



2009

A Citizen's Guide to Protecting Greenland's Water Resources, PREP & Greenland Conservation Commission

Greenland Conservation Commission

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A Citizen's Guide to Protecting Greenland's Water Resources

This publication is brought to you by the Greenland Conservation Commission with a grant from the Piscataqua Region Estuaries Partnership

www.greenland-nh.com/ConservationCommission.html

2009

Where the Wild Things Are!

A Natural Resources Inventory for Greenland
by Theresa Walker, Rockingham Planning Commission

Where is the biggest wetland in Greenland? How much of Greenland is forested? What types of birds can be found in Greenland? Where does most of our drinking water come from? The answers to these questions and many more can be found in the newly completed Natural Resources Inventory (NRI).

For the past year and a half, the Greenland Conservation Commission, a sub-committee of town residents, and staff from the Rockingham Planning Commission have been compiling this very thorough and detailed inventory of all the natural treasures found in Greenland. The report is chock full of interesting facts, data, explanations, and maps about the varied natural resources and ecosystems Greenland is lucky enough to have.

Continued on page 6



Eric Bégin

Wild creatures, like this river otter, compete for space with people in Greenland. To ensure that enough natural areas remain in Greenland's future, careful planning is needed. A Natural Resources Inventory of Greenland has been recently completed that will help with that planning.

Where are Greenland's most precious natural resources?



Find out on page 6

Three Fast Fixes For Reducing Stormwater Runoff

Rain Gardens, Rain Barrels and Green Roofs
by Jean Eno, Conservation Commission

Last year the U.S. Environmental Protection Agency and the U.S. Botanic Garden produced a great video titled 'Reduce Runoff: Slow It Down, Spread It Out, Soak It In' to showcase green techniques such as rain gardens, rain barrels and green roofs for managing stormwater runoff in urban areas. While Greenland may not exactly be considered "urban," we are certainly not free from stormwater runoff and its associated impacts. Incorporating any of these three 'do-it-yourself' techniques at your home or business is an easy way to help protect our water resources.

Rain gardens, rain barrels and green roofs mimic the natural way water moves through an area before something was built on it, like a house. The idea is to deal with stormwater on site, and not send it downstream.

These techniques all do good things for the environment. They reduce the volume of stormwater in streams, they recharge your groundwater, and they capture harmful pollutants that would ordinarily contaminate wetlands, streams, rivers and Great Bay.

Rain gardens allow water to soak into the ground and become absorbed by plants instead of rushing into our storm sewers and polluting waters downstream. Essentially, they allow rainwater to spread out and slow down just long enough to soak into the ground. Rain



Beau Owens

Rain gardens help naturally cleanse rainwater from a roof.

Continued on page 8

Keep an eye on that "Dam Cam"

Dam Removal Begins at Winnicut River Site
by Jill Scahill, Conservation Commission

After six years of planning, the Winnicut Dam is scheduled to be completely removed by Thanksgiving. The project finishes in the spring of 2010 when contractors plant natural vegetation to restore the river's banks. The dam is being removed to open up 39 miles of passageway for migratory fish who swim upstream to breed but have not been able to since the dam was put in place.



NHDES

A public event will be held on Thursday, October 15th at 2:00 p.m. to celebrate the start of the dam's removal, the successful partnership, and most importantly, the restoration of the river.

The project was spearheaded by a collaboration of partners including the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service, New Hampshire Department of Environmental Services Coastal Program (NHDES), New Hampshire Fish and Game Department, USDA Natural Resources Conservation Services, NH Charitable Foundation, the Coastal Conservation Association, the NH Mooseplate Grant Program and the Town of Greenland. The design firm Stantec engineered the plans and Absorption Technologies,

Continued on page 3

INSIDE

Prime Time
A case for Prime Wetlands in Greenland - page 2

Wetland Buffers
What they are and how they work - page 4

Culvert Studies on the Winnicut River
Two efforts strive to improve the river for fish and people - page 5

Greenland's Natural Resources Inventory
Overview of key natural resources in town - page 6

What Homeowners Can Do to Improve Greenland's Water Landscaping Tips - page 8

Talk of the Town
What town officials think about Greenland's water - page 9

Smart Growth
Building like there is a tomorrow - page 10

Read about landscaping that protects Greenland's water resources on page 8.

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Prime Time

Why the most valuable of Greenland wetlands should be designated as Prime Wetlands

by Jill Scahill, Conservation Commission

State RSA 482-A:15 – Prime Wetlands are wetlands of substantial significance to a community due to their size, unspoiled character, fragile condition or other relevant factors.

Bordering Great Bay has a multitude of benefits for Greenland including recreational opportunities, fishing, aesthetics and rich natural landscapes and ecosystems. In addition to these incredible benefits Greenland is also home to some of the most productive ecosystems on earth: wetlands, both freshwater and tidal. With the substantial increase in development that Greenland has experienced over the last decade, these wetlands are being heavily encroached upon, filled in and thoroughly degraded every year. Wetland degradation affects the entire community because as wetlands are filled or built upon they lose their productive abilities to filter and clean our drinking water, store and reduce our floodwaters, protect us from eroding shorelines, recharge our aquifers, or provide critical habitat for our wildlife.

