



Meeting Summary

Niantic River Watershed Science Workshop

July 28, 2005

9:00 a.m. – 1:00 p.m.

Kleinschmidt Building, Essex, CT

Attending:

Marcy Balint - CT DEP, Allison Branco - UCONN, Jennifer Burton - Kleinschmidt, Linda Dufresne - Town of East Lyme, Maureen Fitzgerald - Town of Waterford, John Gaucher - CT DEP, Mary-Beth Hart - CTDEP –OLISP , Paul Jacobson - Kleinschmidt, Jim Kremer - UCONN, Don Landers - East Lyme Shellfish Commission, John Mullaney - USGS, Jeff Nield - Kleinschmidt, Meg Parulis - Town of East Lyme, Sally Snyder – Town of Salem, Paul Stacey - CTDEP, Eric Thomas – CTDEP, Chris Tomichek - Kleinschmidt, Jamie Vaudrey - UCONN, Walter Smith - NRCS, Lisa Krall - NRCS.

Opening Remarks – Jeff Nield

Everyone was welcomed to the Kleinschmidt - Connecticut office (www.kleinschmidtusa.com). Jeff expressed his thanks to the participants for their attendance and covered the day's agenda (below):

Welcome and Introductions - All	9:00 – 9:10 a.m.
Protection Planning Project Overview – Jeff Nield	9:10 – 9:40 a.m.
Roundtable Discussion - Current Research and Conclusions concerning the Niantic River & Estuary	9:40 – 10:45 a.m.
Break	5 minutes
Roundtable Discussion: Will current research efforts be represented in the Watershed Protection Plan? How? <ul style="list-style-type: none">• What scientific research can we present to stakeholders (e.g., taxpayers, municipal decision-makers, development community) and in what form would it be most useful?	10:50 a.m. – 12:00 p.m.
Grab Lunch and Re-convene	12:00 – 12:15 p.m.
Wrap-up Discussion, Next Steps/Homework, Adjourn	12:15 – 1:00 p.m.

NRWP Project Overview – Jeff Nield

An electronic version of the Power Point presentation, ‘Niantic River Science Workshop-v1’ is provided as a separate file.

Summaries of Current Research

University of Connecticut – Avery Point, Marine Sciences Program

Dr. Jim Kremer, Alison Branco (Doctoral Candidate), Jamie Vaudrey (Doctoral Candidate)

Dr. Kremer

Generalized research description: Ecological response to water quality changes. End-point modeling of nitrogen in the estuary considering geology, land use and [human] population in the watershed.

Dr. Kremer provided an overview of his recent research involving the Niantic River. Adapted from a written description provided by his office after the meeting, this research is summarized as follows: Dr. Kremer and his research colleagues are utilizing land use/land cover data provided by UCONN’s **CLEAR** project for the watersheds feeding 10 eastern Connecticut estuaries for 1985, 1990, 1995, and 2002. These GIS data have been analyzed to create the input for the Nitrogen Loading Model (NLM). Estimates of nitrogen loading from all 10 watersheds at different stages of historic development are being calculated using this model with some standardized assumptions. Additionally, information is being collected from local municipalities to better constrain these assumptions in terms of housing density and sewer service in selected “case study” watersheds: the Niantic River and Mumford Cove. This case study will provide insight into the appropriateness of available data for model inputs and a measure of the degree of improvement provided by this more thorough watershed analysis. The historical data will provide a measure of the increases in nitrogen loading associated with recent development within the watershed. The NLM will also be able to predict nitrogen loads produced under different build-out scenarios, where zoning information can be provided.

Nitrogen load estimates are being compared with historic and recent eelgrass distribution data in collaboration with the Connecticut DEP, the University of Rhode Island, and the US EPA. Nitrogen loads are also being related to habitat condition and primary producer biomass measured in three reference sites. During the summer of 2004, comprehensive field surveys were conducted from May to September in the Niantic River, Mumford Cove, and the Pawcatuck River. In these estuaries, water quality and benthic sampling took place monthly at four to seven stations within each estuary. These studies included profiles of temperature, salinity, oxygen, in vivo chlorophyll fluorescence, turbidity, and photosynthetically available radiation (PAR). Point measurements were made of extracted chlorophyll concentration, colored dissolved organic matter (CDOM), diffuse attenuation coefficient of PAR, Secchi depth, total suspended matter (TSM), sediment organic content, and benthic macrophyte biomass.

