Peconic Estuary Partnership

Technical Advisory Committee (TAC) Meeting

August 19, 2020 10:00am

Zoom Conference Call

Attendees: Sarah Schaefer (PEP), Joyce Novak (PEP), Lauren Scheer (PEP), Elizabeth Hornstein (PEP), Matthew Scalfani (CCE), Chris Clapp (TNC), Pat Aitken (PEPC), Chris Schubert (USGS), Josh Halsey (PLT), Michael Jensen (SCDHS), Debbie Aller (CCE), Michele Golden (NYSDEC), Sally Kellogg (SSER), Brian Frank (Town of East Hampton), Nicole Maher (TNC), Cassandra Bauer (NYSDEC), Tristen Tagliaferri (USGS), Julia Socrates (NYSDEC), Mary Ann Eddy (Sage Harbor-Harbor Committee), Maureen Dunn (Seatuck), Paul Misut (USGS), Ron Busciolano (USGS), Don Walter (USGS), Ken Zegel (SCDHS), Roy Reynolds, Theresa Masin (Town of Southampton), SC Legislator Al Krupski, Gwynn Schroeder (Leg. Krupski's office), Jon Sokol (SCEDP), Ed Bausman (Town of Shelter Island), Anthony Caniano (SCDHS), August Ruckdeschel (SCEDP), Arielle Santos (Seatuck), Camilo Salazar (SCEDP), Dan Kendall (NYSDEC), Diana Lynch (SC Parks), Emily Hall (Seatuck), Lena DeSantis (Anchor QEA), Nicholas Calderon (TNC), Nicole Casamassina (USGS), Nora Catlin (CCE), Stephen Lloyd (TNC), Susan Van Patten (NYSDEC)

1. **Welcome & Introductions** –Matthew Sclafani (TAC Chair)

2. **TAC Meeting Summary** – Matthew Sclafani
   - Review of the May Technical Advisory Committee (TAC) Meeting Summary - minutes approved by the committee.

3. **PEP July Program Update Review** – Sarah Schaefer (PEP Program Coordinator) & Elizabeth Hornstein (PEP State Coordinator)
   - The committee was asked to come with any questions after reviewing the July PEP Program Update.
   - PEP provided updates on the following items that have changed since the May Update:
     - The PEP Conference planned for September 25th 2020 has been postponed until April 14th 2021 at the Long Island Aquarium.
     - The 2020 PEP CCMP is in the final stages of review with the USEPA.
     - PEP is continuing to provide results to our partners on the completed projects (Seagrass Bio-optical Model, Greenport Living Shoreline Demonstration Project, Critical Lands Protection Strategy and Climate Ready Assessment, Water Quality

Monitoring Strategy) and is working with our partners to implement the next phases of the Conceptual Habitat Restoration Design projects that were completed in 2019.

- PEP has been able to secure construction funding for the Woodhull Dam Fish Passage Project from the NYSDEC WQIP grant, Suffolk County WQPRP grant, and the USFWS. PEP applied for the Southampton Town CPF application through Suffolk County Parks, which was due on August 17th - if we get this funding we will be in a position to put the project out to bid again this year, with the intention of starting construction in Spring/ Summer 2021.
- Spring 2020 Alewife Monitoring Update: Video camera installed at Grangebel Park fishway on Peconic River for second year. Suffolk County College Professor (Kellie McCartin) and students are helping with video monitoring analysis. Alewife Count Update: From 02/28/20-05/02/20, just over 56,000 fish are estimated to have passed through the camera. Last year's estimate was around 34,500, so we have exceeded last year's estimate. The camera was taken out on June 30th. A report will be distributed on the PEP website with the information and compared to the research that Peter Daniels collected along the river with his pit tag array.
- Expansion and Monitoring of the Town of Southold Living Shoreline project with CCE and Nitrogen Load Reduction Assessment project with Anchor QEA has received a 1 year extension from the EPA on grant funds due to COVID-19 and contracts will continue until the end of September 2021.
- All other projects listed are ongoing- details in the power point presentation.
- E&O updates: The PEP Citizens' Advisory Committee Meeting, Suffolk County Septic Improvement Program Workshop will be held on August 26th from 2-4pm through Zoom. Registration is required. Lauren Scheer included a link in the chat box: Suffolk County Septic Improvement Program Workshop at PEP's CAC Meeting. Registration link for August 26th 2-4: https://cornell.zoom.us/meeting/register/tJMpc-mpqDIrHtOcEiqCUpgjupu0HDzPgQ8o?fbclid=IwAR0vGJqnp2xfgiXLWy5HTAWUCjUbIBR6iP88yaAoeGeRtjDkt2SAK9aCEK4
- PEP has been working with our partners to develop the Long Island Wildlife Monitoring Network which is planned to be hosted on the Seatuck website. A full update on this project will be provided later in September or October.