It is clear that these vital ecosystems must be protected. Due to the size and unspoiled character of some of the wetlands within Greenland they are certainly able to be designated as Prime Wetlands and would then be better protected against encroaching development and subsequent degradation. Once a wetland is designated as Prime, any proposed development, such as a subdivision, within 100 feet of the wetland will require a public hearing to inform the community of the proposed development and to gather all citizens' comments and concerns. The community's comments coupled with an on-site evaluation will be needed before any building permit can be issued. This process ensures a fair consideration of the public's needs and well being when evaluating the impacts of development on our natural resources.



Pickering Brook is part of a wetlands system that provides the town with a variety of benefits, including flood protection, pollutant removal, and wildlife habitat.

To designate Prime Wetlands, Greenland would:

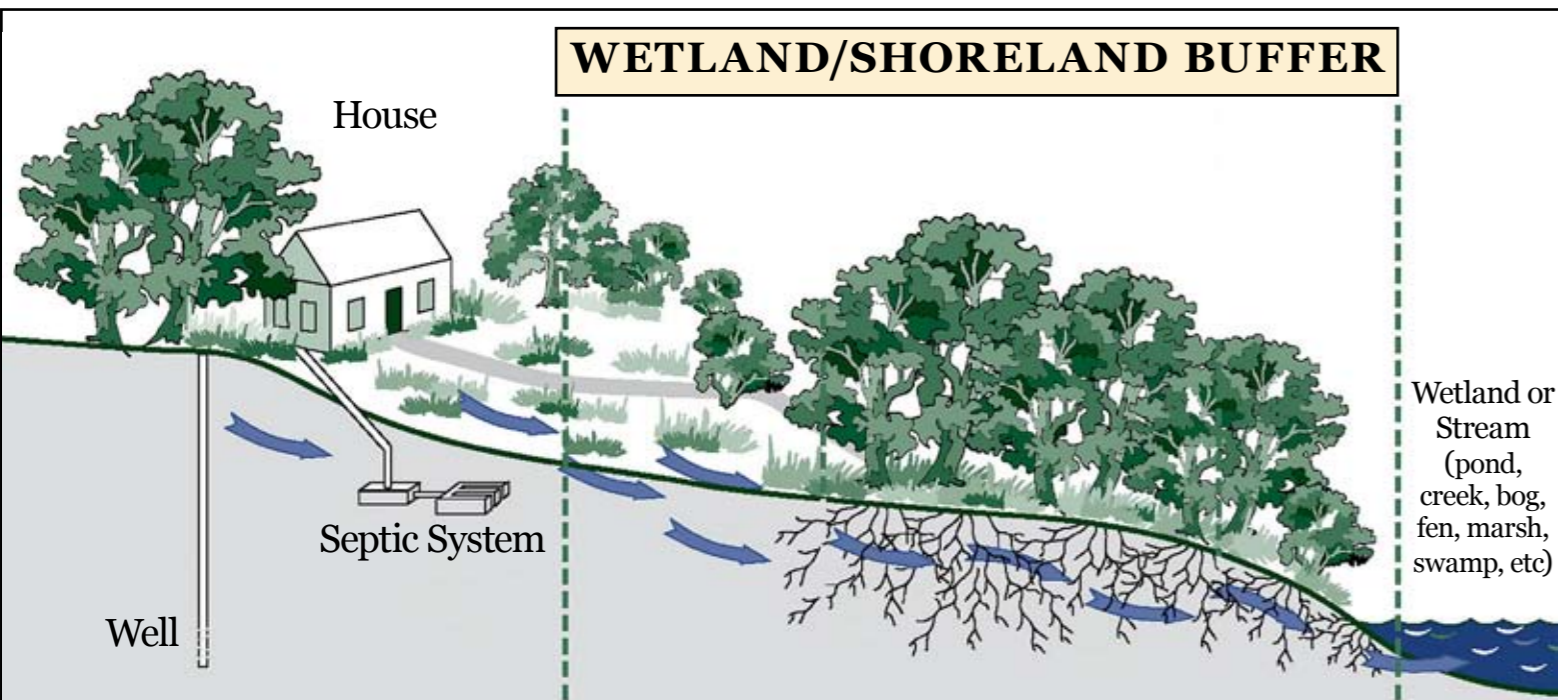
1. Hire a wetlands scientist or natural resource professional to inventory and evaluate our community's wetlands.
2. Select a subset of the highest quality and most beneficial wetlands for prime designation.
3. Hold a public hearing to discuss the evaluation and the effect of prime wetland designation.
4. Vote to approve the designation of selected wetlands.
5. Submit the maps and report to the New Hampshire Department of Environmental Services.



Packers Bog

There are 26 communities across the state that have Prime Wetlands designations including Exeter, Brentwood, Fremont and Newmarket.

Designating Prime Wetlands is a powerful way for Greenland residents to vote for and have a voice in protecting natural resources so that our grandchildren will be able to live in a prosperous, healthy, and beautiful community.



