



Narragansett Bay Research Reserve



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

2008 Winter Newsletter

High Speed Pursuits

by Kenny Raposa, Research Coordinator and
Bob Stankelis, NBNERR Manager


The Narragansett Bay National Estuarine Research Reserve is using an innovative new water quality monitoring tool known as 'dataflow' to fill some of the gaps in our understanding of water quality in Narragansett Bay. Mounted on a small powerboat, dataflow is a flow-through water quality monitoring system used to measure and map surface water quality at speeds of up to 20 knots or more. The equipment includes a global positioning system (GPS) to record position and an instrument called a sonde that automatically and continuously measures water quality.

Dataflow is used to rapidly collect thousands of data points from which highly detailed maps of water quality conditions can be produced. This makes it easier to understand water quality conditions on a whole. Additionally, dataflow can operate in shallow water, giving a more complete picture of water quality in coves and shallow embayments.

The Research Reserve began using dataflow in 2007 in Greenwich Bay, a nutrient-rich embayment with chronic water quality problems and the site of a large fish kill in 2003. In 2008, the Reserve used dataflow to map Greenwich Bay, Greenwich Cove, portions of the West Passage, and Wickford Harbor. Multiple cruises at different times over the summer and fall collected data on temperature, salinity, dissolved oxygen, pH, turbidity, and chlorophyll.



Above: Research boat equipped with Dataflow.

The Research Reserve's experience with dataflow suggests that this technology will be an excellent complement to ongoing efforts to monitor water quality in Narragansett Bay. The technology could be especially helpful when used to rapidly assess water quality conditions immediately after a fish kill. In this case, dataflow could help researchers determine the cause and extent of the problem. This summer there were fish kills in Wickford Harbor, the Seekonk River and upper reaches of the Bay. In the future, the Reserve hopes to use dataflow to map water quality in coves throughout Narragansett Bay in order to develop a more detailed picture of our changing water quality over time. 

Updates from the Coastal Training Program (CTP)

By Jennifer West, CTP Coordinator

Since the last edition of Reserve News the CTP held a “Coastal Community Planning and Development” (CCPD) workshop in partnership with Grow Smart Rhode Island, RI Sea Grant and the RI Coastal Resources Management Council. Using group discussions and hands-on activities, the workshop actively engaged participants from six Rhode Island towns in learning about alternatives for how and where growth and development will occur in their communities. The workshop provided background, examples, strategies, and resources to support alternative development efforts in their communities.

The CTP also held a workshop on CanVis, a visual simulation tool for resource planning. Participants learned how to better communicate planning alternatives to local stakeholders by creating computer-generated simulations or visualizations that help folks “see” the potential impacts of development alternatives. Both the CCPD and CanVis workshops were delivered by instructors from NOAA’s Coastal Services Center.

Additionally, the CTP and the RIDEM Office of Sustainable Watersheds delivered three tailored Conservation Development presentations to the towns of West Greenwich, Warren, and Little Compton. As a result of this outreach and other assistance, more towns are interested in moving forward to adopt these ‘greener’ development ordinances in their communities. Also in partnership with RIDEM the CTP delivered two more Conservation Design DVD workshops. Training participants learned about basic mapping elements that are recommended to appropriately evaluate a potential development site and how to quickly and easily generate ready-to-print maps.

Finally, as a follow-up to the Prudence Island Groundwater Workshop offered in the summer of 2006, the CTP and Stewardship Coordinators, in collaboration with the Prudence Conservancy, Prudence Water District, and the Prudence Island Planning Commission, delivered a Prudence Island Homeowners’ Sustainable Landscaping and Water Conservation Workshop. Participants learned about sustainable landscaping for water conservation, composting and yard waste management, rain barrels and other backyard water-saving tools and techniques, and composting toilets as a way to address septic system concerns.

2008 Sustainable Fishing Contest



By Cheryl Tavares, Seasonal Naturalist

This year’s 6th annual fishing contest had the biggest turnout yet! The contest has grown from less than 40 participants in years past to well over 100 this year. Thanks to local sponsors and their generous donations we had 30 door prizes, a grand prize, and a free t-shirt for all participants.

