New Hampshire Association of Natural Resource Scientists

NHANRS
COASTAL WETLANDS CONFERENCE
Impacts and Restoration

October 15, 2011
9:00 am – 4:00 pm

Urban Forestry Center
45 Elwyn Road
Portsmouth, NH 03801

ABSTRACTS (CONT'D)

Samantha Wright. Belowground Decomposition as the Mechanism Behind Surface Elevation Loss in Ditched Marshes.

Loss of surface elevation makes salt marshes more susceptible to impacts from accelerated sea level rise, such as vegetation die-off, and conversion of marsh to open water. The degradation of salt marsh systems has ramifications ranging from loss of habitat for waterfowl and fish to loss of a buffer from storm surges. A more comprehensive understanding of the mechanisms driving surface elevation loss in anthropogenically altered and degraded marshes is key to engineering successful marsh restoration projects.

This study aims to examine processes controlling surface elevation in areas of salt marsh with high man-made ditch density through comparison of the hydrologic, sedimentary, and vegetative conditions to a non-ditched portion of salt marsh. It is hypothesized that a decrease in hydroperiod through increased drainage, characteristic of areas of high ditch density, results in significantly longer periods of lower water table levels allowing for increased oxygen diffusion into the subsurface causing increased belowground decomposition to occur. This leads to a reduction in organic matter, and without compensation from an inorganic sediment supply, marsh subsidence occurs.

Belowground organic decomposition was measured using a litter-bag technique at which live roots and rhizome material was buried at a 35cm depth in two salt marsh sites in Parker River NWR for periods of 3, 6, and 12 months. This was supplemented by comparisons of belowground biomass data as well as % organic content and bulk density sampled at 2 month intervals for a period of 6 months. Water table levels were monitored simultaneously using a traditional water level well coupled with a water level data logger for more frequent sampling intervals. The study quantifies relationships between hydroperiod, drainage, and belowground decomposition, which are likely to be causing local surface elevation loss.

ABSTRACTS (CONT'D)

Leonard A. Lord, PhD, CSS, CWS. Phragmites Control & Wetland Restoration at Odiorne Point State Park.

Odiorne Point State Park extends over 330 acres and includes some of New Hampshire's rarest native ecosystems such as coastal pitch pine forest, dunes, and salt marshes and barrier marshes. The property is also documented as the oldest settled area in New Hampshire and is the site of Fort Dearborn, a WWII coastal artillery installation. The value and integrity of these ecological and historical resources have been compromised by severe infestations of invasive vegetation. In 2008, a steering committee was formed to address the invasive plant problem at Odiorne. Consisting of the Seacoast Science Center, NH Division of Parks and Recreation, the New Hampshire Department of Environmental Services (NHDES), and the Rockingham County Conservation District (RCCD), this steering committee was started as a flagship initiative of the NH Coastal Watershed Invasive Plant Partnership (CWIPP), one of New England's first Cooperative Weed Management Areas.

In 2009 RCCD began managing restoration projects in the park with a pilot project of 2.8 acres of Coastal Rocky Headland restoration. A second phase of the project was initiated in 2010, which included restoration of 23 acres across six upland and wetland habitat types, including *Phragmites* control both within the park and in a salt marsh directly west of it. A third phase of the project initiated in 2011 includes 3.5 acres of Maritime Shrubland restoration and 6 acres of Coastal Salt Pond restoration. This presentation will review the work completed to date, lessons learned, and the ongoing restoration work. Particular attention will be paid to the wetland restorations, including test plot comparisons of herbicide applications to *Phragmites* using wiping and spraying techniques.

AGENDA

8:45: Registration

9:15: Welcome

Kevin Lucey – Winnicut Dam Removal and Fish Passage Project Results.

Rachel Stevens – Picking our Battles: Priority Areas for Invasive Plant Control in Great Bay and Coastal NH Watersheds.

Sidney A. Pilgrim – New Hydric Soil Indicator for Coastal Marine Silt and Clay Sediments.

Dr. Adam Reitzel – High Marsh Ecology of the Sea Anemone Nematostella vectensis.

12:00 – 12:45: Lunch, Networking

Dr. Aimee Phillippi – Impacts of Rockweed Harvesting on Sediment Structure and Meiofauna Communities.

Leonard Lord – Phragmites Control & Wetland Restoration at Odiorne Point State Park.

Samantha Wright – Ditching Effects on Salt Marsh Surface Elevations.

ABOUT THE SPEAKERS

Leonard Lord is the District Manager of the Rockingham County Conservation District in Brentwood NH.

Kevin Lucey is a Restoration Coordinator with the New Hampshire Department of Environmental Sciences.

