



Narragansett Bay Research Reserve



Audubon Society
of Rhode Island

The Narragansett Bay Research Reserve is funded by NOAA and RIDEM and works in close partnership with the Audubon Society of Rhode Island.

Summer 2009 Newsletter

NBNERR NEWS

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Volume 10.



Photo by: Keryn Gedan

Above: For comparison, a forb-rich salt marsh in Drake's Island Marsh, Wells, ME

Prudence Island's Changing Salt Marshes

By Keryn Gedan, Graduate Research Fellow

Do you remember what Prudence Island looked like when you were a kid? How about just ten years ago? Do you think it looks any different today than it did one hundred years ago, or even four hundred years ago when colonists first settled Rhode Island?

It is difficult to assess gradual changes in the environment when human memories and lifetimes are so short. Oral histories and historical accounts strongly suggest that there have been significant changes in Narragansett Bay and its coastal environments. For example, decades ago Prudence Islanders more frequently experienced winters when the Bay would freeze over and you could walk across the ice to Portsmouth. Many Rhode Islanders may have also noticed changes in the plant and animal communities in our own lifetimes, such as increases in the deer population and the abundance of *Phragmites* reed in fresh water marshes. Taken together, these observations help us understand how local plant communities have changed over time.

Keryn Gedan, a graduate student at Brown University who is presently completing her two-year Graduate Research Fellowship with the Narragansett Bay Research Reserve, became interested in studying how humans have impacted the salt marshes of Prudence Island over time. For centuries, New Englanders have gathered resources from salt marshes, such as baitfish and salt marsh hay. Historically, people also frequently constructed shipyards and ports in salt marsh creeks. Starting in the mid-20th century, salt marshes were targeted for mosquito control efforts with engineered ditching and heavy pesticide applications. Additionally, salt marshes have been impacted by indirect but no less damaging phenomena, such as pollution from stormwater runoff, over-fishing, and climate change.

For Gedan's research project, she studied salt marshes that are the historical equivalents of our own PI salt marshes to investigate long-term environmental changes. For example, the climate in southern Maine now is similar to Rhode Island's climate 150 years ago. Presently in Maine, salt marsh plant diversity is higher than in Rhode Island due to the presence of a group of forbs (broad-leaved herbaceous plants) that are tolerant of salt and low oxygen levels. In one experiment, Gedan warmed salt marsh hay and forb-dominated areas in Maine by using enclosures that act as warming chambers over an area of salt marsh. She

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Algae As An Indicator of Environmental Change in Narragansett Bay

By Kenny Raposa, PhD

When levels of nutrients in an estuary like Narragansett Bay are high, we commonly find increased levels of macroalgae (large alga that are not microscopic). These sizeable beds of algae like sea lettuce (*Ulva lactuca*) can provide habitat for some fish and crustacean species, but if the algae becomes too dense, it causes problems. Too much algae drawing oxygen out of the water as it decomposes can result in very low levels of dissolved oxygen and can eventually kill fish and other animals in the area. In the summer, macroalgae beds cover many shallow coves and embayments in Narragansett Bay, such as parts of Greenwich Bay and the Providence River.

In addition to problems associated with low oxygen levels, these beds can smell very bad when some of the algae begin to rot during low tide periods. Fortunately, large reductions in nutrients in the Bay are soon expected as major sewage treatment plants become upgraded with newer technology. In anticipation of this, Save The Bay, the Narragansett Bay Commission, the Narragansett Bay Research Reserve (NBRR) and other groups have started monitoring macroalgae around the Bay. Monitoring before and after the nutrient reductions will help researchers and managers better understand how macroalgae respond to changing nutrient levels. Monitoring began at six sites around the Bay in 2008; in 2009 the NBRR will add four additional monitoring sites around Prudence Island.

Each month, throughout the summer, researchers will record which macroalgae species are present, how much macroalgae there is, and how much area it covers at all the monitoring sites. Over time, this study will help ecologists document what they hope will be beneficial ecological results from a reduction in nutrient inputs to the Bay thanks to improved wastewater treatment technology.