Graphic by T. Miller
Diagram from Backyard Buffers that Work for People and Nature by Restoring Ecological Function, 2006. Copies of the brochure can be obtained by contacting the Portsmouth Environmental Planning Department or the Coastal Training Program at the Great Bay National Estuarine Research Reserve.

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Take Care of Greenland's Stormdrains

Anything that goes down a stormdrain in Greenland is on its way to a stream, to someone's drinking water, or to Great Bay.

Never dump oil, trash, cigarette butts, dog waste, or any other materials down a stormdrain. It is the same as dumping trash into beautiful Great Bay.



Greenland's Valuable Water Resources



The Condition of Great Bay

by Tom Irwin, Conservation Law Foundation

Activities that take place on the land can have a profound effect on the health and sustainability of water resources. With intense development pressures in New Hampshire's seacoast region in recent decades, land use policies and decision-making have regrettably contributed to changes within the coastal watershed that now threaten the long-term health of the Great Bay estuary.

Much of the seacoast region's population growth in recent decades has translated into low-density "sprawl" development, with adverse consequences for Great Bay and the many rivers, streams and wetlands associated with the estuary.

The most obvious threat associated with development and land use activities is stormwater pollution, which occurs when rainwater or water from melting snow washes pollutants off of roads, parking lots and rooftops into streams. These structures, collectively called impervious surfaces, prevent water from soaking into the ground and becoming cleansed naturally.



The number of adult oysters in Great Bay fell by 95 percent in the 1990s. The population has increased slowly from a low point in 2000, but is still far below historic levels.

Stormwater runoff carries with it a host of pollutants including bacteria, oils, metals, salts, dirt, and nitrogen, which is emitted by cars and accumulates on roads and parking lots.

The threat of stormwater pollution to the Great Bay estuary is evident in trends that are occurring both on land, and in the water. In 2005 UNH's Complex Systems Research Center mapped the amount of land in New Hampshire's coastal watershed that is covered by impervious surfaces. Incredibly, researchers found that impervious cover in the watershed grew from 31,000 acres in 1990, to roughly 53,000 acres in 2005. In Greenland, the land area covered by impervious surfaces nearly doubled during this same time period, increasing from 6.7 percent in 1990 to 12.5 % in 2005.

Increased stormwater pollution in the coastal watershed, and in communities like Greenland, is manifesting itself in another troubling trend – increasing nitrogen concentrations in the Great Bay Estuary. Nitrogen pollution is viewed as the single largest threat to the estuary, and is leading state and federal regulators to designate waters throughout the estuary as "impaired" under the federal Clean Water Act. Increased levels of nitrogen are contributing to the significant loss of eelgrass habitat, an ecological cornerstone of the Great Bay estuary. According to the 2006 State of the Estuaries Report, stormwater pollution is the source of more than 60 percent of nitrogen pollution loads to the Great Bay and Upper Piscataqua River (with wastewater treatment plants accounting for approximately 35 percent).

To protect the Great Bay estuary from continued decline, and to ensure a healthy future for this critical resource, it will be necessary to change the land use trends of recent decades.

Fortunately, through concerted efforts at the local level, and with assistance from regional planning commissions, this can happen. Towns – through their master plans and implementing land use ordinances – can encourage more compact, mixed-use patterns of development that reduce impervious surface cover, and that reduce the distances people drive (not only saving people money and reducing global warming pollution, but also reducing nitrogen-oxide emissions in the watershed). They also can require



best management practices for new development, including low-impact-development practices – such as rain gardens, porous pavements, and "green roofs" for large buildings – that replicate natural hydrology and dramatically reduce stormwater pollution.

Communities like Greenland hold one of the essential keys to protecting the Great Bay estuary – land use planning that reverses the trend of sprawl and minimizes stormwater pollution. The Southeast Watershed Alliance – recently established by the New Hampshire Legislature, and currently being formed by the Department of Environmental Services – will provide an important and much-needed vehicle for towns to come together and tackle this important problem together.

Dam Cam. . .

continued from page 1



Large solar panels erected near Rt. 33 power a video camera aimed at the Winnicut Dam that can be viewed online at www.earthcam.com/winnicut to watch the dam removal process.

which specializes in dewatering and wetland projects, provided construction services.

The current Winnicut Dam, owned by the New Hampshire Fish and Game Department, was constructed in 1957. The site had a dam since the mid-17th century, but shortly after the 1957 dam was installed, it was apparent that the fish ladder was not working. Now 50 years later that is being rectified.

NHDES will install an improved fish passage structure under the Route 33 bridge - allowing access to more than 39 miles of river by migratory fish like river herring, rainbow smelt, alewife and American eel. It will also recover some of the 5,500 feet of riverine habitat lost through the dam's pond and restore 21,000 square feet of intertidal habitat, including 6,500 square feet of salt marsh wetland.

A new public access site at Riverside Drive, upstream of the Route-33 Bridge, will allow shore fishing, and canoe/kayak launching.

In July NOAA allocated \$500,000 to the project from the American Recovery and Reinvestment Act, also known as the stimulus package. The project was one of 50 to receive funding out of 814 submitted to NOAA and was selected because it addressed an ecological need, was "shovel ready", created jobs, and provided a lasting value for the American public.