The NLM is similar to the modeling proposed under this Niantic River Watershed Protection Planning project, results from the two efforts can be compared in the future.

Allison Branco

Described her doctoral research to the group. In a written summary submitted later, she describes her research as developing a new empirical algorithm for predicting the diffuse attenuation coefficient from the commonly measured ecological parameters extracted chlorophyll concentration and turbidity as well as CDOM absorbance. In natural systems, light drives primary production, and is therefore an important parameter that affects all living components of the ecosystem, and many abiotic systems components as well. In the aquatic system, the effects of light are further complicated by its interactions with the water and the substances dissolved and suspended in it: colored dissolved organic matter (CDOM), phytoplankton, and non-living suspended material. My thesis research has focused on the role of CDOM in the ecology of small shallow estuaries, and the importance of its contribution to diffuse light attenuation. This work has taken place in three main parts. In aquatic ecological modeling, underwater light is often predicted in a very simplistic way: as a function of phytoplankton standing stock. In the first part of my thesis research, I have proven that in many shallow coastal systems, the traditional method of predicting light attenuation from standing stock of phytoplankton is not valid. In fact, CDOM is a far better predictor of diffuse attenuation coefficient than phytoplankton is. Secondly, I have developed an empirical algorithm that predicts the diffuse attenuation coefficient (K) of photosynthetically available radiation (PAR) from easily measured water quality parameters including chlorophyll stock, CDOM absorption coefficient, depth, and turbidity. Most of these parameters are commonly measured and easily predicted with existing knowledge. The one parameter that is not yet easily predictable is the CDOM absorption coefficient. Therefore, the third segment of my research has focused on the empirical development of methods to predict the influence of CDOM in coastal water bodies based on readily available watershed characteristics.

Jamie Vaudrey

Jamie also presented a summary of her recent research that pertains to measuring ecosystem metabolism in estuarine systems. She has conducted extensive water quality and benthic monitoring in association with the 10-watershed study mentioned above. In addition to these water quality surveys, three more intensive benthic surveys were conducted in each site comparing the biomass of benthic macroalgae and eelgrass to water column chlorophyll and benthic micro-algae. These field campaigns were complimented by two-week long deployments of continuously monitoring, profiling sondes in the Niantic River and Mumford Cove throughout the field season.

Her doctoral research deals with the evaluation of the use of automated unattended sondes for determining ecosystem metabolism in shallow coastal embayments. An abstract of her research is provided here for reference:

ABSTRACT: Automated meters were deployed in small (<3 km²) shallow (avg. depth < 2m) coastal embayments for 5 to 25 days from May 2002 to the present time. These meters continuously record dissolved oxygen, temperature, conductivity, chlorophyll, and turbidity. Ecosystem production and respiration were calculated from hourly averages of the oxygen rate of change. Depth integrated metabolic rates (g O₂ m⁻² hr⁻¹) were corrected for atmospheric exchange based on local wind data and a gas transfer coefficient specific to shallow, sheltered estuaries. One station per estuary appears adequate for determining ecosystem metabolism in the sites studied. While calculated rates of production and respiration at stations within an estuary are not always quantitatively similar, they do follow the same trends. Metabolism measurements are most reliable during times of peak primary production. During periods of low productivity, the signal to noise ratio is so small that measurements of ecosystem metabolism are less reliable. Estuarine ecosystem production and respiration can be calculated from diel changes in dissolved oxygen measured via automated meters, but the temporal and spatial variability must be considered if these estimates of ecosystem metabolism are to be accurate.

United States Geological Survey (USGS) – John Mullaney.

Three current studies:

- 1) Estimating the groundwater quality impacts of sewerage the Pine Grove Neighborhood (East Lyme, CT). Monitoring will establish baseline data to compare groundwater quality before and after the installation of centralized wastewater treatment in this densely-populated coastal neighborhood that is experiencing the conversion from small, seasonal dwellings to large, year-round dwellings.
- 2) Water-quality samples and streamflow measurements during typical base-flow conditions will be collected from selected subbasins in the Niantic River Basin. Base-flow samples represent samples of ground water integrated over 1- to 2-mi² (square mile) areas. Water-quality samples will be analyzed for nutrients and nitrogen isotopes; the nitrogen isotope analyses will provide insight on the dominant or mixed sources of nitrate nitrogen. Monitoring wells will be installed to determine water levels and aquifer properties, and to estimate ground-water discharge to the Niantic River. The expected outcome from this project will be information that can be used by State and local officials, scientists, and others working to establish nutrient reduction targets sufficient to improve and restore eelgrass habitats.
- 3) Examination of nitrogen isotopes (*i.e.*, N₁₄/N₁₅ ratio) in groundwater quality samples to identify sources (biological vs. atmospheric), *i.e.*, the N₁₄/N₁₅ ratio increases for human/septic systems sources.