4. **Next Steps for the Peconic Estuary Partnership Water Quality Monitoring Strategy –** Joyce Novak (PEP Director)

- Matt Sclafani stated The Peconic Estuary Partnership's Water Quality Monitoring Strategy was developed in collaboration with CoastWise Partners, LLC. The Strategy has a list of steps for improved water quality monitoring in the Peconic Estuary that would provide improved information to the resource managers in the area and to the public. The Strategy was approved by the TAC on 05/04/2020, by the Management Committee

on 05/28/2020 and by the Policy Committee on 06/10/2020. The Final Strategy document will be formally approved by the EPA and incorporated into CCMP.

- Joyce stated the PEP TAC made great strides to decide on the initial parameters to report on for the annual water quality report. The National Estuary Programs are required to report water quality in their watersheds. In the past Suffolk County has shared data over multiple years but not in an annual report and the PEP would like to facilitate annual water quality reporting. *See preliminary targets in the above linked Water Quality Monitoring Strategy.*
- One of the big next steps to develop an annual water quality monitoring report is to develop a Monitoring Collaborative, a subgroup of the TAC. The meeting frequency will be potentially quarterly but will likely be less frequent (the meeting frequency has not been determined yet and may fluctuate throughout the year). It is appropriate to have Suffolk County and NY State to be involved on the Collaborative. We had talked previously about including the NY State LIQWIDS reporting system to be incorporated into the water quality monitoring report. East End Towns should be represented on the Collaborative. The report is meant to be easily understood and a public friendly document that Towns, the public, resource managers can use to communicate water quality information in the Peconic Estuary.
- See the PEP Water Quality Monitoring Strategy: Technical Memo (attached to the agenda) for:
    - A summary of the approved Next Steps by year, to facilitate tracking and planning; and
    - Additional technical information which may be helpful in implementing key Next Steps.
- Joyce asked the TAC if there are members who would like to be part of the Peconic Estuary Monitoring Collaborative. If so, please reach out to the Peconic Estuary Partnership over the next month so that we can put together the next steps and meeting dates.
- The first Peconic Estuary Water Quality Report will be put out in 2021, before the end of the Peconic Estuary Partnership's fiscal year which ends in September 30th, 2021.
- Reach out to Joyce (joyce.novak@suffolkcountyny.gov), Sarah (sarah.schaefer@suffolkcountyny.gov) or Elizabeth (elizabeth.hornstein@dec.ny.gov) directly if you would like to be part of the Monitoring Collaborative.

5. **Peconic Estuary Partnership Solute Transport Model Status Update –** Jack Monti and Don Walter (USGS)- specific questions on the Solute Transport Model can be directed to Jack Monti (jmonti@usgs.gov) or Don Walter (dawalter@usgs.gov).
    - Matt Sclafani stated that the Solute Transport Model will provide us with groundwater inputs of nitrogen into the Peconic Estuary. The Model will allow us to look at specific scenarios and will allow us to see what areas we might want to focus on in the Peconic Estuary in the future for nutrient management actions. The Model will be a really useful tool and will be potentially used for policy development for the East End Towns and other entities.

Don Walter provided an overview of the Peconic Estuary Nitrogen Solute Transport Model goals, methods and results so far in a power point presentation. *The main points of the power point presentation are summarized below (the presentation cannot be shared at this point because it includes preliminary information subject to revision):*

- Cooperator: NYSDEC, Peconic Estuary Partnership
- Location: Peconic River and associated coastal watersheds, Suffolk County, Long Island (Starts at the headwaters of the Peconic River and out to the Peconic Bays to the end of the North and South Forks to Plum Island and Gardiners Island.)
- Problem: Anthropogenic activities have increased excess nitrogen loads in the Peconic watershed leading to eutrophication, harmful algal blooms, loss of aquatic habitat, and degradation of important fisheries.
- Objective: Develop numerical methods to better simulate time-varying nitrogen loads from complex sources to ecological receptors and evaluate the response of those loads to nitrogen-mitigation efforts within the watershed.
- Approach:
    1. Development of historical nitrogen loads 1900-2015
        a) Sources include wastewater, residential fertilizer, agriculture, livestock, and atmospheric deposition (Jack Monti will get into detail on this during his portion of the presentation)
        b) Nitrogen sources extended (2016-2020)
    2. Model Development
        a) Regional model (historical conditions: 1970-2020)
            i. Evaluate need for added model complexity
            ii. Base scenarios
        b) Inset model (future conditions: 2020-2120)
    3. Scenarios (Inset model)
        a) Initial aquifer concentrations from regional historical simulations
        b) Develop model inputs representing possible nitrogen-mitigation actions
        c) Evaluate changes in annual nitrogen loads to wells and ecological receptors
- Modeling Approach for Simulating Time-varying Nitrogen Loads (*represented in a flow chart in the presentation*):

    - Annual Recharge (1900-2015) and Annual N Load (1900-2015)-> Nitrogen Concentration (1900-2015)-> Model Input to Transient regional solute transport model (1900-2020). All of those are used to create the 3D aquifer N concentrations (2015) which are then used as the Model Input to the Transient inset solute transport models (2020-2120). Scenarios are run based on the Transient inset solute transport models (2020-2120) to develop time-varying N loads to ecological receptors.

