



2009

PREP Year in Review

PREP

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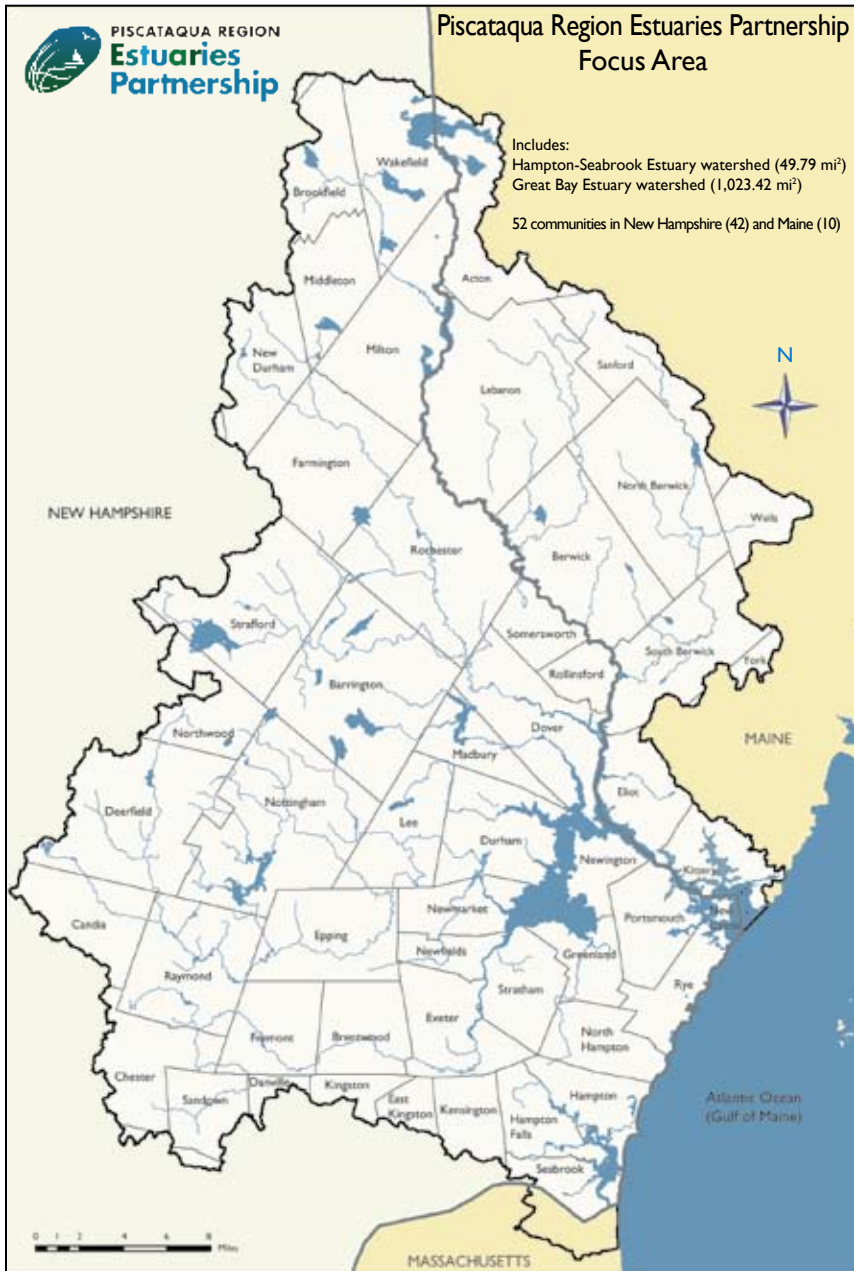
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Piscataqua Region Estuaries Partnership: A Year in Review and a View of the Future



A summary of program activities in 2008 and plans in 2009 that protect, restore, and monitor the region's estuaries