To celebrate the start of the dam's removal, the successful partnership, and most importantly, the restoration of the river, a public event will be held on Thursday, October 15th at 2:00 p.m. All Greenland residents are encouraged to attend.

For those who can not attend, the partners have installed a "dam cam" – a small camera mounted on a pole overlooking the construction site that will take a photo every 10-15 minutes so that the public can keep an eye on the project from beginning to end. The dam cam can be viewed at www.earthcam.com/winnicut/.

VOLUNTEER

The Winnicut River Needs YOU

BECOME A VRAP VOLUNTEER TODAY!

In 1998, the NH Volunteer River Assessment Program (VRAP) was established to promote awareness and education of the importance of maintaining water quality in New Hampshire's rivers and streams. VRAP aims to educate people about river and stream water quality and ecology and to improve water quality monitoring coverage for the protection of water resources.



Citizens who want to participate in VRAP may contact the Greenland Conservation Commission at 431-7111, or by email at conservation@greenland-nh.com

Wetland and Shoreland Buffers



Buffers: What Are They and Why Should I Care?

A buffer is simply the vegetated area directly adjacent to something.

If it is a wetland buffer it is, in Greenland, next to an intermittent or perennial stream, small pond (<10 acres), small river, freshwater marsh or bog. Shoreland buffers in Greenland would be those found adjacent to Great Bay or any one of its tidal rivers (Winnicut), streams or marshes (listed below). Both types of buffers function about the same, but sometimes they are regulated differently.

Wetland and shoreland buffers protect water resources. They slow rainwater and snowmelt by allowing it to seep into the ground where it is absorbed by plant roots or enters groundwater.

Every Greenland resident's well taps into groundwater. Therefore it is in everyone's best interest to maintain healthy buffers so we can maintain clean drinking water in town.

Dissolved nitrogen, a prominent pollutant to estuaries in rainwater, is removed by plants absorbing it and by soils transforming it. Recently, the US Environmental Protection Agency has determined that Great Bay is being polluted by dissolved nitrogen. Maintaining buffers is now even more important for communities that are working to keep Great Bay in ecological balance.

It is clear that wetland buffers are important to all Greenland residents. This is why there is a town Wetlands Conservation District and a Buffer Zone ordinance that limit activities near all wetlands, ponds, streams and rivers.

Greenland regulations mandate that "no structure, septic system, or impermeable surface shall be permitted within 75' of tidal influenced lands or within 50' of inland wetlands." Furthermore, the "inner twenty-five feet closest to the body of water or wetlands [50' for tidal influenced] is to be left, as much as possible, in its natural state. The outer zone of the buffer can be managed forest with some pruning and clearing of trees allowed. No fertilized turf (lawn) is allowed in this zone."

For land adjacent to tidally-influenced waters, like Great Bay and the lower portions of the Winnicut River, Brackett Brook, Meloon's Creek, Foss Brook,



The vegetative area around Shaw Brook and other streams affected by the tides is protected by the Comprehensive Shoreland Protection Act, which regulates activity within 250 feet of the high tide line.

Shaw Brook, Packer Brook and Pickering Brook, the state's Comprehensive Shoreland Protection Act (CSPA) has jurisdiction. Landowners next to these tidal waters and marshes should go to the NH Department of Environmental Services website (des.nh.gov/cspa) and read about the CSPA.

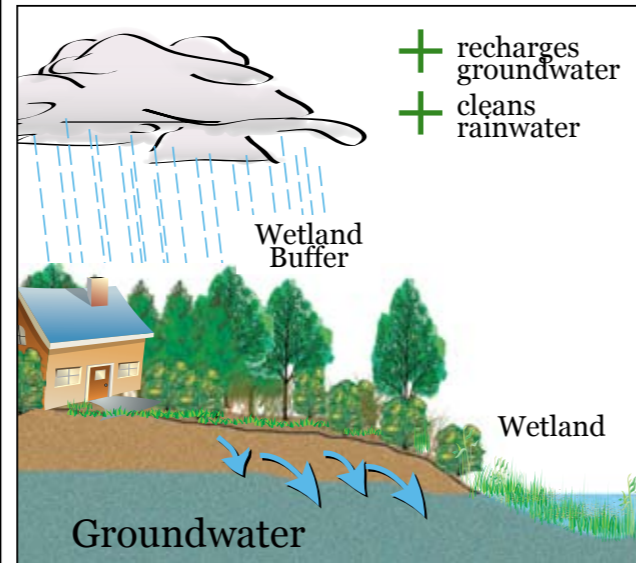
State and local ordinances help protect Greenland's wetlands and water quality, but research suggests that these buffers may not be enough to protect all of the valuable services provided by wetlands.

HOW MUCH BUFFER IS ENOUGH?