- Status update: Currently the USGS is working on the Evaluate changes in the annual nitrogen loads to well and ecological receptors step (3.c in the approach list above). All other tasks have been completed at this point.
- Historical Nitrogen Loads:
    1. Island-wide annual estimates of nitrogen loads from land use, US Census, and agricultural data for the period 1900-2015
    2. Sources include wastewater, residential fertilizer, agriculture, livestock and atmospheric
    3. Combined with annual estimated of recharge and anthropogenic stresses
    4. Documented in a USGS Scientific-Investigations Report- Report is very close to being finalized/approved
- Regional (Island-Wide) Model (500 ft discretization):
    1. Developed as part of the USGS's National Water-Quality Assessment (NAWQA) Program.
    2. Steady-state version documented in a USGS Scientific Investigations Report
    3. Modified to simulate transient groundwater flow and solute transport
    4. Simulation period: 1790-2020
- Analysis of Legacy Land Nitrogen Loading:
    1. Regional-scale analysis
        a) Regional flow and transport model
        b) Historical nitrogen loads from major sources
        c) Simulation period: 1790-2120
    2. Evaluate importance of historical nitrogen disposal on current loads to receptors
    3. Estimate present-day distribution of nitrogen in the aquifer system (initial conditions for future scenarios)
- Time-varying hydraulic stresses and nitrogen source terms are used to develop the nitrogen concentrations for the Solute Transport Model. This is so make sure we are incorporating transient pumping and recharge stresses and changes in nitrogen sources over time in the Peconic Estuary, this is also being done for the Long Island Sound watershed, and South Shore Estuary Reserve watershed.
- Peconic Inset Model: includes the Peconic watershed, parts of other watersheds.
    1. Linked to the Regional model
    2. Simulates flow and solute transport
    3. Uses current aquifer concentrations estimated from analysis of historical nitrogen loading
    4. Can estimate time-varying nitrogen loads and concentrations resulting from possible nitrogen-mitigation actions
    5. Simulation period: 2020-2120
    6. Transient flow and transport, 250 ft discretization (4-fold increase in resolution), more detailed boundaries, hydraulic properties consistent with 2019 regional model, constant-head boundaries along western edge
- Ongoing Model Development/Modifications:

1. Important to align PEP modeling analysis with parallel, Island-wide investigations
2. Analysis of nitrogen transport and loading to Long Island Sound planned (FY21)
3. Modelling approach in the Peconic modified to ensure consistency
    a) Update version of the regional model being developed (LI Sustainability Project)
        i. The Long Island Model has been updated to use Modeling code Mode Flow 6, results of drilling/sampling (2017-2020) have been incorporated, updated time-varying hydrologic stresses (2020) have been incorporated and the simulation of the dynamic freshwater/saltwater interface has been incorporated
    b) Incorporate transport into the updated regional model and link to updated inset model of the Peconic watershed
    c) Same tools used for Long Island Sound

- Scenarios:
    1. Currently 14 general scenarios under discussion
        a) Total of 20 scenarios, including variants
        b) Some are not well defined and may have issues
    2. Delineation of ecological receptors
        a) Include streams, wetlands, estuaries, and open coastal waters based on NYSDEC Receiving Waterbodies (RWBs)
        b) About 330+ receptors defined for the Peconic watershed and associated waters
        c) Some aggregation may be required
    3. Results could include graphs time-varying loads and maps of discharging concentrations.
    4. Scenarios need to adhere to USGS Fundamental Science Practices
        a) Models need to be reviewed, documented and formally archived on-line.
        b) No public release of scenario results prior to USGS approval of any models
        c) Scenario results need to be documented in a USGS Data Release and archived on-line.
    5. Full suite of products for all nitrogen sources and RWBs could result in 33,200 graphs and several hundred maps
    6. Possible workarounds:
        a) Aggregate RWBs
        b) Combine nitrogen source terms
        c) Transmit results as .csv files of annual loads and discharging concentrations

Jack Monti provided a presentation of Estimating Unattenuated Non-Point Source Nitrogen Loads to Evaluate the Impacts to Groundwater Quality in the Peconic Watershed from 1900-2017. *The main points of the power point presentation he shared are summarized below (the presentation cannot be shared at this point because it includes preliminary information subject to revision):*