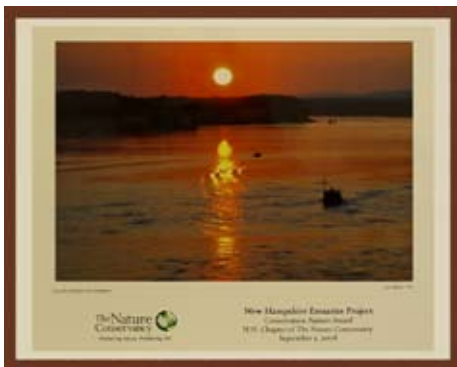
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Award Winning Year

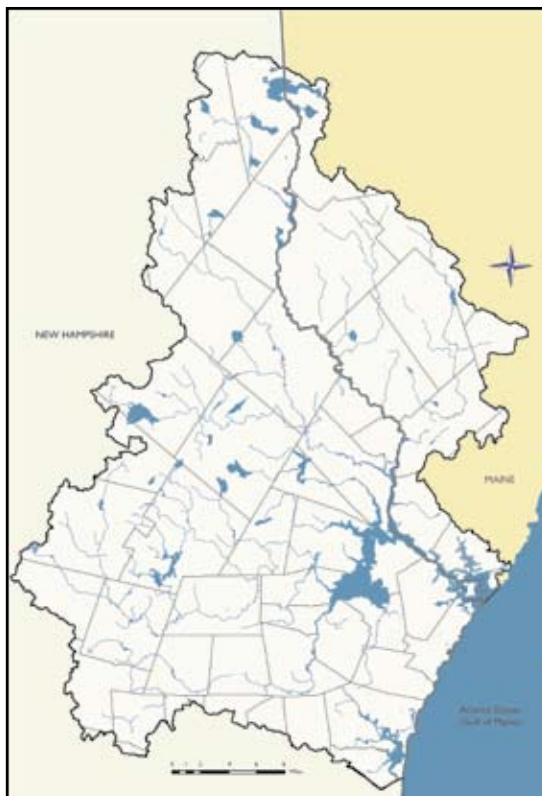
In 2008, the New Hampshire Chapter of The Nature Conservancy presented PREP with its annual Conservation Partner Award in recognition of the group's collaborative approach to improving water quality, habitat and shellfish restoration, and land protection in New Hampshire's coastal watersheds.

Changes for the Better

New Hampshire Estuaries Project expands focus area and changes name to address ecosystem integrity at a watershed scale

The New Hampshire Estuaries Project (NHEP) was initiated in 1995 as part of the U.S. EPA's National Estuary Program. From its inception, the NHEP was committed to implementing a watershed-based plan to protect and restore the region's estuaries. However, with administration of the NHEP through New Hampshire state agencies, the program's work was limited to New Hampshire only. Following the NHEP's move to the University of New Hampshire in 2005, the Management Committee expanded the program's focus area beginning in 2008 to Maine, thereby covering the entire watershed of the Great Bay Estuary.

On January 1, 2009, the name of the New Hampshire Estuaries Project changed to the Piscataqua Region Estuaries Partnership (PREP). The name change reflects the organization's commitment to watershed management and collaborative stakeholder-driven approaches to natural resource management. "Piscataqua Region" encompasses the Hampton-Seabrook Estuary, smaller Atlantic Coast estuaries, and the Great Bay Estuary, of which 24% lies within Maine. "Partnership" best describes the collaborative approach to determining management priorities and implementing the PREP Comprehensive Conservation and Management Plan. More than 20 organizations are represented on the PREP Management Committee.



Piscataqua Region Estuaries Partnership Focus Area

With funding from the New Hampshire Charitable Foundation - Piscataqua Region, PREP has initiated several important projects in Maine, including impervious surface mapping and developing a regional land conservation plan for the Maine part of the Great Bay Estuary watershed.