A variety of fish were caught, but only legal-sized fish were recorded. Allan Bearse and Tyler Smith jigged for skipjacks to claim the trophies for “Most Fish” in the adult and junior categories respectively. The “Most Scup” trophies were awarded to the mother and daughter team of Kay and Chrystal Santos. Junior angler Abby Smith caught a sea robin, recording the “Largest Fish” in her category. But, the biggest fish of the day was a 30-inch bluefish caught by Sean Cassidy that edged out a rival by just one inch. Also recognized was the winner of the Summer-Long Scup Tournament, Bill Follett, who earned himself the title of “Scupmaster.” Keith Barreto took home the title of “Junior Scupmaster.”

Contestants are already looking forward to next year’s contest. Mark the day after the Firemen’s Fair on your calendars – Sunday, August 16, 2008.

New sponsors are always welcome and can leave their contact information with Kristin: Kristin@nberr.org or (401) 683-1478.



The Value of Fringing Salt Marshes

By Kara McKeton, Seasonal Research Assistant

As you walk along the cobble beaches of Narragansett Bay, you may encounter green patches of smooth cordgrass (*Spartina alterniflora*) located within the intertidal zone. Exposed to air at low tide and submerged during high tide, these *Spartina* beds are known as fringing salt marshes. Most fringing marshes are <30 meters in length; however, some beds can reach lengths up to 500 meters. If you were to walk the entire coastline of Prudence Island, you would run into approximately 6000 m of fringing marsh, which covers 15-20% of our shoreline.

Comprising nearly one third of Prudence Island's intertidal area and occurring throughout Narragansett Bay, fringing marshes are a common coastal habitat. Surprisingly, this habitat has been understudied and the ecological value of fringing salt marsh to fish, birds and other wildlife is unknown.

However, we do know that *Spartina* is a salt marsh species, typically growing along creek banks of estuarine salt marshes. As a lower marsh species, *Spartina* can tolerate flooding and high salinities and serves as a foundation species. The intricate root structure of *Spartina* allows it to stabilize substrate, making it possible for seedlings of other native species to emerge. Fringing marshes longer than 100 meters reduce flow velocity and provide a microhabitat in the cobble where rare plant communities can grow. Mussels rely on *Spartina* beds for concealed protection and attach themselves to the rooted vegetation in clusters.

More research on this habitat is needed to determine if fringing salt marshes serve as a breakwater for other plant communities and if they provide significant protection for invertebrates. Determining if fringing marshes

are ecologically valuable to important fish and wildlife may help with conservation and management of this critical coastal habitat.

Researchers at Narragansett Bay Research Reserve are taking a closer look at which fish and wildlife are using fringing marsh habitat. Kara McKeton, a seasonal research assistant with the Reserve, is heading up a study to monitor birds and nekton (fish, shrimp and crabs) in fringing marshes. For comparison, she is also monitoring their presence in adjacent unvegetated cobble habitats. In addition to finding out which species use the fringing marshes, Kara also hopes to find out if there is a relationship between the size of the fringing marsh and the density of the animals found there.

Interestingly, Kara has frequently observed the Saltmarsh Sharp-tailed Sparrow (*Ammodramus caudacutus*), a species of global conservation concern, in and around fringing marsh habitat. So far Kara has found five other bird species and five nektonic species using fringe marsh habitat. These species are listed below in order from most to least common.

Identifying species found in fringing marshes is the first step in understanding the ecological importance of this habitat. Next time you walk the cobble shores around Narragansett Bay, keep an eye out for fringing marshes and any wildlife that may be hiding in the thick *Spartina* grass.