Restoring Native Forests on Prudence Island

By Robin Weber

Upland forested areas on Prudence Island are highly degraded as the result of past land use practices and the presence of invasive species, particularly Asiatic or Oriental bittersweet (*Celastrus orbiculatus*). Forested areas are also notably less diverse than they would have been before they were cleared for agriculture in the 1600s and 1700s. The Narragansett Bay Research Reserve hopes to reverse some of these trends with a new forest restoration project that will focus primarily on the recovery of species that are either not present, or not abundant anywhere else on the island.

One potentially exciting component of the forest restoration project is a test plot for a blight-resistant strain of American chestnut tree, currently available through the American Chestnut Foundation. The American chestnut tree comprised up to one quarter of all the hardwood trees in eastern woodlands until succumbing to a lethal fungus infestation, known as the chestnut blight, during the first half of the 20th century. The Reserve hopes to re-introduce chestnut trees on Prudence Island.

Native forest restoration has been planned for two plots with different land use histories and soil characteristics. The primary site (4.5 acres) is located on the North End unit of the Reserve and a secondary site (5.5 acres) on the South End unit of the Reserve. Utilizing the volunteer woodcutting stewards program, the Reserve has begun to prepare the North End unit site for restoration by selectively cutting non-native tree species. Next steps in this forest restoration program include the mechanical and manual removal of invasive shrubs and vines, targeted herbicide application, and the planting of an appropriate mix of native tree and shrub species.

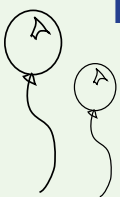
As much as possible, native trees and shrubs will be purchased through a joint fund-raising effort with the Reserve and the Prudence Conservancy with proceeds to be applied toward future stewardship activities conducted by both organizations. Stay tuned for more information on these forest restoration fund-raisers.

Narragansett Bay Block Party - July 18, 2009 - 11am to 3pm

Lab and Learning Center, South End, Prudence Island

Featuring live music, food, kids' activities, nature walks,
and a Prudence Island art exhibit by Arlene Cram

~ For Details Contact Kristin: kristin@nberr.org or 401-683-1478 ~



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Prudence Island's Changing Salt Marshes

found that under warmer conditions, the forbs were rapidly out-competed by salt marsh hay. Essentially, warmer temperatures caused the plant diversity in salt marshes in Maine to resemble the warmer Rhode Island salt marshes. These results imply that global warming could reduce the abundance of these forbs and salt marsh plant diversity in areas that are currently cooler.

Other research has shown that mosquito ditching, which drains the high marsh on ebb tides and flushes it on flood tides, can also reduce the abundance of forbs and salt marsh plant diversity. In a study of mosquito ditching in New England that used GIS (Geographic Information Systems) mapping technology, Gedan found that ditching is less intense in Maine than in Rhode Island. Rhode Island's history of intense mosquito ditching also helps explain differences in salt marsh plant diversity across the region.

In general, Gedan's research has found that the less diverse salt marsh plant communities in Rhode Island are a result of human impacts over the centuries, confirming anecdotal stories of ecosystem change. Understanding what local environments looked like in the past provides a reference to work toward as we carefully restore them. Research like Gedan's helps the scientists and managers at the Narragansett Bay Research Reserve understand how species interact and coexist. Ultimately, this helps us to protect biodiversity and helps to keep the protected ecosystems of Prudence Island healthy and productive.



Above: An experimental warming chamber in a salt marsh on Prudence Island, RI

Reserve News

Below: The unique plant assemblage of forb pannes (bio-diverse salt marshes) includes salt and low oxygen tolerant forbs like these.

Seaside Arrowgrass

Triglochin maritima



Goose Tongue

Plantago maritima

Sea Lavender

Limonium nashii



Photo credit: Keryn Gedan

New Technical Reports Series from the Reserve!

The Narragansett Bay Research Reserve has assembled a new Technical Reports Series to archive and make available any data and reports that have been produced in association with the Reserve, but are not published in the scientific literature.

The Technical Report Series is a way for the Reserve's research program to share results from past and present research projects to diverse audiences.