RESEARCH IN MAINE BUILDS KNOWLEDGE FOR ENVIRONMENTAL MONITORING

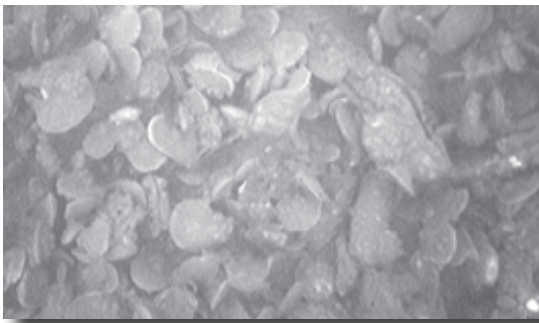
When PREP expanded its Focus Area to include the Maine portion of the Great Bay Estuary watershed, data gaps needed to be filled to monitor environmental indicators across the watershed.

Oyster Reef Mapping in Maine

Beginning in 2008, University of New Hampshire researcher Dr. Ray Grizzle began a PREP funded project to characterize and map the boundaries of oyster bottom in the Upper Piscataqua River, Sturgeon Creek, and Spruce Creek. Most of these areas hadn't been surveyed since the 1970s.

Underwater video in conjunction with GIS technology was used to map areas of significant "shell bottom". Video footage of nearly 7.5 miles identified several areas containing oyster shells and one active reef.

The active reef at the mouth of Sturgeon Creek is 15.6 acres and ranks third in size relative to other oyster reefs in the Piscataqua region.



Underwater video was used to inventory oyster reefs in the Upper Piscataqua River, Sturgeon Creek, and Spruce Creek.

Developing Impervious Surface Estimates for Southern York County, Maine

PREP contracted with the University of New Hampshire Complex Systems Research Center to estimate impervious surface acreage in 1990, 2000, and 2005 for an 11-town region in York County, Maine. The project extended previous work in New Hampshire, relying on comparable satellite-based data sources and image processing methodologies. As a result, standardized impervious surface estimates are now available for the entirety of the PREP focus area.

The classifications indicate that 3.3% (9,098 acres) of the survey area was impervious in 1990, with increases to 5.3% (14,646 acres) in 2000 and 6.3% (17,394 acres) in 2005. At the subwatershed level, the Portsmouth Harbor subwatershed recorded the highest percentage of impervious surface acreage in 1990, 2000, and 2005 with 7.8% coverage (1,283 acres), 12.3% coverage (2,009 acres), and 14.5% coverage (2,380 acres) respectively.

The data have been archived in the UNH GRANIT system and are freely available to land use planners and citizens.

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PREP is updating its Comprehensive Conservation and Management Plan (CCMP). The CCMP outlines management objectives and specific actions that collectively are intended to protect and restore the region's estuaries and their associated watersheds.

Enough is Enough

Setting numeric limits for nutrients entering the Great Bay Estuary

In 2006, the PREP State of the Estuaries Report highlighted a trend of increasing nitrogen concentrations in the Great Bay Estuary amounting to an increase of 59% in the last 25 years. This trend is troubling because too much nitrogen in an estuary will cause algal blooms that cloud the water and disrupt the estuarine ecology.

PREP recognized the threat posed by increasing nitrogen concentrations in the Great Bay Estuary and began the development of numeric criteria for nitrogen in the estuary. Establishing numeric criteria is a critical step toward limiting nitrogen loads to the estuary for two reasons. First, without a numeric target it is impossible to know what load reductions would be needed to solve the problem. Second, numeric criteria are a form of water quality standard which is legally enforceable.

Between 2005 and 2008, PREP dedicated significant staff time, as well as most of



Eelgrass is the basis of an important habitat for fish, shellfish, and waterfowl. Elevated levels of nitrogen entering from tributaries threaten the viability of eelgrass beds in the Great Bay Estuary.

the meetings of its Technical Advisory Committee to this issue. The PREP Technical Advisory Committee is made up of state agency water resource managers, University researchers, volunteer water quality monitoring groups, and others. The collective expertise of this group was brought to bear on proposals for nutrient criteria developed by PREP staff.