- Impacts of nitrogen loads change over time was based on land cover maps aerial imagery. Population and agriculture are the main drivers of land cover change, which has an impact on sewers, septic, fertilizer application, and livestock loads. Natural sources such as atmospheric deposition also need to be considered.
- Data used:
    1. Land use/land cover change
    2. Wastewater management changes- sewer area polygons and year built
    3. Impervious surface coefficient
    4. Atmospheric deposition
    5. Decadal Population data 1790-1980 tables and 1990-2010 U.S. Census, American Community Surveys available 2011-2017.
    6. Agriculture Census- County data scale
    7. Calculated Residential Lawn Fertilizer or Non-Farm N Mass
- Non-Point Source Load Approach: Septic N Load, Crop N Load, Livestock N Load, Residential Fertilizer N. Load, Atmospheric N Load = Total N Load
- Rates of application were used in the model for human waste, residential fertilizer, agriculture fertilization, cattle (beef), cattle (dairy), chickens, horse, pigs, and hogs, sheep and goats, turkeys, and ducks – other wildlife is not being representing a livestock load such as Canada geese and deer because Jack did not have access to this data but this data could be something to look into in the future. Legislator Al Krupski is interested in continuing the conversation about incorporating loads from Canada geese and deer outside of this meeting.
- Ken Zegel noted that we need to clarify if 2.04lbs/1,000sf/year assumption for residential fertilizer application rate used in the Suffolk County Subwatersheds Wastewater Plan, and in the Solute Transport Model, factored in the assumption that not all residents are applying fertilizer.
- Jack presented a graph of unattenuated Island-wide Nitrogen Source Estimates for agriculture, livestock, septic, residential and atmosphere between 1900-2015.
    1. Jack went into detail on the trends in atmospheric deposition of nitrogen in the Peconic Estuary watershed- Fossil fuels burned in urban communities on the mainland with concentrations are generally higher in the west than in the east. Atmospheric nitrogen drifts from the mid-west to the east. There was a air pollution regulatory change made in the early to mid-1990s that may have caused a reduction in atmospheric deposition regionally.
    2. Roy Reynolds asked Jack about the attenuation rate for the septic systems that are being applied in the model. Jack Monti stated that for the purposes of the Solute Transport Model USGS is using the attenuation rate for septic systems applied in the Suffolk County Subwatersheds Wastewater Plan (6%

from the septic system and 10% for the vadose zone along with the other list of attenuation rates from the County). Roy Reynolds offered to send over a report to the USGS that he recently completed regarding the Suffolk County Subwatersheds Wastewater Plan and nitrogen removal efficiencies for septic systems. Don and Jack stated there could be an opportunity to adjust attenuation rates and assumptions used in the Solute Transport model as model sensitivity and scenarios are developed.

- Jack presented a graph of unattenuated Peconic Estuary Annual Nitrogen Loads between 1900-2015 for agriculture, livestock, septic residential and atmosphere.
- For 2015 and forward parcel level or >30 meter resolution data will be used from the following data sets:
    - National Land Cover Database
    - USDA Cropland data layer
    - Polygons of parcels in the 2016 tax roll
- Jack is working on developing the model scenarios currently based on the .pdf of the Final Draft Scenarios List for the Peconic Estuary Solute Transport Model (attached):
    - Base scenarios
        1. Pre-development nitrogen load
        2. No further nitrogen loading to the watershed
        3. No nitrogen load reduction action in watershed
        4. Reduce atmospheric deposition of nitrogen, no action to other sources
        5. Potential Future/ full build-out at the current allowable density
    - Wastewater treatment upgrades in 6 management areas (scenarios 1-3)
        1. As laid out in the SCSWP (scenario 1 and 2.1)
        2. 50% faster than the SCSWP timeline (scenario 2.2)
        3. 50% slower than the SCSWP timeline (scenario 2.3)
        4. Focused on 0-2 year groundwater contributing area in all priority areas (scenario 3.1)
        5. Focused on 0-2 year groundwater contributing area and phase II area (scenario 3.2)
        6. Focused on 0-2-25/50 year groundwater contributing area and phase III area (scenario 3.3)
    - Potential mitigating Town actions (scenarios 4-6)
        1. Land Management - upzoning, land preservation, critical land protection strategy (scenario 4)
        2. Existing STP's – Sewer system expansion projects of area and capacity, also STP water reuse (scenario 5)
        3. Proposed Sewers (scenario 6)
    - Fertilizer Management actions (scenario 7)
        1. LINAP turf fertilizer recommendations (scenario 7.1)
        2. Complete elimination of residential fertilizer (scenario 7.2)
        3. Slow release fertilizer 50% (scenario 7.3)
    - Agriculture Management (scenarios 8-10)

1. Increase N loads 10, 20, 30% representing agricultural lands switching to livestock production (scenario 8)
2. Impacts of implementing soil health BMPs (scenario 9)
3. Implementation of shallow narrow drain fields (scenario 10)

- Load reduction goals (scenario 11)
    1. What wastewater management actions are needed to meet groundwater quality and quantity protection goals (scenario 11)

- Jack Monti and Don Walter are available (see email addresses above) if there are any specific questions or information that someone would like to discuss.
- Roy Reynolds provided information in the Zoom chat for anyone interested in reviewing his report- contact at rrvreynolds@optonline.net/ (6318851926) or to view the report at tiny.cc/NREreport

6. **Next Steps and Meetings –** Matthew Sclafani

<u>Upcoming 2020 TAC meetings:</u>

November 18th, 2020 10:00 am – 12:30 pm- TBD location

7. **Public Comment Period-** meeting attendees were asked to indicate in the Zoom chat if you would like to speak.
    - No comments.