Dr. Aimee Phillippi is an Associate Professor of Biology and Director of the Center for Biodiversity with Unity College, Unity Maine.

Sidney A. Pilgrim is an Adjunct Faculty member of the Natural Resources Dept. at the University of New Hampshire, Durham, N.H.

Dr. Adam Reitzel is a Post Doctorate Researcher at the Woods Hole Oceanographic Institute.

Rachel Stevens is the Stewardship Coordinator with the Great Bay National Estuarine Research Reserve of the New Hampshire Fish and Game Department.

Samantha Wright is a Masters Degree candidate at Boston University with a concentration in Coastal Geomorphology.

ABSTRACTS (CONT'D)

Aimee Phillippi, Ph.D. Impacts of Rockweed Harvesting on Sediment Structure and Meiofauna Communities.

Rockweed, primarily Ascophyllum nodosum, has been harvested for centuries for use as a fertilizer. More recently its uses have become diversified and harvesting methods more efficient, creating the need for research on the impacts of harvesting and regulation to help control those impacts.

In the past couple decades, some studies have been conducted on the changes in algal species and biomass from harvesting and on the impacts of mobile macrofauna, such as snails and crabs. However, little is known about the changes that result from harvesting on the meiofauna community. During high tide, many species of commercial fish and shellfish use the rockweed beds for shelter and food. Much of what these species are eating are the meiofauna. Therefore, understanding how harvesting one commercial species may affect the populations of other commercial species requires us to examine these impacts.

Using a study site in Sears Island, Maine, I create both harvested and unharvested plots of rockweed. These plots are sampled at one, two, three, and four months post-harvest. Sampling involves quantifying mobile macrofauna in the field and taking samples to the lab for meiofauna identification and quantification. In addition, because substrate is a crucial determining characteristic for many meiofauna species, sediment analyses are also conducted on the harvested and unharvested plots.

This study aims to answer questions such as: Does harvesting alter the sediment structure of the intertidal, and if so, how long does this alteration persist? Does harvesting change the meiofauna community composition, and if so, what potential impacts might this have on populations of commercial species?

ABSTRACTS (CONT'D)

Adam M. Reitzel, Ph.D. A Starlet in the Mud: Population Genetics, Environmental Stressors, and Local Adaptation in the Estuarine Anemone Nematostella vectensis.

Increasing global temperatures and anthropogenic contaminants represent a threat to estuarine natives that are limited in their ability to disperse to more suitable habitats. At the same time, estuaries have become increasingly fragmented by extensive coastal development, some of which interrupts the natural hydrology and further reduces the opportunity for dispersal.

Nematostella vectensis, an anemone occupying tidally restricted marsh pools throughout North America, is a representative of high marsh taxa that are likely to be the most heavily affected estuarine organisms due to their isolation. In this presentation I summarize our research addressing the population genetic structure of this species, which revealed multiple instances of anthropogenic dispersal and highly structured populations, and the roles of asexual reproduction in this species' establishment in non-native and restored marshes. I will report our interdisciplinary research to better understand the molecular mechanisms utilized by this organism in response to environmental stressors, including temperature and xenobiotics, and evidence for local adaptation in natural populations.

We suggest the Nematostella may be a valuable sentinel species for environmental monitoring because the habitat and mode of feeding of an indicator impacts route and susceptibility to pollutants and other stressors, and it is necessary to have representatives from divergent niches for inferring community response to particular stressors. In addition to its ecological niche Nematostella has several additional features that make it particularly attractive as an indicator species including a sequenced genome and gene expression profiling techniques that are being used to develop informative biomarkers.

ABSTRACTS

Kevin Lucey. Winnicut River Dam Removal and Fish Passage Project: Restoring Anadromous Fish Passage and Tidal Habitats.

The head-of-tide, Winnicut River Dam and its attached Canadian "step weir" fish ladder were built in 1957 to create habitat for waterfowl and to provide upstream fish passage. Soon after construction, it became apparent that the design of the fish ladder did not pass the targeted diadromous fish species.

In 2005, NH Fish and Game Department decided to remove the dam; however, during the feasibility process, it was determined that Route 33 (located 300 feet upstream of the dam) severely constricted the channel resulting in water velocities too swift to allow fish to move upstream. To resolve the fish passage issues beneath the Bridge, an innovative run-of-river fish pass structure was designed. The modified "pool and weir" concrete fish pass is 132 feet long, 20 feet wide, 10 ft deep and is designed to convey the total volume of the river. The design calls for a 6-inch elevation change between each of the 18 weirs, allowing for fish passage at low flow and low tide.