Common Name	Scientific Name
Least sandpiper	<i>Calidris minutilla</i>
Herring gull	<i>Larus argentatus</i>
Semipalmated plover	<i>Charadrius semipalmatus</i>
Snowy egret	<i>Ardea alba</i>
Great blue heron	<i>Ardea herodias</i>
Mummichog	<i>Fundulus heteroclitus</i>
Striped killifish	<i>Fundulus majalis</i>
Atlantic silverside	<i>Menidia menidia</i>
Asian shore crab	<i>Hemigrapsus sanguineus</i>
Long-clawed hermit crab	<i>Pagurus longicarpus</i>

Reading the Water

By Leanna Heffner, URI Graduate Student

In Narragansett Bay, nutrients fertilize marine plants and algae that are the building blocks of the food web. When nutrients are present in excess in the Bay, they can cause algal blooms. Nutrient pollution is caused by excessive nutrients flowing into streams, rivers, and coastal waters from human sources such as sewage, fertilizers, and animal waste. Nitrogen, the nutrient of primary concern, enters Narragansett Bay through groundwater, surface runoff, rivers, and wastewater treatment facilities discharging fertilizer and/or wastewater. This nitrogen stimulates the overgrowth of phytoplankton (microalgae), especially in the upper portions of Narragansett Bay. The masses of phytoplankton use up the dissolved oxygen in the water, which can leave many species of marine animals and plants without enough oxygen to survive. In addition, too much phytoplankton in the water can shade-out eelgrass to a degree that eelgrass cannot grow. Eelgrass serves as important habitat to animals like fish, crabs, and shellfish.

By monitoring nutrient concentrations scientists can get a clearer picture of how nutrients are distributed around the bay, how their concentrations fluctuate throughout the year, and if they change over long time periods. Scientists use this data in conjunction with other information, such as the bay's circulation or phytoplankton abundance, to understand how nutrients affect the ecology of Narragansett Bay. These studies help to inform decision-makers on how to manage the bay's resources, including the management of nutrient pollution.

During the winter and spring of 2008 the Reserve hosted a graduate student intern, Leanna Heffner, who came to us from the University of Rhode Island's Graduate School of Oceanography (GSO). Leanna is a Ph.D. student and a coastal marine ecologist in training. She worked at the Reserve as part of an internship program through URI's Coastal

Institute IGERT Program (CIIP). The CIIP program is a two-year fellowship program at URI that trains Ph.D. students from various disciplines in coastal issues and how to address and communicate these issues from a perspective that integrates natural and social sciences. The internship serves as a practical and in-depth training experience for the students to work outside of academia with organizations that deal in real-world problem solving of coastal issues. With an interest in the effects of human activities on coastal ecosystems, especially as they pertain to nutrient pollution, Leanna came to the Narragansett Bay Research Reserve to assess nutrient data from water quality monitoring programs at the Reserve and around Narragansett Bay.

As part of the National Estuarine Research Reserve System, the Narragansett Bay Research Reserve takes part in a national water quality monitoring program. For approximately eleven years the Reserve has been collecting water quality data and nutrient concentrations around Prudence Island. Leanna has been looking for trends in nutrient concentrations at the T-Wharf monitoring station, as well as nutrient data collected by GSO in the upper West Passage near Wickford. She is comparing differences between the two sites, including annual and seasonal patterns in nutrient fluctuations.

With this information, Leanna recently completed a report that analyzed trends in nutrients at T-wharf and a station monitored by GSO in the upper West Passage near Wickford.

The study found that nutrients between the two sites are fairly similar, including how concentrations change over time. Mid-bay nutrient levels, however, are usually much lower than those in the upper-bay near Providence where the majority of nutrients enter Narragansett Bay via wastewater treatment facility discharges and storm-water runoff. These findings indicate that monitoring in only one mid-bay site can likely provide enough information to characterize nutrient dynamics within the mid-bay region. Leanna's report will soon be locally distributed to other scientists and decision-makers who can use this information to better understand and manage the precious resources of our Ocean State's great bay.



Photo by Dan Cinotti

Dining in the Salt Marsh

By Elizabeth DeCelles, Graduate Research Fellow

You may remember reading about wading birds at risk in the last edition of our newsletter. Elizabeth DeCelles chose to study Great and Snowy Egret foraging ecology for her master's thesis. She became interested in this research because of the egrets' declining numbers in Narragansett Bay, and her interest in juvenile fish and birds. The National Estuarine Research Reserve System (NERRS) and NOAA have funded Beth as a Graduate Research Fellow for 2008-2009. She hopes her research will help scientists to determine if a lack of high-quality foraging habitat is limiting the growth of our local population of egrets, and to help guide natural resource managers' decisions regarding suitable egret habitat in salt marsh restoration projects.