8. **Adjourn**

TECHNICAL MEMORANDUM

TO: Joyce Novak Peconic Estuary Partnership Director

FROM: Holly Greening, Gerold Morrison and Rich Batiuk, CoastWise Partners

DATE: May 13, 2020

SUBJECT: PEP Water Quality Monitoring Strategy: Additional technical information

The Peconic Estuary Partnership Technical Advisory Committee recommended approval of the Peconic Estuary Water Quality Monitoring Strategy, a required element of the Peconic Estuary Partnership's 2020 Comprehensive Conservation and Management Plan. The finalized Strategy includes a summary of existing water quality monitoring programs and an assessment of whether data collected by those programs can adequately track and detect changes in water quality needed to assess progress towards CCMP Goals. The Strategy also includes Next Steps to address gaps in data and/or information needed to fully assess progress towards CCMP Goals.

The purposes of this Technical Memorandum are to:

1. Summarize the approved Next Steps by year, to facilitate tracking and planning; and

2. Provide additional technical information which may be helpful in implementing key Next Steps, including a more detailed description of analyses needed to finalize the adopted Provisional Targets and newly published information regarding eelgrass water quality requirements with anticipated increased temperatures.

The following is a summary of the Next Steps defined in the Water Quality Monitoring Strategy document. Please refer to the Strategy document for a full description of each of the Next Steps.

Next Steps, organized by year:

2020

- The PEP Program Office will facilitate the formation of the Peconic Estuary Monitoring Collaborative, consisting of the Peconic Estuary monitoring partners. The Collaborative will be supported by a Suffolk County water quality analyst beginning in October 2020.

- The Monitoring Collaborative will initiate work with the New York State Ocean Acidification Task Force to define how to enhance existing monitoring networks to include parameters specific to ocean acidification.

- The Collaborative and the TAC will evaluate priority statistical issues and finalize and adopt PEP water quality targets for pathogens, water clarity (Secchi depth), and chlorophyll-*a* and dissolved oxygen concentrations, in time for the 2021 PEP Conference.

- Interested members of the TAC and other PEP partners will evaluate the use of the Peconic R-based open science package to report annual water quality reports.

2021

In 2021, the PEP TAC and Monitoring Collaborative will:

- Develop stoplight graphics for presentation at the Spring 2021 Conference, using the adopted targets.

- Evaluate the feasibility of including climate change adaptation in water quality models and/or ecosystem models to identify potential areas of impact.

- Identify feasible and cost-effective methods for monitoring seasonal and diel variations in dissolved oxygen at multiple locations within the estuary. The Collaborative will also evaluate the feasibility of including continuous near-bottom dissolved oxygen measurements.

- Evaluate whether certain targets (e.g., for Secchi depth and chlorophyll-*a* concentration) are appropriate for all three estuary management zones. If zone-specific targets are necessary for these parameters, develop and recommend adoption of these revised targets to the Management Committee by May 2022.

- Explore the development of a tiered reporting system, summarizing water quality conditions on a broad scale (e.g., for the three proposed estuary segments) and also identifying problem areas in individual sub-watersheds or embayments.

- Assess the technical and financial feasibility of monitoring nutrient concentrations and other water quality parameters more frequently at the USGS Peconic River gage site, to support estimation of annual nutrient loadings at that location.

- Evaluate how the Solute Transport Model can be used to run scenarios and use the tool to support decision making and make recommendations to the PEP Management Conference.

- Evaluate potential additional information sources, such as the sanitary shoreline surveys conducted by the NYSDEC shellfish monitoring program and the microbial source tracking currently done by multiple partners, as means to identify potential pathogen sources.

- Develop maps of water temperature in potential seagrass habitat areas, and couple with results of the groundwater transport model to assist in identifying future areas for restoration. Map areas where PAR and water temperature could potentially support eelgrass restoration.

2022

In 2022, the PEP TAC and Monitoring Collaborative will:

- Examine potential elements of an 'early warning system' which could be used to alert decision-makers and the public to anticipated water quality issues such as fish kills and HABs.

