the calibration to the years 2005-2006 completed and reviewed by the Model Evaluation Group (MEG). Full model calibration for the years 2005-2014 is now underway. Hydrodynamic and water quality embayment modeling will start soon for Port Jefferson Harbor and Niantic River/Bay. He showed some 2005 calibration results with a west to east section along Long Island Sound of temperature, salinity, and dissolved oxygen data for July 2005; as well as dissolved oxygen data for the year 2005 at selected stations. The model does a good job of reproducing the data, much better than the earlier models of the 1990s and early 2000s. However, there is still some fine tuning to be done. He showed the river flow patterns for the Connecticut, Quinnipiac, and Housatonic Rivers from 2003-2019 and noted that the full ROMS-RCA calibration will cover the 2005-2014 period which shows a wide range of hydrologies, and two validation periods which encompass 2003-2004 and 2015-2018. They are hoping that the good calibration results from 2005-2006 carry over to the full calibration from 2005-2014. There will also be an additional model testing period from 2019-2022 after many of the loads were reduced.

The locations for embayment modeling, Port Jefferson Harbor and Niantic River/Bay, were selected in coordination with NYSDEC and CTDEEP, and include:

1. Hydrodynamic and water quality modeling
2. Finer spatial scale model grids
3. Offshore boundary conditions extracted from the open water LIS model
4. 1-year model calibration
5. Test linking of stand-alone embayment models to the open water LIS model

Andy briefly reviewed the Model Skill Assessment Approach which included both qualitative and quantitative measures, the latter including Relative Error, Root Mean Square Error, r^2 , and a Skill Assessment parameter. Qualitative measures involve graphical comparisons of model results with data, while quantitative measures involved the statistical measures above and were the focus of great efforts. A series of both hydrodynamic and water quality parameters will be subjected to such quantitative skill assessments and grouped by regions, compared to targets where literature guidance is available, and evaluated for different time periods, such as annual versus seasonal.

For model skill assessment purposes HDR has divided LIS into multiple regions, from east to west the East Basin, Central Basin, West Basin, East Narrows, and West Narrows. The data sets to be used include those from CTDEEP, IEC, and the NYCDEP Harbor Survey. The will be calculating skill assessment statistics at each station and then presenting a median for each region. For the five regions in New York/New Jersey Harbor Estuary, data will also come from the NYCDEP Harbor Survey as well as the New Jersey Harbor Dischargers Group. For the eleven offshore regions data comes from routine monitoring stations and glider deployments. They collected Model Skill Assessment Targets for both the ROMS and RCA models from the literature and made significant efforts to compare these targets with LIS model data. Not all model skill assessment targets will be met for all parameters in all regions.

Another aspect of model development is the Graphical User Interface/Decision Support Tool (GUI/DST). It will be a web-based model interface/dashboard. Users will be able to view project data and stored model output, execute model runs, and produce reports. The GUI/DST will be accessed by a username and password. Back-end development of communications, etc., has been underway and now front-end development (model viewing, etc.) is proceeding. Calls are held about every six weeks to discuss the status of development. Additional discussions are underway to determine who will host it after completion. Andy showed the GUI/DST landing page with some of the GIS data layers, station data, and model results already included.

The timeline for the project includes model skill assessment, compiling available ocean data, and full model calibration (2005-2014) in May-June 2024. Embayment modeling will begin in July as well as the start of living resource modeling. From August to December 2024, the following will be conducted:

1. Full model calibration and embayment modeling will be finished
2. The ROMS-RCA Model Calibration Memo will be drafted
3. The Embayment Modeling Report will be drafted

4. And a LIS Wiki SharePoint Site will be updated and accessible

In 2025, earlier reports will be finalized, a GUI/DST User's Manual will be developed, and GUI/DST and ROMS-RCA training will occur. The Living Resource Demonstration Study Report will be drafted. The project ends in August of 2026.

Discussion:

-Craig Tobias noted that he has western Sound respiration rates for 2020-present which could be compared with the model. Andy said that they could be used in the post validation testing period. Craig also asked if HDR was familiar with the ongoing EPA WASP modeling in Niantic and other Connecticut embayments and Andy said that he was.

-Paul Stacey asked about what was involved with the living resource model. Andy replied that they were like habitat suitability index models but also went beyond that to more mechanistic models such as for eelgrass. Paul further asked if they could address management issues and Mark Tedesco replied that management applications were clearly intended such as the impacts on living resources of changes in nitrogen loading, and climate change impacts in the future. He mentioned the recent webinar from the Tampa Bay program discussing their living resource challenges, particularly the recent loss of seagrass. Mark also noted that the LISS has a Management Advisory Group (MAG) which meets quarterly and evaluates model progress. The meetings also include the Model Evaluation Group (MEG). Mark also thanked NYCDEP for their management of this project.

-Peter Linderoth said he had 2019 data they could use for the model.

-Greg Wilkerson added that addressing management issues was the goal of the project and would largely occur following model development using the best available science.