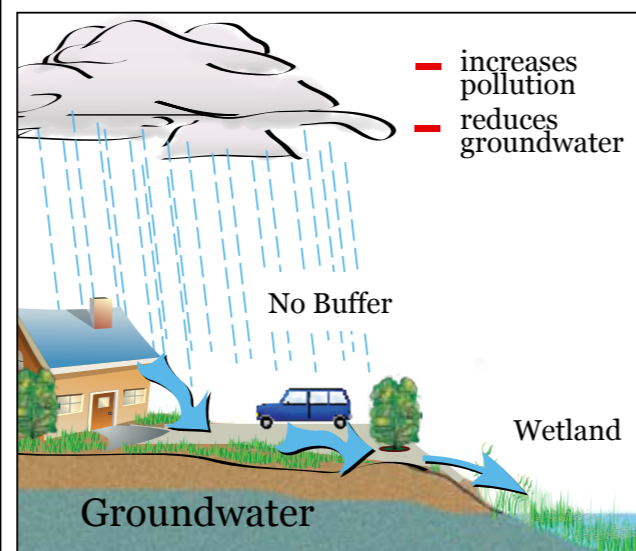
Research shows that each function of a wetland typically requires a minimum wetland buffer width. To prevent sediment from washing into streams, at least 150 feet of buffer is needed. To mitigate the impact of flooding, 200 feet of buffer is needed. For adequate wildlife habitat, 300 feet of uncut, natural buffer is needed.

Beyond adhering to the town's regulations, careful stewardship of buffers is an important individual responsibility of landowners. No one should store vehicles in places that oil leaks can reach the ground and possibly pollute our water. Keeping landscaping activities to a minimum and planting only native plants will benefit wildlife and create a more stable environment. Consider maintaining a large buffer (>300 feet) of natural, uncut area to better protect wetlands and attract more beautiful wildlife. These measures are not mandated by law, but they make sound ecological sense.

How Buffers Help Wetlands



Rainwater that falls on or flows through a wetland buffer soaks into the ground where it is cleansed and it recharges the groundwater we need for drinking water. Nitrogen is removed naturally from the rainwater before it enters the wetlands



Rainwater that falls on or flows over roads, parking lots, and roofs washes oil, sand, and other pollutants directly into an unprotected wetland where water quality is reduced.

The Path Less Traveled

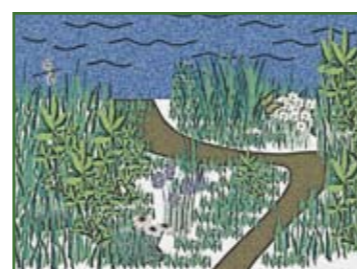
The design of a path to a river or pond can have a big impact on the health of the water.

The thick plant growth of a healthy buffer will have a robust root system that holds the soil in place during rain storms and allows water to seep into the ground. The roots remove many contaminants from rainwater, such as dissolved nitrogen, before it enters a stream or your drinking water.

Routing rainwater through a vegetative buffer will improve water quality.



Often the banks of rivers and ponds are steeply sloped, which rushes rainwater into the waterbody. If a path is cut directly to the water (top image), pollutants are funneled by rainwater directly into the water. By simply winding a path to the water and planting diverse, native plants in the buffer, pollutants are removed before they contaminate a pond or river. (bottom image).



Winnicut River Watershed Happenings



Helping Winnicut River's Migratory Fish: Culverts Assessed To Determine If Fish Can Get Home

by Ray Konisky, The Nature Conservancy



As removal of the Winnicut Dam begins, The Nature Conservancy (TNC) has conducted an assessment of all stream crossings in the watershed above the dam for migratory fish passage. The Winnicut River supports a small run of river herring, and records suggest that other migratory fish used the river in the past, including shad, salmon, eel, and smelt. Once the dam is removed and a new fishway is built under Route 33, biologists expect that migratory species will return to the river and use its 40 mile stream network for spawning habitat.

TNC analyzed 42 road crossings in the watershed and measured culvert placement, dimensions, and road characteristics. Each crossing was scored as severe, moderate, minor, or passable for fish. Results showed that one crossing was identified as severe, thirty-five were moderate, and no crossings were determined to be fully passable for all fish.

TNC used computer analysis to create a list of about 12 priority crossings to fix, all with more than 1/2 mile of upstream habitat and within 10 miles of Great Bay.

TNC will present a final report to Greenland and state officials that clearly shows the value to migratory fish of enhancing priority culverts. The report can be used by the Town to apply for state and federal grants to pay for the enhancements.



Culvert on Thompson Brook in Greenland is a barrier for some migratory fish.

Preparing for a Changing Climate

Determining Culvert Vulnerability To Increased Stream Flows Due To Development and Climate Change

by Colin Lawson, Antioch University, Principal Investigator

Like many small towns across the Northeast, New Hampshire Seacoast communities are currently experiencing mounting pressure on local lands targeted for residential and commercial development. Greenland faces this pressure due to its easy access to I-95, open building lots, and its close proximity to beautiful natural resources such as Great Bay and the Atlantic Ocean.

Careful planning is needed to protect Greenland's rural character and natural resources from being damaged by too many roads, roofs, driveways, and parking lots. One way these structures damage our water is by funneling rainwater and snow melt (collectively called stormwater) into streams and rivers, which causes flooding and erosion. Research clearly shows that the more developed land becomes, the more flood damage and environmental damage occurs.