- Define additional indicators that may need to be tracked and reported to assess progress toward CCMP Objectives, such as the spatial distribution of nuisance macroalgae blooms, suitability of water quality conditions (e.g., DO, pH) for spawning and development of diadromous fish, and tissue levels of mercury and other potential toxins in river otters and other wildlife.

- Work with NYSDEC's Division of Water and Watershed Management Division to develop additional monitoring elements which will support 303(d) listings or other regulatory requirements as well as track progress toward PEP CCMP Goals and Objectives.

- Define monitoring questions and research needed to characterize HABs in freshwater bodies.

- Evaluate the feasibility of calculating the amount of total chlorophyll *a* measured at a given location and date that is due to harmful algal bloom species.

- Assess the elements needed to monitor the quality and quantity of groundwater more comprehensively and consistently in order to fully estimate nutrient loads to the estuary.

Establish a baseline groundwater monitoring network for ecosystem objectives, and resources needed to and sustain it through time.

- Evaluate how to measure nutrient concentrations/loads in the hyporheic discharge zone to improve understanding of loads in this 'hand-off' zone between the watershed and the estuarine system.

- Verify which of the existing groundwater monitoring wells are on the flow paths of contaminants to the estuary. Through application of the validated Solute Transport Model, design a more comprehensive monitoring program.

- Determine whether annual freshwater inflows ('hydrologic loads') to the estuary should be an element of tracking and reporting, and perhaps used to 'normalize' estimates of annual nutrient loads with respect to annual freshwater inflows.

2023

In 2023, the PEP TAC and Monitoring Collaborative will:

- Develop a monitoring plan and initiate water quality monitoring in key rivers and streams.

Timeline not yet determined

New *Enterococcus* standards have been proposed and are currently in review at the State level. If new State standards are adopted, PEP will revise its target to reflect the new standards going forward.

The Monitoring Collaborative will work with all parties on issues related to shellfish bed closures and pathogen-related TMDLs at the state and federal levels.

The TAC and Monitoring Collaborative will periodically assess the current water quality targets regarding support for eelgrass habitat and water temperature changes as additional information becomes available.

Some questions to consider when finalizing the provisional water quality targets (2020):

a) Are the provisional Secchi depth (2 m) and chlorophyll-a (5.5 µg/L) targets appropriate for all three estuary management zones?

   This question was discussed by the TAC during its December 2019 meeting. Applying these targets to all three PEP management zones provides support for the Suffolk County subwatersheds wastewater management program, which uses them on a county-wide basis. In the future, however, if the targets prove to be inappropriate (or unattainable) for some portions of the PEP program area, the TAC may wish to modify them. CWP recommends that the provisional targets be adopted estuary-wide for an initial (e.g., 3-5 year) evaluation period, and then reassessed periodically by the TAC regarding their attainability and continuing appropriateness for helping PEP address its resource management goals. Ongoing climate change, which as discussed below, is one issue that is likely to require periodic evaluations of these targets. In addition, the U.S. EPA (2009) recommends that coastal monitoring programs move to augment or replace Secchi depth measurements with direct measurements of photosynthetically active radiation (PAR) and light attenuation (K_d), due the uncertainties involved in estimating PAR and Kd using Secchi depth measurements alone.

b) Should the Secchi depth and chlorophyll-a targets be based on mean or median values?

   The provisional targets are based on annual median values observed during the April 1 through October 31 growing season. CWP recommends the continued use of medians rather than means in this case because medians are robust estimators of central tendency in data sets that may not be normally-distributed, a situation that appears to apply to both the Secchi depth and chlorophyll-a data. However, it will also be important for the PEP evaluations of target compliance to be consistent with those produced by Suffolk County. The TAC and the County will therefore need to work collaboratively to identify an approach that both entities will use to report target compliance.

c) How will the red, yellow and green categories be defined for the stoplight graphic tables?

   The following methods were used to produce the stoplight graphics shown in the Water Quality Monitoring Strategy document:

   - For chlorophyll-a, the median and its 95% upper and lower confidence interval values were calculated for each PEP management zone and year. In cases where all three values were less than the 5.5 µg/L target, a ‘green’ (fully meets target) classification was applied. In cases where all three values were greater than the target, a ‘red’ (does not meet target) classification was used. In cases where the lower 95% CI value was less than and the upper 95% CI value was greater than the target, a ‘yellow’ (partially meets target) classification was used.

- For Secchi depth, the same logic was used to determine the green-yellow-red classifications. In this case, however, the presence of 'right-censoring' (Secchi depth observations reported as 'visible on bottom' rather than as a measured depth) required the use of alternative methods for calculating the median and 95% CI values. This is a common and often unavoidable issue with Secchi disk data collected in shallow-water areas (e.g., Carstensen 2010). Nonparametric methods, such as the Kaplan-Meier estimator, are commonly used to analyze similar right-censored data in fields such as engineering (estimating failure times of manufactured devices and components) and medicine (estimating survival times of patients in clinical trials). We used the R Package 'survival' (accessed at https://cran.r-project.org/web/ packages/survival/index.html) to calculate annual, zone-specific Kaplan-Meier estimates of median and 95% CI values for the PEP Secchi depth data. In cases where all three values were greater than the 2 m depth target, a 'green' (fully meets target) classification was applied. In cases where all three values were less than the target, a 'red' (does not meet target) classification was used. In cases where the lower 95% CI value was less than and the upper 95% CI value was greater than the target, a 'yellow' (partially meets target) classification was used.