PREP also applied for and received grant funding from the U. S. Environmental Protection Agency to collect additional data to support nutrient criteria development. This funding

supported University of New Hampshire researchers during a two year study of water clarity, eelgrass, and macroalgae in the Great Bay Estuary using moored buoys and hyperspectral aerial imagery (see page 6).

After three years of work, PREP staff presented a proposal for numeric criteria to the New Hampshire Department of Environmental Services (NHDES) Water Quality Standards Advisory Committee in January 2009.

PREP BRINGS A NOVEL APPROACH TO THE ISSUE OF ASSESSING THE EFFECTS OF NUTRIENTS ON THE GREAT BAY ESTUARY

In 2007 and 2008, PREP secured \$85,000 in grants from the U.S. Environmental Protection Agency Region I to lead a multi-agency research project to understand the effect of increasing nutrients on the Great Bay Estuary.

The project focused on using hyperspectral aerial imagery of the 17-square-mile region to identify correlations between water clarity, nuisance macroalgae, eelgrass, and nitrogen concentrations. To check the reliability of the image data, teams of researchers from the University of New Hampshire (UNH) and New Hampshire Department of Environmental Services took water samples in a variety of locations at the same time as the imagery was collected. Also, a monitoring buoy was deployed in Great Bay for the majority of the year by the UNH Coastal Observing Center. Sensors attached to the buoy made continuous measurements of the water clarity as well as other physicochemical parameters, including turbidity, chlorophyll-a, colored dissolved organic mater, and nitrate.

Information from the buoy and the hyperspectral imagery provided valuable insights into the effects of nutrients on the Great Bay Estuary.



Hyperspectral aerial images record 64 wavelengths across the visible and near-infrared spectrum. The resulting imagery was used to map water clarity, macroalgae, and eelgrass in the Great Bay Estuary.

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PREP will continue to work with NHDES to formally establish numeric criteria for nitrogen for the Great Bay Estuary. PREP will also work with its partners to begin reducing nitrogen loads to the estuary through the use of best management practices throughout the watershed.

Communities in Action

Community Technical Assistance Program enables communities to achieve natural resource planning goals quickly

In 2008, PREP accepted applications from municipal planning boards and conservation commissions for the third consecutive year of the Community Technical Assistance Program (CTAP), that provides consulting assistance to communities on a wide range of regulatory and non-regulatory approaches to natural resource protection.

Through this program PREP hires Technical Assistance Providers (“TAPs”) to work with communities directly on eligible projects of mutual interest to the community and PREP. TAPs are organizations and firms with expertise in natural resource protection issues and activities.

The program is simple for communities because PREP develops work scopes to ensure communities’ needs are met and consultants have a clear understanding of community expectations. PREP also manages

contracts and pays consultants directly for services, thus saving municipalities administrative time and costs.

In 2008, twelve CTAP projects were initiated, totaling nearly \$80,000 of work. Three projects completed natural resource inventories, three developed land use regulations, and four implemented outreach projects targeted to improve community protection of wetland buffers. Two communities utilized CTAP to create plans to protect and manage valuable natural resources.



CTAP is helping the Town of Milton develop a water resource plan and buffer ordinance that will protect key areas like the Salmon Falls River.

All 42 communities of New Hampshire coastal watersheds were eligible for CTAP funding in 2008. Applications had to be submitted by Planning Boards or Conservation Commissions. Funding for the 2008 CTAP projects was from the New Hampshire Charitable Foundation – Piscataqua Region and from the U.S. Environmental Protection Agency National Estuary Program, through an agreement with the University of New Hampshire.