Check it out:

www.nbnerr.org/techreports.htm

SUMMER CALENDAR

June 13, 2009

Prudence Island Bike Tour



10 am to 4:30 pm

Register with the Audubon Society of Rhode Island. Space is limited and registration is required. Ask for Brenda at 401-949-5454 or email: bmcmahon@asri.org

July 13, 2009

Prudence Conservancy Day Camp – Seining with the Research Reserve



9:30 am to 11:00 am

Contact Jessie Brooks for more information at 401-683-6012 or email: jsbrooks1@verizon.net

July 18, 2009

Narragansett Bay Block Party



11 am to 3 pm

Lab & Learning Center, South End Prudence Island
Contact Kristin for more information at 401-683-1478 or email: Kristin@nbnerr.org

July 20, 2009

Prudence Conservancy Day Camp – Shore Crabs with the Research Reserve



10:30 am to 12:00 pm

Contact Jessie Brooks for more information at 401-683-6012 or email: jsbrooks1@verizon.net

July 27, 2009

Prudence Conservancy Day Camp – Explore the Salt Marsh with the Research Reserve



9:30 am to 11:00 am

Contact Jessie Brooks for more information at 401-683-6012 or email: jsbrooks1@verizon.net

August 9, 2009

North End Recreation Day



10 am to 4 pm

Weather and road conditions depending, the north end of the island will be accessible to vehicles. Contact Robin for more information at 401-683-7369 or email: Robin@nbnerr.org

August 16, 2009

7th Annual Sustainable Fishing Contest

Time TBD

T-Wharf, South End Prudence Island
Contact Kristin for more information at 401-683-1478 or email: Kristin@nbnerr.org

August 26, 2009

Prudence Island Garden Tour

10 am to 4:30 pm

Register with the Audubon Society of Rhode Island. Space is limited and registration is required. Ask for Brenda at 401-949-5454 or email: bmcmahon@asri.org



September 26, 2009

National Estuaries Day Beach Cleanup

10 am to 4:30 pm

Register at the Homestead Ferry Landing on Prudence Island between 11 am and 1 pm. Contact Kristin for more information at 401-683-1478 or email: Kristin@nbnerr.org



September 30, 2009

Prudence Island Fungus Foray

10 am to 4:30 pm

Register with the Audubon Society of Rhode Island. Space is limited and registration is required. Ask for Brenda at 401-949-5454 or email: bmcmahon@asri.org



October 11, 2009

North End Recreation Day



10 am to 4 pm

Weather and road conditions depending, the north end of the island will be accessible to vehicles. Contact Robin for more information at 401-683-7369 or email: Robin@nbnerr.org

And don't forget to visit:

www.communityconnectionri.org

To find training opportunities from the Coastal Training Program and other organizations in RI!

Updates from the Coastal Training Program (CTP)

By Jennifer West

The CTP has been busy recently in partnership with RIDEM, to deliver presentations to four Rhode Island towns on the Scituate Reservoir Watershed Greenspace Plan. Planning board members and other participants learned about zoning strategies to protect water quality and community character as outlined in the Plan and reviewed resource maps that were prepared for each town. The towns learned about low-impact development principles and how they can be integrated into land use regulations for new development. These principles will prevent stormwater impacts to water quality and comply with the Phase 2 Stormwater Permit Post Construction Management Measure.

Back by popular demand, the CTP also partnered with RIDEM to hold yet another Conservation Development workshop for town planners, planning board and town council members, designers and developers. Two more Rhode Island municipalities have adopted Conservation Development ordinances and one more town has completed a draft ordinance. To date, nine Rhode Island towns have adopted Conservation Development ordinances, eight towns have completed draft ordinances, and four towns are pending. Therefore, 21 out of the 28 “eligible” (non-urban and not fully developed) RI communities are implementing Conservation Development.

The CTP Coordinator, Jennifer West, also cosponsored, exhibited, and presented during a session at the 2009 Land and Water Conservation Summit. The session, entitled “Permanently Protecting Land in Conservation Developments,” was a ‘sneak peak’ of what’s to come in the RI Conservation Easement Manual and subsequent trainings for target audiences such as attorneys, planners and planning board members, land trusts, and conservation commissions.

In addition, the CTP is developing a training on Rhode Island Community Low-Impact Development Site Planning and Design Standards, and a Wetlands Avoidance and Minimization workshop with RIDEM’s Freshwater Wetlands Program. As a result of a recent training audience needs assessment conducted by the CTP in partnership with Grow Smart RI and with support from 25 other training organizations within the Narragansett Bay watershed, current priority issues and preferred information transfer methods of coastal decision-maker audiences throughout Rhode Island have been identified. One of the main priorities is climate change, and over the next year and a half the CTP and partners will develop and deliver workshops and trainings on adapting to and mitigating the effects of climate change in our communities.