- For *Enterococcus*-related bathing beach closures, we used data collected annually by Suffolk County at the 28 beaches it monitored within the PEP program area during the years 2010 through 2018. The County follows current New York State criteria (*Enterococcus* counts are not to exceed 104 colony forming units per 100 ml water sample) to determine bathing beach closures. For the stoplight graphic, beaches which had zero closures in a given year were given a 'green' (fully meets target) classification, those that had a single closure were given a 'yellow' (partially meets target), and those that had multiple (2 or more) closures were given a 'red' (fails to meet target) classification.

- No stoplight graphics have been prepared to date for the dissolved oxygen target because of limited data availability. At present it appears that the two continuous water quality monitoring stations maintained by the USGS in the PEP program area are the only sites providing data with sufficient diurnal/nocturnal and seasonal coverage for a rigorous assessment of compliance with the New York State acute and chronic dissolved oxygen criteria. If desired as a placeholder, until a geographically broader data set is available, the TAC could prepare graphics comparing DO levels at those two sites to the state criteria over the sites' available periods of record.

Issues related to climate change and light-related water quality targets:

Ongoing climate change may necessitate changes in the light-related targets PEP uses to help protect and restore submersed aquatic vegetation (SAV). The chlorophyll-*a* and Secchi depth targets selected for the Suffolk County Subwatersheds Wastewater Plan (Suffolk County 2019) are intended to be broadly protective of SAV in the County's waters. In the case of eelgrass (*Zostera marina*), which is an important SAV species locally and throughout northern temperate coastal waters, research in a number of geographic areas (e.g., Chesapeake Bay, Denmark, South Korea) indicates that higher irradiance levels, and thus greater water clarity, are required as water temperature rises (e.g., Lee et al. 2007, Staehr and Borum 2011, Moore et al. 2012, Zimmerman et al. 2015, Arnold et al. 2017).

This is apparently due, at least in part, to higher respiration rates that occur at higher temperatures, which in turn require higher photosynthesis rates to maintain P:R ratios >1 in order to support survival and growth (Moore et al. 2012). Both photosynthesis and respiration increase with increasing water temperatures, but respiration usually increases at a higher rate than photosynthesis, leading to reductions in net photosynthesis as temperatures become elevated (e.g., Lee et al. 2007, Staehr and Borum 2011).

More frequent episodes of hypoxia/anoxia at higher water temperatures also require higher photosynthesis rates, to prevent mortality from tissue anoxia and sulfide invasion from the sediments (Lee et al. 2007, Moore et al. 2012, Staehr and Borum 2011). A recently discovered facultative mutualism between seagrasses and lucinid bivalves that support endosymbiotic sulfide-consuming gill bacteria can help to alleviate this problem by reducing the buildup of sulfide in seagrass bed sediments, perhaps improving the resilience of seagrass systems in the face of global climate change (van der Geest et al. 2020).

Recent research in Chesapeake Bay and elsewhere also suggests that the higher pCO_2 levels associated with ocean acidification may have a growth-enhancing effect on eelgrass and other seagrass species, by reducing the carbon limitation they experience due to the pH levels and inorganic carbon concentrations present in current seawater (e.g., Beer and Koch 1996, Zimmerman et al. 2015, Arnold et al. 2017).

At present, the potential long-term impacts on SAV of these and other factors associated with climate change are difficult to assess. These issues are regional in scope, and perhaps would be best addressed through a collaborative, regional effort to support more comprehensive research and monitoring and provide a strong technical background for future SAV management actions. Given the number and variety of ecological feedback mechanisms that have been found to affect the success of SAV conservation and restoration programs, adaptive management programs based on strong technical frameworks appear needed successfully cope with ongoing climate change, coastal nutrient enrichment and other anthropogenic stressors (Maxwell et al. 2017).

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FINAL DRAFT Peconic Estuary Solute Transport Model Scenario List

Updated as of May 21st, 2020

The USGS-PEP Solute Transport Modeling Project is developing a subregional solute transport model of the Peconic Estuary ground watershed to assess the time-varying discharge of nitrogen into fresh and coastal waters within the Peconic Estuary watershed. Once the model is complete it can then be applied to run a limited set of scenarios to estimate resulting nitrogen loading rates over time. These tools will provide valuable insights into how nitrogen discharge likely will change in response to nitrogen mitigation efforts within the watershed to guide local, state and regional management actions.