2008 CTAP Projects

Barrington, NH
natural resources inventory

Brentwood, NH
land use regulation outreach

Danville, NH
town forest stewardship plan

Hampton, NH
conservation lands inventory

Hampton Falls, NH
water resources & buffer outreach

Milton, NH
water resources protection plan & buffer ordinance

New Durham, NH
stormwater ordinance & regulations

Newfields, NH
easement monitoring & conservation lands inventory

Newington, NH
stormwater regulations for commercial zone

North Hampton, NH
wetland & water resource protection outreach

Portsmouth, NH
vernal pool inventory & protection plan

Sandown, NH
water resources & buffer outreach

VERNAL POOL INVENTORY AND PROTECTION PLAN FOR PORTSMOUTH

In 2008, the Portsmouth Conservation Commission set out to protect ecologically important vernal pools in the city that were vulnerable to development. To do this, the Commission planned to enact a city ordinance to protect these wetlands with a 100 foot “no development” buffer zone. The greatest challenge facing the Commission was locating all the vernal pools. The Commission applied to CTAP and a Technical Assistance Provider was hired to conduct a city-wide vernal pool inventory. The final report identified 33 vernal pools using detailed maps, photo logs, and field evaluations. The Commission submitted the inventory, a protection plan, and a draft vernal pool ordinance to the City’s Planning Board for approval by the City Council in 2009.



Spotted salamander found during vernal pool inventory.

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PREP will initiate Round 4 of CTAP, funding an estimated eight to ten community projects in the areas of water resources protection, stormwater management, and land conservation. Maine and New Hampshire communities are eligible for the 2009 program.

Seeing the Big Picture

Studying the ecological role of restored oyster reefs in Great Bay

In 2007, University of New Hampshire Researcher Dr. Ray Grizzle constructed about 1.75 acres of oyster reefs to, in part, conduct a study in 2008 to document how these newly-created habitats are utilized by a variety of Great Bay's plants and animals.

To create the reefs, the researcher placed disease-resistant juvenile oysters, called spat, onto oyster shells collected through an oyster shell recycling program. The "seeded" shells were then used to construct 12 small circular reefs, about 15 feet across in Great Bay. Grizzle then surveyed the reefs to examine the oysters' progress and to collect samples of creatures living among the oysters.

Algae, fish, worms, crabs, and other creatures from both the newly constructed experimental reefs and nearby natural reefs were carefully documented. Data gathered through this process will be used to determine the diversity, density, and number

of living creatures on both the experimental and natural reefs. The findings of the study will help integrate restoration efforts of a variety of species in Great Bay and illustrate the importance of oyster reef habitat to the ecological integrity of the Great Bay Estuary system.



University of New Hampshire researchers build an experimental oyster reef in Great Bay.

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PREP supports the development of the Hampton-Seabrook Estuary Restoration Compendium (HSERC) which will compile historic and current distributions of salt marshes, sand dunes, and seven diadromous fish species within the Hampton-Seabrook Estuary watershed. The study will evaluate habitat loss and changes in land use over time to identify restoration opportunities within the watershed.

Building Watershed Literacy

Outreach that helps citizens protect and manage natural resources

Shellfish Spotlight

In the fall of 2008, PREP published the Shellfish Spotlight to address a variety of outreach needs identified in the PREP Management Plan.

The large, three-panel brochure included a summary of New Hampshire clam and oyster populations, as well as articles on oyster reef restoration, invasive Chinese mitten crab, incidence of clam disease, new harvesting regulations, and a summary of the 2008 severe ride tide.



The brochure was mailed to all 1,388 New Hampshire shellfish license holders, as well as all coastal license vendors and key public distribution areas.

Community Outreach Campaigns

In 2008, PREP assisted Conservation Commissions in Brentwood and North Hampton to develop outreach campaigns that improved natural resource stewardship. Each multimedia campaign was tailored to specific needs of the community.

In Brentwood, 1,267 large brochures were mailed to each residence that highlighted newly adopted land use regulations, home owner actions, and a map of natural resources in the town.

In North Hampton, an outreach campaign communicated the value of wetlands and wetland buffers to the community. PREP mailed 1,925 8-page conservation newspapers to each town resident that included articles on specific North Hampton water resources.



in 2009

PREP will host a State of the Estuaries Conference in the fall to communicate the findings of the PREP State of the Estuaries Report and to provide a forum for researchers, land use planners, and natural resource managers to present information on a wide range of topics relevant to the PREP Comprehensive Conservation and Management Plan.