An equally challenging variable, climate change, could also contribute additional stormwater into Greenland streams. Well documented regional climate change predictions anticipate substantial increases in rain and snow over the next twenty five years. As a consequence, more stormwater entering the watershed may seriously compromise undersized culverts throughout Greenland. Not only would

potential culvert failure present a financial threat to the community, it would also present considerable safety issues should culverts and associated infrastructure fail during flooding. In response to these escalating stormwater flows, it is crucial for Greenland to evaluate how additional runoff into streams might present considerable risk to the town's culvert infrastructure.

In an effort to scientifically evaluate stormwater impacts to the Winnicut watershed, a comprehensive analysis of individual culverts is being performed to calculate the hydrologic capacity of each subcatchment (the restricted area immediately above each culvert). Through the use of fieldwork and computer modeling, this assessment will analyze how increased stormwater, relative to development and climate change, will affect Greenland's culvert infrastructure. By understanding the limits of each subcatchment, this study will be able to identify culverts that are most likely to fail under intense stormwater flows, and what infrastructure improvements could be implemented to reduce these impacts.

This study will begin during late summer 2009 and conclude late 2010. For more information, contact Colin Lawson at clawson@antioch.edu.

Conservation Law Foundation's Great Bay Initiative

by Tom Irwin, Conservation Law Foundation



For several years, the Conservation Law Foundation (CLF) – a member-supported, regional environmental advocacy group with offices in New Hampshire – has been working with partners to protect the Great Bay Estuary. Motivated by the tremendous ecological, recreational, and cultural values of the estuary, and the major threats facing it, CLF has been working with state and federal laws to protect this remarkable resource.

CLF is currently addressing nitrogen pollution in the estuary which has increased in the last few decades and is a suspected cause of the decline of eelgrass habitat. CLF has worked with state and federal regulators to ensure the estuary is fully protected by national the Clean Water Act. CLF successfully urged the Environmental Protection Agency (EPA) to designate numerous water bodies within the estuary as "impaired", which triggers regulatory protections that are designed to prevent the Great Bay Estuary from suffering a nitrogen-driven ecological collapse, like is being experienced in the Chesapeake Bay.

In recent years, CLF has addressed the threats to the Great Bay Estuary caused by sewage treatment plants and has played a vital role in the effort to upgrade Portsmouth's treatment plant and include nitrogen limits for Exeter's discharge.

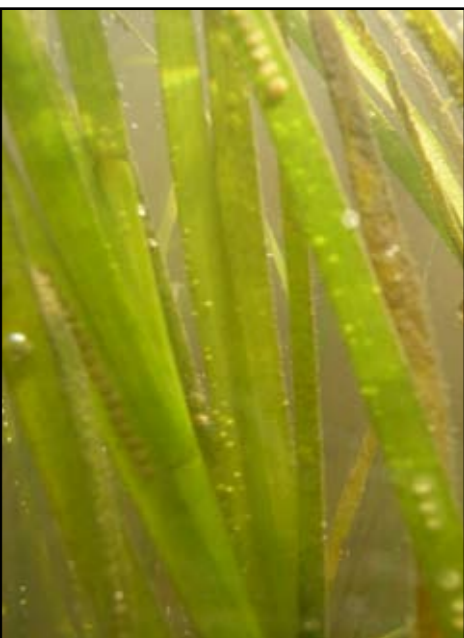
In Greenland, CLF helped limit nitrogen pollution to Great Bay by highlighting water quality concerns associated with the Target/Lowe's mall project. The project developer agreed to work with CLF and the University of New Hampshire's Stormwater Center to re-work the stormwater management approach and install innovative measures, such as 4.5 acres of pervious parking lot that allow rainwater to soak in the ground.

Recognizing the hard work ahead to solve the problems facing the Great Bay Estuary, CLF and other members of Save Great Bay – a coalition of legislators, organizations, agencies and concerned citizens – worked to develop, and ensure passage of important legislation establishing the Southeast Watershed Alliance (SWA). The Alliance will provide communities like Greenland the opportunity to develop innovative solutions to wastewater, stormwater, and land use issues.

To learn more about CLF, the SWA, and the threats facing the Great Bay estuary, go to www.restoregreatbay.org.



Limiting the rainwater that pours through stormdrains and washes pollutants to Great Bay Estuary is one of the greatest challenges facing Seacoast communities.



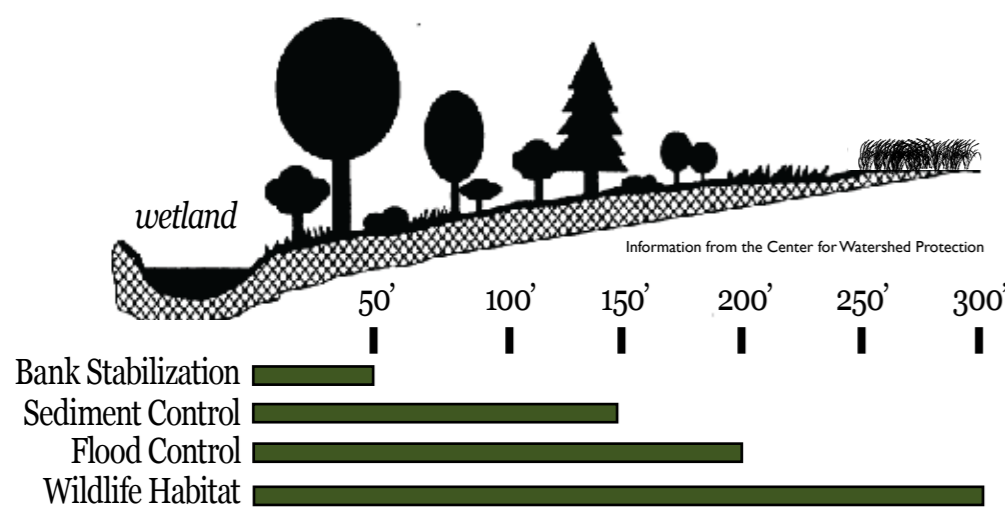
Eelgrass creates an important habitat in the Great Bay Estuary for fish, shellfish, and many other creatures. Eelgrass abundance has declined in recent decades and excessive dissolved nitrogen is a suspected cause.