The Peconic Estuary Partnership wants to ensure that our partners can effectively use the PE Solute Transport Model to guide nitrogen mitigation efforts and wants to make sure that the set of scenarios that the model runs are representative of local, state and regional management actions. Our stakeholders discussed and provided comment on a list of potential scenarios at the November 2018, May, August and December 2019 PE Solute Transport Model meetings. Scenarios reference the Suffolk County Subwatersheds Wastewater Plan (SCSWP).

Prioritization of the scenarios considered the scale of the scenario application among partners and current data availability.

Any comments or feedback should be directed to sarah.schaefer@suffolkcountyny.gov

Scenario Prioritization	Description	Notes
*Climate change scenarios can be a subset to each scenario.		i.e. draught, increased intensity of precipitation events, rising groundwater levels.
Base scenario	"Pastoral"/ pre-development nitrogen load.	
Base scenario	No further nitrogen loading to the watershed.	
Base scenario	No nitrogen load reduction action in watershed.	
Base scenario	The reduction in atmospheric deposition of nitrogen BUT no on the ground nitrogen load reduction action in watershed.	
Base scenario	Potential Future/full build-out in watershed at the current allowable density.	**Detail from SCSWP:** For purposes of the SCSWP, Suffolk County Department of Economic Development and Planning developed the conditions used for potential future build-out which were based on the more stringent of Suffolk County Sanitary Code Article 6 or local zoning for all: Vacant Parcels without development restrictions, Agricultural parcels without development restrictions, and Subdividable low density residential parcels.
1	Full Implementation of Wastewater Treatment upgrades (I/A OWTS, sewering and clustering) in 6 Peconic Estuary Management Areas.	**Detail from SCSWP:** 6 Peconic Estuary Management Areas- Peconic Estuary Restoration and Protection Area I, II and III, Sag Harbor Cove and Connected Creeks, West Neck Bay and Creek and Menantic Creek, & Peconic Estuary Restoration and Protection Area IV.
2	**Implementation of Full Implementation of Wastewater Treatment upgrades (Scenario 1) at 3 "speeds":** 1) as laid out in the SWP; 2) 50% faster, assuming the industry and revenue source can accommodate a more aggressive program ; and 3) 50% slower, assuming the industry and/or funding source can't support the recommended timeline.	

3	**Implementation of Full Implementation of Wastewater Treatment upgrades (Scenario 1) in Phases:** 1) Full Implementation of Wastewater Treatment upgrades in 0-2 year groundwater contributing area. 2) Full Implementation of Wastewater Treatment upgrades in 0-2 year groundwater contributing area and Phase II area. 3) Full Implementation of Wastewater Treatment upgrades in Phase III area.	**Detail from SCSWP:** 1) 0-2 year groundwater contributing area in all priority areas ranking 1, 2, 3, 4. 2) Phase II area- Surface water and groundwater priority area 1. 3) Phase III area- Surface water priority area 2-4 and Groundwater priority area 2. 2-25/50 Year Contributing Area.
4	**Potential mitigating Town actions- Land Management:** Up-zoning from 0.5 acres to 1 acre., Land preservation and easements- according to CPF/ Town and County Comprehensive Plan lists; Land preservation according to 2019 PEP Critical Lands Protection Strategy.	
5	**Potential mitigating Town actions- Existing STPs:** 1) Implementation of Peconic Estuary watershed Potential Sewer Expansion Projects from SCSWP. 2) Increasing other existing STP capacity/ expansion, STP water reuse projects.	**Detail from SCSWP:** Based on Wastewater Management Response Evaluation Findings, these are parcels that were identified as benefitting from additional sewer expansion.
6	Full Implementation of Proposed Sewering Proposals in Peconic Estuary Subwatersheds.	**Detail from SCSWP:** Existing Sewer Proposals- Riverside Revitalization Project, Springs School District sewer project, Downtown Montauk Sewer project.
7	**On the ground Fertilizer Management Actions in watershed and implementation of fertilizer best management actions in the watershed:** 1) The LINAP Turf Fertilizer Recommendations: -Residential/Turf Fertilizer: Maximum of 1.8 lbs N/1,000 sqft annually. -Golf Courses: Maximum of 2.7 lbs N/1,000 sqft annually. - At least 50 percent of the nitrogen in any turfgrass fertilizer product should be “slowly available nitrogen.” 2) Complete elimination of residential fertilizer.	Detail from LINAP Turf Fertilizer Recommendations.
8	Increase in N load from 10, 20, 30% etc. of agricultural land switching over to livestock production.	
9	Impacts of implementing soil health BMPs.	
10	Implementation of Shallow Narrow Drainfields.	
11	Model what wastewater management actions are needed to meet groundwater quality and quantity protection goals.	Get Load Reduction Goals from SCSWP and Towns.