New Investigator Presentation: Quantifying the Impacts of Anthropogenic Emissions and Specific Infrastructures on Urban Air Quality Using Fine Scale Modeling and Air Monitoring: Abi Lawal, UConn

Abi introduced herself as a new UConn faculty member who recently completed a postdoc at UC Berkeley after getting her Ph.D. at Georgia Tech. She noted that anthropogenic air emissions have negative impacts on climate, human health, and global ecosystems. The major sources of air emissions are from infrastructure such as transportation, buildings, and the power supply. Cities are major hotbeds of these sources because of the concentration of infrastructure in them. Cities have high populations combined with highly integrated systems. Seventy percent of global energy use is by cities. As cities continue to grow and expand, we need to plan for the sustainable cities of the future. Cities are subject to numerous challenges, including the current heat wave crisis compounded by the "heat island" effect. Cities are also subject to epidemics, such as COVID19, due to the large populations, high densities, and great mobility. Cities also consume 70% of global energy and are continuing to expand. They will encompass 60% of the global population by 2030 and 70% by 2050.

How do we plan for future sustainability? There is a growing need to develop sustainable cities. She posed four questions: 1. As populations grow, what impact will emissions and their sources

have? 2. How do we plan and develop sustainable, equitable cities? 3. How much of a role do policy regulations, socioeconomics, urban infrastructure, and technological changes play in influencing these emissions, their distributions, or their impacts? 4. How do we plan for climate adaptability, resiliency, and sustainability under adverse climate scenarios?

Abi runs the Urban Systems Modeling Lab in the Civil and Environmental Engineering Department at UConn. Her research is focused on energy and air quality through the lenses of climate, health, policy, sustainability, technology, and big data. She studies the interactions between the urban built environment and specific infrastructure effects on urban air, such as the impact of a highway next to a housing area. Her research incorporates climate change, inequities in environmental pollution, and transformations in infrastructure through technological innovations. Students in the Urban Systems Modeling Lab at UConn learn about theoretical and practical applications of air quality.

Abi has both a chemical and environmental background and thrives in interdisciplinary and collaborative partnerships. She approaches cities as systems composed of many sub-systems where you can delineate interactions among them. Her primary research tools are regional and global air quality models. These models incorporate climate and energy, evaluate the effects of city infrastructure, quantify and evaluate inequities, and include the impacts of new technologies. Her primary model is CMAQ-the Community Multiscale Air Quality Model. CMAQ is a state-of-the-art model developed by EPA in the 1990s which has evolved over time with input from the scientific community. The model includes chemical kinetics, photo- and aerosol chemistry, cloud formation, and the physical processes of diffusion and transport. The model is based on first principles but is validated by real data. The atmosphere is modeled like a three-dimensional grid and a series of equations is solved for each grid cell and then combined at the end of each time step.

CMAQ is considered a regional model which is usually run at a resolution of 36 km or less, typically 12 km but Abi is moving to finer resolution of 4 km, which requires more computing power but provides more insight. (Global models may have resolutions of 100 km or greater.) Finer resolutions better represent air chemistry and transport processes. Air quality patterns can also be more readily discerned, such as the impacts from urban infrastructure like highways and airports. She has conducted a variety of studies, ranging from pollution distribution and inequities to the urban heat island effect, to the impact of airports on air quality. Opportunities and challenges include the fact that computational models like CMAQ are rarely run with a resolution less than 4 km due to limited data quality and the required computational resources, biokinetics are not included in bioaerosol models, and urban technology transitions like green buildings and electric vehicles may not be receiving sufficient evaluation. Abi reviewed several research projects that she was involved on the topics above, including neighborhood traffic patterns and emission distributions, health impacts of bioaerosols, and effectiveness of policy solutions.

She concluded with a review of a study energy use in the United States, which requires a holistic approach. Energy use is a key driver of both the US economy and air quality. Of the four major components of energy use, commercial, industrial, residential, and transportation, residential is the most difficult to model. Heating and cooling are the bulk of residential energy use, but it is dependent on many factors and much of the energy use data is unavailable. Therefore, statistical modeling of big data is needed. The objective was to determine the important variables that influence both electricity and natural gas consumption and the hypothesis was that social and economic factors are major drivers. The study was conducted in the Atlanta metropolitan area, the 9th largest in the US. In addition to demographic data, 2010 annual electricity and gas use data were available, tabulated by zip code. A statistical model was developed, and data transformations were applied to reduce collinearity. While the regression model for gas use confirmed the hypothesis of socio-economic drivers, the model for electricity use had too much error to be very useful. However, when she overlaid electricity use with a map of metropolitan Atlanta, the highest use was concentrated in the central city, demonstrating the importance of the urban heat island effect. Therefore, the urban design layout is important in electricity use, in addition to socio-economic factors. Designing energy-efficient buildings will not be sufficient by itself. Abi concluded by mentioning her interest in global modeling as well as cities, outlining her research plans, and acknowledging her funders and collaborators.