To understand why egrets select certain sites to forage, Beth designed her study to sample egrets' nektonic prey (small fish and swimming invertebrates) in both the areas used for foraging and in random locations. She is looking at a number of marshes throughout Narragansett Bay. Once she completes a survey of foraging egrets, she samples the water in the birds' exact locations looking for their prey by using a one-meter square mesh "throw trap."

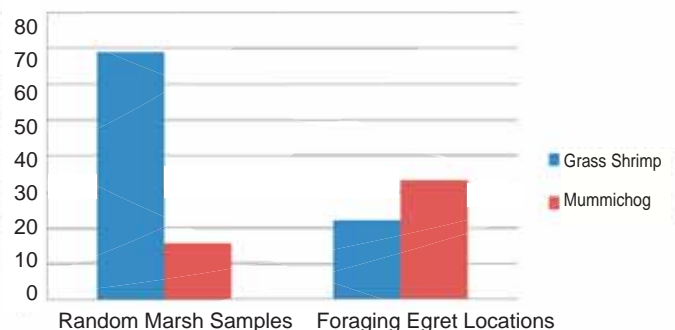
She also uses the trap to collect the same number of random samples throughout the marsh to determine if prey might be affecting the spatial distribution of egrets within marshes. In other words, are the birds spread out because their prey

is spread out? Beth has conducted throw trap samples from May to August this year and is currently analyzing this data.

The Jenny Pond salt marsh on Prudence Island is one of Beth's six study sites in Narragansett Bay. Based on her throw trap samples, the two most common prey species found in the marsh are mummichogs (a small schooling marsh fish species) and grass shrimp. As the figure below indicates, egrets at Jenny's Creek are foraging in areas of high mummichog densities and low shrimp densities. Based on research from other marshes in North America, this makes biological sense because egrets are known to primarily feed on small fish. Beth's research suggests that degraded marshes with reduced fish densities may offer less than ideal foraging habitat for both Great and Snowy Egrets. To take this idea a step further, Beth is investigating prey densities in degraded marshes with restricted tidal flow, while also sampling seemingly 'healthy' marshes with unrestricted tidal regimes.

The next component of Beth's study will involve the physical analysis (species, length, sex, and weight) of juvenile egret stomach regurgitations. Beth collected the stomach contents of young egrets on Hope and Little Gould Islands this past summer. This work will be the first of its kind in New England and will provide an idea of the specific species that are in our local egrets' diet. Stay tuned for further updates as Beth's analysis continues.

Prey Species Density per Meter Squared



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From the Editor: A recent Prudence Island bike tour led by the Narragansett Bay Research Reserve and offered through the Audubon Society of RI, so impressed Patricia Cook of Jamestown, RI, that she offered to write about her experience for our newsletter. Pat is a retired teacher learning to freelance. She enjoys being with family and friends and living one day at a time.

A Simpler Time

by Patricia Cook

We left our cars in the crowded lot and boarded, bicycles in tow, an older form of transportation, a ferry, the Prudence Island ferry. As it pulled away from Bristol Harbor that October Saturday morning, we watched Hog Island, Poppasquash Point and the distant Warwick Neck sparkle in autumnal splendor. This was the initiation to our bicycle tour of Prudence Island, a historic place, isolated amid sea scents, woodland creatures, and birds.



Photo by Pat Cook

Kristin Van Wagner, Education Coordinator, and Kara McKeton, Seasonal Research Assistant, both from the Narragansett Bay Research Reserve, greeted us at the island ferry landing. They would safely lead and kindly educate the twelve of us on this bike tour: men, women, and a young boy with his parents.