Acting Locally

Local Grants Program funded three projects in 2008 that address the PREP Comprehensive Conservation and Management Plan

The annual Local Grants Program supports projects by municipalities, community groups, schools, land trusts, watershed associations, environmental groups, regional planning commissions, and other organizations that conduct conservation work in the coastal watershed. All projects address specific Action Plans described in the PREP Comprehensive Conservation and Management Plan.

In 2008, grantees were given a total of \$24,075 funds and they matched those funds with \$70,215 of non-federal funds.

The Local Grants projects are selected through an annual competitive application process.



A 2008 Local Grant funded the development of stormwater technology recommendations for lakes in Northwood, NH.

2008 Local Grants Program Recipients

The **Town of Northwood** worked with a consultant to research and recommend appropriate stormwater management treatment technologies in the town that has a significant number of lakes. The grant also enabled the town to create a municipal shoreland buffer ordinance designed to protect surface waters within the town.

Bear-Paw Regional Greenways initiated the Isinglass River Conservation Corridor Project that targeted the protection of nearly 800 acres of land, including 288 acres of high conservation-value forestland along the river in the Town of Strafford. (see page 12)

Southern New Hampshire Planning Commission was awarded a grant to develop shoreland protection and riparian buffer regulations for the Town of Raymond's headwater and lower order streams. The project included a public outreach program and the development of buffer regulations designed to protect all buffer areas adjacent to surface waters.

PROTECTING THE ISINGLASS RIVER

PREP provided a \$9,075 Local Grant in 2008 to Bear-Paw Regional Greenways to support the Isinglass River Conservation Corridor Project. The grant paid for a portion of the transaction costs associated with the project that protected high-value conservation land along the Isinglass River in Strafford, New Hampshire.

Overall, the \$2.9 million project was a collaboration of Bear-Paw Regional Greenways, the Trust for Public Land (TPL), and the Town of Strafford that protected 868 acres of forest, over one mile of road frontage, and more than three miles of frontage on streams and rivers. All protected parcels were identified as focus areas for conservation in the Land Conservation Plan for New Hampshire's Coastal Watersheds.



A PREP Local Grant protected Isinglass River shoreland.

The project was primarily funded by a \$1.3 million federal Coastal and Estuarine Land Conservation Program (CELCP) grant. Other project funding was from the New Hampshire Conservation License Plate Grant Program, the Samuel P. Hunt Foundation, the Fields Pond Foundation, the McIninch Foundation, the Davis Conservation Fund, the Fuller Foundation, and individual gifts to Bear-Paw and TPL.

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Seven projects will be implemented in 2009 through the PREP's Local Grants Program. Projects include an optical brightener study of Spruce Creek by the Town of Kittery and Spruce Creek Association, a Maine shoreland mapping project by the Southern Maine Regional Planning Commission, a State of the River newsletter by the Exeter River Local Advisory Committee, the implementation of the Great Works River NPS Pollution Watershed Management Plan by Wells National Estuarine Research Reserve, land protection around Stonehouse Pond in Barrington by Trust for Public Land, implementation of the Strategic Conservation Plan by Bear-Paw Regional Greenways, and conservation of Pawtuckaway River and Kennard Hill Focus Areas by Southeast Land Trust of New Hampshire. A total of \$46,964 of PREP funding was awarded.

Greasing the Wheels of Conservation

PREP provides hard-to-find funding for land protection projects

PREP relies on partnering with land conservation organizations to achieve its goal of permanently protecting 15 percent of the watershed land area by 2010. These partnering organizations are often nonprofit groups that raise significant funding to protect land, however, they often struggle to pay for the administrative costs of land protection, such as land surveys, attorney fees, staff time, and stewardship costs.

To address this need, PREP developed the Land Transaction Grant Program that in 2008 provided grants up to \$3,000 to pay for expenses that are often the most difficult to offset with fundraising.

In 2008, 14 projects received PREP funds to support land transaction costs. Funds were granted to eight different organizations, all of which were land trusts or municipal Conservation Commissions.