The new fishpass is designed to provide upstream and downstream passage to diadromous and resident fish species. In addition, removal of the Winnicut Dam is intended to increase spawning area for rainbow smelt. Other project benefits include restoration of 21,100 ft^2 head-of-tide floodplain, restoration of 700 feet of stream bank, and eradication of 5,000 ft^2 population of Japanese knotweed.

The Winnicut Project, originally bid in May 2009, has also been the subject of a contract default, contractor bankruptcy, storm related damage, bond proceedings, and a re-bid process. A new contractor mobilized to the site in May 2011 and the project is scheduled for substantial completion by mid October 2011.

In addition to design parameters, ecological benefits and results, this presentation will include project management considerations for large-scale ecosystem restoration projects.

Rachel Stevens. Picking Our Battles: Priority Areas for Invasive Plant Control in the Great Bay and Coastal NH Watersheds.

Invasive plants are changing the face of America. They can cause significant ecological and economic harm and are a common focus of coastal restoration projects. However, these projects are rarely successful in the long term when conducted at the individual stand or property scale. Invasive plants know no boundaries and can easily reestablish from surrounding areas unless a landscape scale strategic approach is taken to prioritizing control projects. This presentation overviews the results of a community driven model that developed a landscape scale prioritization strategy for invasive plant control projects throughout the Great Bay and Coastal watersheds. Areas of ecological significance and human functional value were evaluated in concert with areas of high risk of invasive plant spread into new areas.

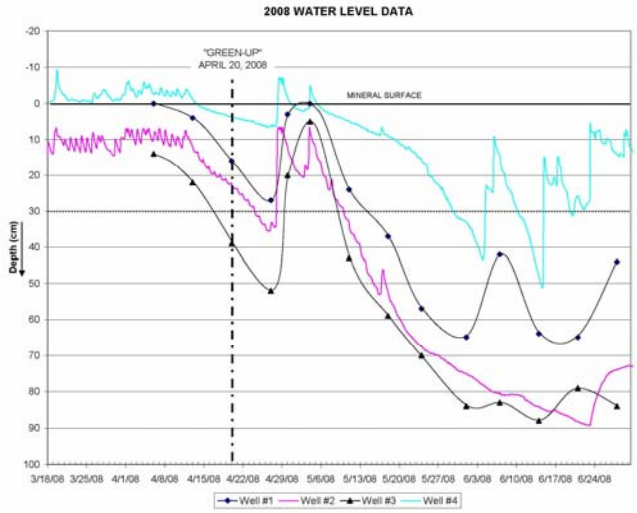
Over 111 individuals, natural resource professionals, and conservation groups contributed to the building of this model. Results of their input were synchronized with New Hampshire's Wildlife Action Plan by NH Fish and Game Department's Invasive Plant Working Group. Extensive community input was solicited to make this guidance model relevant to as many end-users as possible. We will demonstrate how this model can be applied to prioritize control projects using real world invasive plant locations mapped throughout a subwatershed of Great Bay. We will also discuss which species of invasive plant might be targeted for control in specific wetland and coastal situations.

Finally we will discuss challenges encountered when invasive plants provide a critical food, shelter, or other benefit to native wildlife that is otherwise limited in an area. We hope the maps produced from this project will aid conservation commissions, land trusts, watershed groups and other natural resource partners to select stands of invasive plants that, if managed for removal, will have the most immediate impact and most effectively protect our native natural resources in the long term.

Sidney A. L. Pilgrim[1], Joseph Noel[2], and James F. McMahon III[3].

Coastal Marine Sediments of New England with Brown Colored Surface Soils – Wetness Characteristics.

This study was completed to address problems using both National and Regional hydric soil indicators for soils derived specifically from sediments found along the coastlines of Maine, New Hampshire and Massachusetts. The monitoring study was sponsored by the New England Hydric Soils Technical Committee (NEHSTC) and located at the University of New Hampshire Thompson Farm on Bennett Road in Durham, New Hampshire. Ground water monitoring wells were installed on a sloping marine terrace dominated by a somewhat poorly drained soil (currently an unnamed soil). Surface horizons have characteristic brown colors representative of the marine sediments. Similar soils in Maine (frigid soil temperature zone) are the Lamoine soils. The wetter component of the SWPD soil (well#1) exceeded the National Standard for soil saturation in 2008, 2009 and 2010. The dryer component (well#2) failed the National Standard. The authors suggest that a new Hydric Indicator be added to the Regional System.



1Adjunct Professor of Soil Science, University of New Hampshire, Durham, New Hampshire
2Practitioner, Soil and Wetland Consulting, South Berwick, Maine
3Professional Engineer, Soil Scientist in Training, Horizons Engineering, Inc., Littleton, New Hampshire