Reserve News

Impacts of Development On Breeding Bird Habitats

By Rick McKinney, Research Ecologist
US EPA Atlantic Ecology Division

Local land use planners and state watershed officials are currently struggling with the dilemma of how to allow for economic growth and development in a watershed while still maintaining a natural variety of plants and animals in the landscape. The conservation of naturally-occurring plant and animal species is essential because of the important benefits they provide to human society. Alternative development scenarios such as cluster and conservation subdivisions are currently being promoted because of their enhanced ability to protect areas of natural habitat within a residential landscape. While the ecological principles upon which these developments are based are sound, there is little direct evidence of the extent to which they may affect the habitat value of previously undeveloped land.

To begin to remedy this situation, researchers from the US EPA Atlantic Ecology Division and the Narragansett Bay Research Reserve will be examining habitat use by breeding birds under a variety of development scenarios in a rapidly urbanizing community in the northeast US. We will measure bird abundance and diversity in a number of habitat types within developments that protect varying amounts of natural land in different arrangements. Our results will help to inform resource managers and the conservation community of the benefits of sustainable development practices towards maintaining wildlife habitat in a watershed, and may allow us to identify specific characteristics that enhance the value of habitats adjacent to developments for naturally-occurring plant and animal species.

Reserve News

Alternative Spring Break 2009

By Robin Weber

For most college students the term “Spring Break” generally brings to mind warm, sunny locations and somewhat excessive entertainment options. This was not true for a number of adventurous students who opted to participate in an alternative spring break program hosted here on Prudence Island. In its second year, the program ran for three weeks, and involved twenty-five students representing eight different educational institutions (University of Virginia, Bryant University, Rhode Island College, Trinity College, University of Rhode Island, Community College of Rhode Island, Mt. Holyoke College, and Roger Williams University).



Armed only with hand tools and herbicide, students volunteered their time to remove autumn olive (*Elaeagnus umbellata*) in both sparsely and heavily infested areas on the Reserve’s South End management unit. Most days the students worked for six hours, making a significant impact on remaining stands of autumn olive, and greatly advancing island-wide efforts to control this species. Although the work was exhausting, the students’ reviews were overwhelmingly positive; describing the program as wonderful, awesome, a good experience, a lot of fun, as well as a good workout. The alternative spring break program focused primarily on invasive species control, but the students were keenly interested in all stewardship activities at the Reserve as well as the island’s land use history, which is largely responsible for current stewardship concerns. A dozen local residents also lent support to this effort by preparing home cooked meals and desserts for students lodging in the Reserve’s overnight accommodations.



Thank you to everyone who helped make this program a success!

Current NBNERR control efforts targeting autumn olive are a component of an island-wide effort to control this species in accordance with the Prudence Island Cooperative Weed Management Area (PI CWMA) strategy for addressing invasive plant species. Autumn olive poses a great risk to sensitive coastal shrubland habitat and is a high management priority.

7th Annual Sustainable Fishing Contest

Mark the day after the Firemen’s Fair on your calendars – **Sunday, August 16, 2009.**

We’ll see you down on the T-Wharf for a great family event that reinforces sustainable fishing practices as well as legal catch sizes and bag limits. Categories include, “Most Fish,” “Largest Fish,” and “Scupmaster.”

Thanks to local sponsors, the contest offers plentiful door prizes, a grand prize, and a free t-shirt for most participants.

For more information about attending or sponsoring the event please contact Cheryl at (401) 683-1478

Will Cleaning Up Pollution in Narragansett Bay Inadvertently Alter the Food Web?

By Courtney Schmidt, Graduate Research Fellow

Nitrogen is one of the largest pollutants in Narragansett Bay. Excess nitrogen has been linked to harmful algal blooms and fish kills in estuaries around the world, and locally in Greenwich Bay. Most of the nitrogen that affects the Bay comes from the wastewater treatment plants (WWTP) located along its shores.

The Narragansett Bay Commission is currently upgrading WWTP throughout the state and these efforts will reduce the amount of nitrogen being added to the Bay. The Narragansett Bay Research Reserve's newest Graduate Research Fellow and URI graduate student, Courtney Schmidt, is designing research projects aimed to find out how a decrease in nitrogen output will affect the delicate food web of Narragansett Bay.