Discussion:

- Kamazima Lwiza mentioned that Abi could help the LIS by examining the impact of the NYC plume on LIS along with atmospheric chemists at Stony Brook. He also mentioned learning more about the impacts of emissions of the more western states on LIS.
- Paul Stacey suggested the Abi should incorporate more the living environment into her work, such as the impact of trees on the air quality.

LIS as a Multi-Stressor Laboratory for Ecosystem-Based Management: Craig Tobias, UConn

Craig reviewed the origin of this idea and said his intent was to take the temperature of the STAC on this issue which he hopes to move more front and center for the LISS since it seems like the obvious next step but is not the kind of research that he himself does. He showed NOAA definitions for Ecosystem Based Management and Ecological Forecasting, noting that the LISS is currently moving in those directions even if the efforts to date have been incremental and piecemeal. He showed a figure illustrating the important components of ecological forecasting and noted that the LISS was heading in this direction but had not embraced longer term forecasting efforts including climate predictions and global change scenarios. Craig sees LIS as an excellent model which is under climate stressors throughout compounded by urban stressors at the west end, however, at the same time it is in a state of recovery with the reduction in hypoxic area due to management actions. LIS is a biogeographic boundary between New England and the mid-Atlantic and becoming increasingly more like the latter because of climate change. While we have made progress, you can never return to the initial condition (Duarte's Return to Neverland concept), so success can be difficult to define. However, Craig noted that LIS has a lot of data and tools to draw from and listed numerous long-term monitoring programs and modeling efforts. Craig mentioned his 2016 NSF Long Term Ecological Research (LTER) proposal for LIS that was

well reviewed but not funded. This proposal would have combined observed changes to date with directed studies, regionally downscaled climate predictions, and management projections for anthropogenic inputs to LIS, to develop response trajectories or forecasts.

Forecasting in aquatic ecosystems is not new, NOAA is heavily involved in it, primarily for hypoxia, HABs, pathogens, and species or habitat shifts. Forecast can be days to seasonal or on a decadal scale, data sources range from “real-time” data to downscaled climate projections, and simulations can be statistical or dynamic. He showed examples of short-term forecasts from the Chesapeake Bay for hypoxia, acidification, and sea nettles, as well as seasonal forecasts for Dungeness crab from the Pacific Northwest and decadal acidification forecasts for the Gulf of Maine based on climate and circulation models. Craig then mentioned the Puget Sound Integrated Modeling Network, which incorporates models from the watershed to the open sea and includes socio-economic components. Current LIS models are often stove-piped and could benefit from greater interactions.

LIS has a lot of information that is not well integrated, but the new integrated ROMS model currently under development should provide a backbone for a more integrated effort. However, besides hypoxia, what should we forecast and on what time scale and how do we decide? Craig then posed two questions for STAC consideration: 1. Is this worth doing and dedicating significant resources towards? 2. Are we ready to do it scientifically? If the answer to either question is yes, would it be worthwhile to develop a working group to review available information, identify gaps, and develop targets for monitoring, modeling, and forecasting, including the integration of social sciences. The result would be a blueprint for developing this capacity in LIS.

Discussion:

-Penny Vlahos asked if Craig had been part of the CCMP writing teams and Craig said no but it could be worthwhile to participate.

-Paul Stacey said Craig was right on track and suggested the work that he had done with UCONN CLEAR the watershed should be included. Improvements in the watersheds will result in major improvements downstream.

-Kamazima Lwiza supported Craig’s idea to develop a group to address these issues. He disagreed that we have enough data, which Craig said he did not say, he said we have lots of data. Kamazima said that we were missing some fundamental data, such as microbial Q₁₀ data. Penny mentioned that the biological components to be added to the ROMS model should be revealing.

Connecticut National Estuarine Research Reserve (CT NERR): Craig Tobias, UConn

Craig noted that the reserve is now two years old, and that he became the director in January. It is the 32nd in the reserve network funded by NOAA in a partnership with UConn and CT DEEP. All the reserves emphasize coastal locations which are locally relevant and nationally significant and address complex issues through collaborative efforts. He reviewed the Vision and Mission statements and showed a map of the areas included in the reserve, many of them are CT DEEP properties. The watershed area is large and extends to Rhode Island and beyond Hartford. The CT NERR is a center within UConn, with Craig as Director, and Kevin O’Brien as Manager of day-

to-day operations. The bulk of the work is done by the four coordinators and the large number of undergraduates who have been hired. The four coordinators cover the four main sectors of activity, research & monitoring, stewardship, education, and coastal training; but many of the activities overlap among sectors. Current efforts include collaborating with stakeholders to develop monitoring, mapping and profiling the reserve properties, educating and training, and leading some eelgrass restoration efforts.

Summer activities this year include starting teacher programs and increasing staff, and current formal collaborations with the LISS include restoration of Bluff Point State Park, environmental education efforts, and especially the Long Island Sound Eelgrass Collaborative, since the reserve includes more than a third of LIS eelgrass. There are also numerous informal collaborations and interests aligned with the LISS which he described. The reserve is at the cleaner eastern end of the Sound and may serve as a template for restoration efforts in the western Sound.