Southeast Watershed Alliance

In 2009, The NH Legislature established the Southeast Watershed Alliance to:

- Create better municipal, intermunicipal, and regional planning that addresses wastewater, stormwater, water quality, water supply, and land use issues;
- Establish a regional framework for coastal watershed communities and stakeholders to collaborate on efforts to improve and protect coastal water quality, particularly with respect to nitrogen pollution;
- Encourage municipal collaboration, planning and investments – including improved land use planning – to protect water quality and advance the state's smart growth policy;
- Seek innovative solutions to reducing pollution and enhancing water quality.

Wetland functions and the minimum buffer widths needed to sustain these functions



Greenland's regulations only provide the most basic protection for the community's wetlands. It is up to each landowner to increase buffers beyond regulated widths to receive the benefits of sediment control, flood mitigation and wildlife habitat that wetlands provide.

Greenland's Natural Resources Inventory

Wild Things . . .

continued from page 1

The main purposes of the NRI are to:

- Map and describe significant natural resources in Greenland;
- Identify areas of high ecological value;
- Recommend options for the protection and management of natural resources in town.

This effort to inventory Greenland's treasures was born from the obvious intensified growth and development that Greenland has faced in the last decade. The town's transformation from a predominantly rural community to a suburban town mirrors the experience of towns across New Hampshire's seacoast. The growth of the state and particularly the southeastern region is not predicted to slow. Given this, Greenland is faced with the challenge of finding a balance between growth and development and the protection of the significant natural resources in the community. The rural and historic character of Greenland in combination with the Great Bay Estuary, Packer Bog, rivers, salt marshes, forests, and farms provides a high quality of life for residents and excellent habitat for native plants and animals.

The challenge of conserving significant resources in the face of increasing development and population pressures is not an easy one, but one that Greenland has proudly accepted. The Planning Board, Conservation Commission, Selectmen and residents can use the NRI as a foundation for policies and programs to protect farmland soil for local food production, groundwater for drinking water supplies, and wildlife habitat for diverse and healthy ecosystems. Greenland residents want to retain the high quality of their natural resources for future generations and the NRI can help achieve that goal.

THE KEY NATURAL RESOURCES OF GREENLAND ARE:

- Great Bay, Winnicut River, Pickering Brook, Brackett Brook, Packer Brook, and other rivers and streams and their associated wetlands;
- Aquifers underlying Breakfast Hill Road, Post Road, and Portsmouth Avenue, all which provide drinking water;
- Remaining large blocks of open land, including farmland;
- Forests with a diversity of woodland species.

All of these natural resources have provided, and continue to provide, Greenland residents with the necessary elements of life, opportunities for recreation, and a legacy for our children.

Much of the information in the NRI was contributed by Greenland residents. A 2008 survey of our citizens provided information on a multitude of wildlife and other natural resources that was not known previously. The citizens of Greenland were fundamental to the NRI because local knowledge captures a more accurate picture of Greenland's natural resources. The result is an inventory that reflects every aspect of Greenland's rich resources, from the water quality in a stream to a backyard sighting of a fox. The NRI is an adaptive document that will continue to be reviewed, amended, and enhanced as more information is learned and shared.

Citizens are asked to read and review the NRI and add to it with both photos and facts by emailing (conservation@greenland-nh.com) or mailing the Conservation Commission.