United States Department of Agriculture – Natural Resources Conservation Service (NRCS)

Lisa Krall, Soil Scientist

Lisa presented GIS-based soils information for the project area and Connecticut. NRCS has increased the availability of soils information (<http://www.ct.nrcs.usda.gov/soils.html>), nationwide, and sees many applications for it, including the siting and design of development and stormwater best management practices (BMPs). As an example, Lisa pointed out that in the Niantic River Watershed there are certain soils that would be suited for infiltration of stormwater and some that would not be. Therefore, that would influence where BMPs are sited and how they are designed.

Dominion – Millstone Environmental Lab

There exist 30 year's worth of data from a wide spectrum of water quality and biological investigations and monitoring. Much of this information is available in the laboratory's annual reports. Additional datasets will be review and compiled by Kleinschmidt.

Group Discussion

Qs and As

Q: Which towns have conducted water quality testing and is the data available for review?

A: Waterford – Maureen Fitzgerald: 28 sites. Physical and chemical water quality parameters. Samples taken in June and October. The data has not been “crunched” but is organized in spreadsheets.

East Lyme – Aquasolutions: Several sites; pre- and post- construction monitoring. Data is available.

Montville and Salem: No known testing programs within the watershed were discussed.

Q: What happens after the recommendations are given? Is there someone responsible for monitoring the progress of the plan? Who monitors if the recommendations are followed?

A: The Niantic River Watershed Plan will recommend a long-term monitoring program complete with responsible parties, monitoring methods, and performance measures. These recommendations will consider recommendations for a volunteer coalition to meet quarterly to revisit and update goals and adjust implementations.

John Mullaney suggested monitoring major tributaries to produce an estimate of ground water discharge to the Niantic River. This would address some of the effect of nitrogen loading during low flow situations.

Comments and Suggestions – For further research and exploration

- Examine how stormwater volume changes the hydrodynamics of the streams.
- Investigate links between activities/impacts in the upper watershed to effects to the water quality of the river.
- Study the effects of water withdrawals on the loading of nutrients.
- Explore the possibility of using fish and invertebrates in streams as biological indicators of the health of the watershed.
- Examine the impact of boating traffic on the estuary. Don Landers suggested looking at the stresses induced by boat traffic, and asked for an estimate of boat docking space, the pump out capacities and suggested the harbor plan as a source of information. This information can be located in the State's No Discharge Zone permit application to EPA as prepared by their consultant, Fitzgerald & Halliday.
- Can an estimate be made of the time it takes precipitation in the upper watershed (e.g., Salem) to get to the Niantic River Estuary? Can we use this data for public education by producing an illustration or graphic?
- Impacts of water diversions/out-of-basin transfers on the watershed. A source of information about water withdrawals may be the City of New London Water Department or their contractor, Earth Tech. It would also be valuable to work with the municipal water/sewer departments to estimate the number of homes that are sewerred (in the watershed).
- Is there any information from the CTDEP Office of Inland Fisheries on stream chemistry for the Niantic River watershed area?
- Recommended sources of information provided by participants:
 - National Coastal Assessment (Project) – EPA Narragansett, Walt Galloway
 - SPARROW Model for East Coast - Dr. Jim Latimer, EPA Narragansett
 - National Shellfish Sanitation Program – CT Dept of Agriculture, Shellfish Program
- Meg Parulis suggested getting town zoning and planning (commissions) involved in developing watershed protection strategies. This cooperation will be crucial for

implementation. For example, how the towns deal with setbacks and lot sizes should be examined.

- The NRWP should illustrate how the Niantic River compares to other similar estuaries in terms of water quality and ecological health. One recommendation was to compare the estuaries that Jim Kremer's research includes.
- Plan should have a strong education component. One recommended approach was to promote "ownership" of Niantic River and Watershed by installing signs indicating the boundaries of the Niantic River watershed.
- Dr. Kremer asked if there any other factors that we need to assess besides the four elements in the STEPL model and if there any other models that can be used or evaluated for the project? Paul Stacey suggested bacteria should be on the list of elements to be evaluated.
- Other models suggested were the Sparrow and the AVGWLF models.