Projects were completed in nine towns, totaling 984 acres. Nine of the 14 projects were located

in priority Conservation Focus Areas identified in the Land Conservation Plan for New Hampshire's Coastal Watersheds. Twelve of the 14 projects protected stream or river shoreland habitat, with a total estimated distance of 4.45 miles of shoreland receiving permanent protection.

The majority of projects utilized conservation easements as the primary land protection mechanism and involved significant financial compensation to the landowner.

PREP invested \$40,880 towards the transaction costs associated with the 14 projects, which was matched by \$94,789 worth of cash and in-kind contributions by grant recipients. The total real market value of the land permanently protected is estimated to be \$6.56 million.

The Land Transaction Grant Program provides important financial support that improves the capacity of local governments and nonprofit organizations to complete land protection projects in the PREP focus area.

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Available funding will support transaction costs for eight to ten land conservation projects in New Hampshire, up to \$4,000 per project.

A Watchful Eye

PREP analyzes monitoring data to inform management decisions

To measure the effectiveness of Management Plan implementation, PREP follows a Monitoring Plan that defines environmental and administrative indicators of estuarine quality and outlines a strategy for communicating the status of those indicators to stakeholders. The core component of PREP's Monitoring Program involves tracking 30 environmental indicators, which are measurable markers that help interpret the condition of the environment and how it changes over time.

Assessing Nitrogen

PREP has taken the lead on compiling and analyzing nitrogen monitoring data and establishing benchmarks to nitrogen limits in the estuaries.

Several PREP projects occurred in 2008 that addressed the critical issue of nitrogen loading in the Great Bay Estuary.

Once a month PREP staff took effluent samples from eight wastewater treatment facilities discharging to the Great Bay Estuary to assess the total amount of nitrogen that is being contributed by these facilities. This field data, combined with data from treatment facility staff at two other facilities, accounts for about 95 percent of the effluent discharged into the system.

PREP also collects nitrogen loading data from the tidal tributaries to the Great Bay Estuary. Both data sets



In 2008 PREP staff sampled effluent from eight wastewater treatment facilities in the Great Bay Estuary watershed to determine the nitrogen input into the system.

provide the foundation for Great Bay nitrogen limits to be set by the New Hampshire Department of Environmental Services.

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PREP will produce its fourth State of the Estuaries Report that communicates the status of 12 out of the 34 environmental indicators tracked by PREP. For each of these key indicators the report provides the associated PREP management goal and an explanation of supporting data.

Preparing for a Rainy Day

PREP is conducting one of six pilot projects in the U.S. to help coastal watershed communities deal with climate change

In 2008, PREP received a \$50,000 grant from the U.S. Environmental Protection Agency's "Climate Ready Estuaries" initiative to conduct an assessment of climate change impact on existing road and stream networks in the Oyster River. PREP is leading a technical team to complete a climate adaptation pilot project that identifies specific road/stream crossing culverts that will likely fail under expected changes in precipitation patterns.

The study approach utilizes watershed modeling techniques to examine the hydrologic impact of several climate change and land use scenarios on existing culvert infrastructure.



Researchers assessed 110 culverts to provide data for a computer model that will help municipalities update infrastructure to accommodate changing climate conditions.



Jean Pauly-Jennings

Damage to culverts and roads like this one in Rochester, NH, is expected to increase dramatically in the coming decades as precipitation amounts continue to increase as a result of climate change.

The model will calculate impacts of runoff volumes under current and projected climate conditions. It also evaluates two land use scenarios, one assuming current development patterns and another utilizing Low Impact Development (LID) techniques.

Based on the model results, the project team will provide recommendations for infrastructure improvements to municipalities that are based on risk, cost, and infrastructure lifespan.

This pilot project addresses climate adaptation on a watershed scale and provides a repeatable methodology for other coastal watersheds.

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The results of the study will be presented to Town Administrators in the study area and recommendations from the project will be incorporated in the 2010 PREP Comprehensive Conservation and Management Plan.