Nitrogen is a vital nutrient needed as a building block for life. The smallest photosynthetic organisms use it, and in turn they feed and support higher-order organisms like quahogs, flounder and lobsters, and on up through the food web to apex predators like sharks and people. Scientists have determined that there are two types of nitrogen found in the Bay – offshore, “natural” and anthropogenic, “human-induced” varieties.

Offshore nitrogen comes into the Bay through constant circulation and mixing with the waters of Rhode Island Sound. Anthropogenic nitrogen is introduced into the Bay through the WWTP. Schmidt's research will attempt to determine which types of nitrogen phytoplankton are using and where the different types of nitrogen tend to be located throughout the Bay.

Water samples will be taken from stations near the mouth of the Providence River at the head of the Bay, and all the way down to the open ocean of Rhode Island Sound. The water samples will be filtered to remove everything but the phytoplankton. The filtered plankton will then be analyzed for chlorophyll-a or “*chl a*.” This is a photosynthetic pigment used by phytoplankton that provides scientists with a representation of phytoplankton concentration. Using stable isotopes, Schmidt will determine the type of nitrogen within the *chl a* that has been used by the phytoplankton at each station. Anthropogenic nitrogen has a different isotope signature than offshore nitrogen, much like humans have different fingerprints.



Photo by: Brian Bill
Northwest Fisheries Science Center, NOAA

Above: *Chaetoceros debilis* viewed under a microscope.

There are many possible outcomes of this research. Prior studies from Dr. Scott Nixon's laboratory at the Graduate School of Oceanography – University of Rhode Island indicate that quahogs from the lower Bay feed on phytoplankton with a signature similar to anthropogenic nitrogen. This could mean that the phytoplankton are getting their nitrogen from the upper bay and floating to the lower bay to support food webs there. In that scenario, a decrease in nitrogen from the WWTP may affect the food web supporting these quahogs. Less nitrogen available in the upper bay might mean less phytoplankton and less food web support down bay. However, other research, particularly from Dr. Candance Oviatt's laboratory at the same institution, indicates that Narragansett Bay has strong gradients, with high concentrations of nutrients and *chl a* in the upper bay and lower concentrations in the lower bay. Nitrogen may follow the same pattern. This means that a decrease of nitrogen in the upper bay may not greatly affect the rest of the Bay.

Since the largest WWTP, Field's Point, will not be fully upgraded until approximately 2013, this research will be used to create a baseline enabling ecologists to compare conditions before the upgrades and after. Schmidt and other scientists studying Narragansett Bay hope to find out where the phytoplankton are getting their nitrogen and if that source will change once all the waste water treatment upgrades are completed.

North End Recreation Days

August 9, 2009 - 10am to 4pm

October 11, 2009 - 10am to 4pm

During Rec Days islanders may drive in to the north end and take in the views from Providence Point, clam and berry around the northern tip of the island.

Please note: if road conditions are poor, the Reserve will not be able to open the road to vehicles.

Contact Robin for more information
at 401-638-7369 or email at Robin@nbnerr.org



Teachers on the Estuary

This summer, thanks to a grant from NOAA's Bay Watershed Education Training program, the region's National Estuarine Research Reserves will offer Teachers on the Estuary (TOTE) workshops. This is a research and field-based professional development opportunity for teachers designed to improve teachers' and students' understanding of the environment using local research examples. The trainings will also provide resources and experience to support the incorporation of estuary and watershed topics into classroom teaching.

While registration is closed for this year's TOTE trainings, check out our website for information about workshops at Research Reserves in Maine, Massachusetts, and Rhode Island to be held in 2010 and 2011.

More information can be found here:
www.nbnerr.org/tote.htm

Reserve News



Our Wish List

The Reserve has a growing wish list. If you are able to donate (possibly as a tax deductible contribution) any of the following items, please contact Nancy Jurnak at nan@nbnerr.org or 401-683-4476

Blade weed whacker (gas powered)

5-gallon buckets

1-gallon planting pots

T Fence post driver (manual)

Post hole digger

Golf cart

Mulch and/or topsoil

Wheel barrow



Narragansett Bay Research Reserve

P.O. Box 151
55 South Reserve Drive
Prudence Island, RI 02872

GO GREEN !

*Please share and circulate this news-
letter around your home and office.*