Photo by Pat Cook



Our first historic destination was the Sandy Point Lighthouse guarding the East Passage. The Mount Hope Bridge provided a classic nautical background for pictures. Subsequently the ride south became gravelly and the silent voices of by-gone Navy sailors, nineteenth century farmers, Roger Williams and Native Americans murmured amidst the woods to the listening bicyclists.

The main building of the Reserve's Lab and Learning Center appeared and placed us back in the 21st century. The animal exhibit and bay murals alerted us to the living island treasures. Here scientists, researchers, and volunteers monitor and study Narragansett Bay and help preserve the island's habitat.

Soon we ate lunch at south end of the island, basking under the ripening Indian summer sun and experiencing life's simple pleasures afloat in time. Fishing families and a few tourists enjoyed themselves on the immense T Wharf; a family of three playfully dug in the low tide for clams.

Later as we rode north with woods on the right and the bay on the left, we entered a variety of time capsules: secluded modern homes, the historic Farnham Farm and the famous white steepled one room school house. Turning west on Broadway revealed more: the Victorian homes of Prudence Park adorned with gingerbread woodwork overlooking the old stone steamboat landing. Where were the straw hats and bonnets?

Culminating our journey was a stop at Roger Williams' pulpit rock, visible from the road but nestled in the woods. Prudence, one of his virtue islands, is still carefully tended today! Returning full circle to the ferry landing, each journey-man had memories of a more rustic time that are now part of them.

New England Research Reserves Receive a Grant for Professional Teacher Development Workshops

The New England National Estuarine Research Reserves (NERR) will receive a grant of \$259,901 for professional teacher development workshops called *Teachers on the Estuary* (TOTE). Funded by the National Oceanic and Atmospheric Administration's "Bay Watershed Education and Training" program, the workshops will be scheduled over three summers, starting in 2009.

Teachers on the Estuary offers field-based professional development for educators on watershed and estuary topics. NERR staff use local ecological research and estuary habitats as a context for introducing teachers to coastal science.

In Rhode Island, the TOTE courses will provide information about estuaries and watersheds and activities focusing on topics of research at the Narragansett Bay Research Reserve based on Prudence Island. "We look forward to bringing high quality, cutting edge science education about Narragansett Bay into classrooms throughout Rhode Island by way of these workshops," says Kristin Van Wagner, Education Coordinator for the Narragansett Bay NERR.

Funding from this grant will launch the TOTE program, which has been in development by NERRS educators since 2004. These courses will serve as models for similar programs at Research Reserves across the country.

The summer of 2009 will feature a three-day TOTE workshop at Narragansett NERR and Waquoit Bay NERR. Over the next two years the Wells, Waquoit, and Narragansett NERR locations will all provide the programs. The workshops will be developed in coordination with teacher advisory groups formed at the Reserves during fall 2008. This grant provides stipends for participants, stewardship funding to implement student projects, support for follow up sessions, and funding for ongoing evaluation of the programs.

Information for teachers interested in applying for the program will be available in March 2009 at www.nbnerr.org or by contacting Kristin Van Wagner at Kristin@nbnerr.org

JOIN THE GREAT BACKYARD BIRD COUNT!

Feb. 13-16, 2009

This year the Narragansett Bay Research Reserve is helping to promote the 12th annual Great Backyard Bird Count (GBBC) and invites you to participate. Join tens of thousands of people throughout the U.S. and Canada who contribute valuable information for science and conservation. As a participant you simply document the highest number of individual birds you see in your backyard or on local conservation lands after a minimum of 15 minutes of bird watching. It is easy and fun and people of all ages and levels of bird-watching experience are encouraged to participate. The collected data is used to determine changes in the year-to-year abundance and distribution of birds, migration patterns, and potential impacts of stressors such as global climate change, changes in land use patterns, and disease. Individuals may participate on their own by downloading species lists and data forms at <http://www.birdcount.org> or can request copies of these materials from Robin Weber by email: robin@nbnerr.org; or by telephone: 401-683-7369.

The GBBC is a joint project of the Cornell Lab of Ornithology and the National Audubon Society.

Photo by Laura Erickson