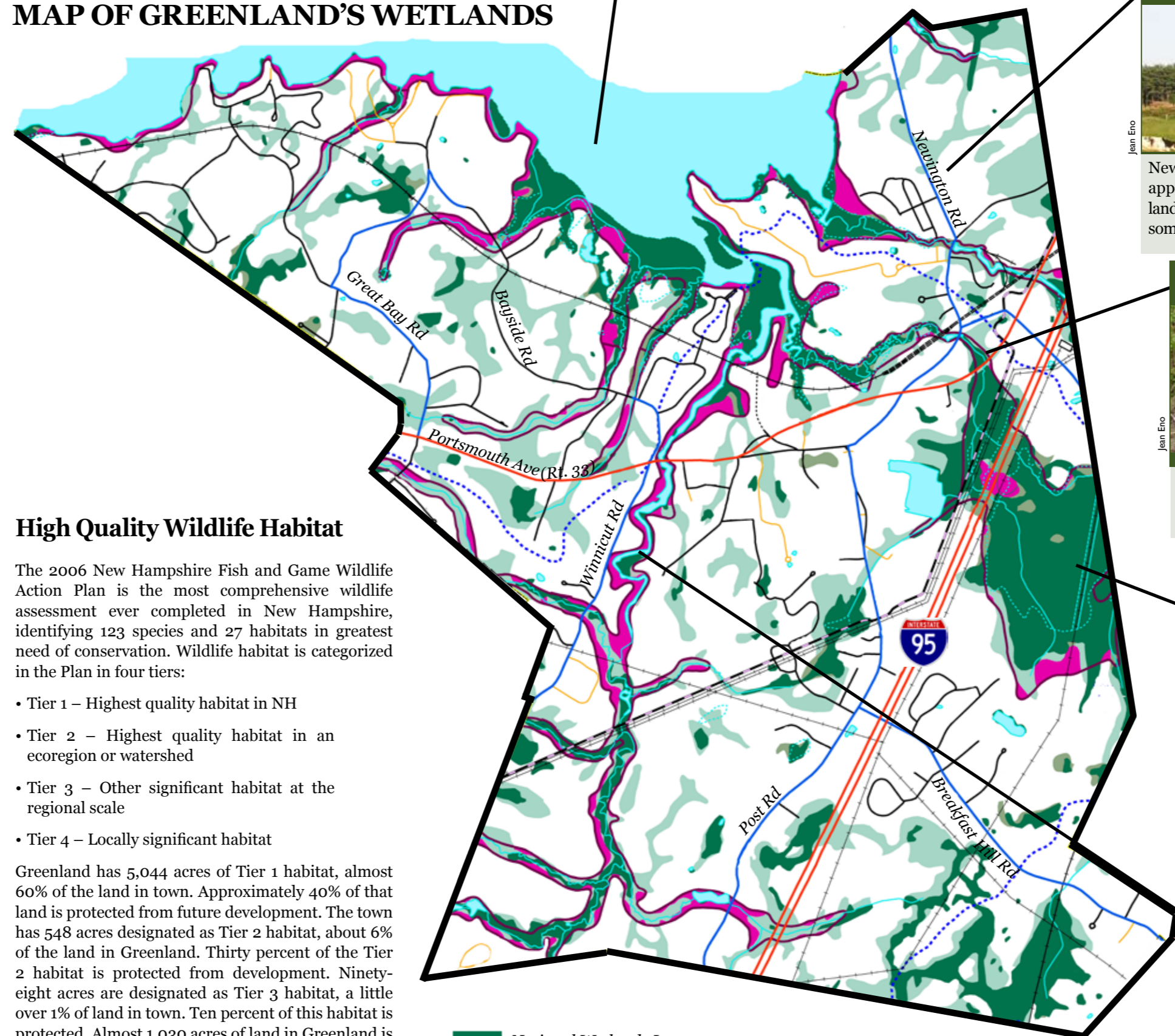


View of a beautiful wetland from Newington Road in Greenland.

The NRI is available for review at Town Hall and will be available on the Town's website (<http://www.greenland-nh.com/ConservationCommission.html>).

VITAL SIGNS: Greenland encompasses 8,524 acres, of which approximately 1,666 acres are part of the Great Bay Estuary. The New Hampshire Office of Energy and Planning (OEP) estimates the 2008 population to be 3,383. The population of Greenland grew 22% between 1990 and 2007. OEP projects Greenland's population in 2020 will be 3,880 and 4,240 in 2030.

MAP OF GREENLAND'S WETLANDS



High Quality Wildlife Habitat

The 2006 New Hampshire Fish and Game Wildlife Action Plan is the most comprehensive wildlife assessment ever completed in New Hampshire, identifying 123 species and 27 habitats in greatest need of conservation. Wildlife habitat is categorized in the Plan in four tiers:

- Tier 1 – Highest quality habitat in NH
- Tier 2 – Highest quality habitat in an ecoregion or watershed
- Tier 3 – Other significant habitat at the regional scale
- Tier 4 – Locally significant habitat

Greenland has 5,044 acres of Tier 1 habitat, almost 60% of the land in town. Approximately 40% of that land is protected from future development. The town has 548 acres designated as Tier 2 habitat, about 6% of the land in Greenland. Thirty percent of the Tier 2 habitat is protected from development. Ninety-eight acres are designated as Tier 3 habitat, a little over 1% of land in town. Ten percent of this habitat is protected. Almost 1,030 acres of land in Greenland is classified as Tier 4 habitat, approximately 12% of the land in town. Fifteen percent of this land is protected from development.

- National Wetlands Inventory
- Very Poorly Drained Soils
- Poorly Drained Soils
- Area inundated by annual chance flooding

This map is a reasonable representation of Greenland, New Hampshire. Landowners wishing to build on their property must hire a Certified Wetlands or Soil Scientist to determine ordinance compliance.

Great Bay

Great Bay Discovery Center, Greenland



The Great Bay Estuary is Greenland's most significant salt water resource. Covering 17 square miles with nearly 150 miles of tidal shoreline, Great Bay is unusual because of its inland location, more than five miles up the Piscataqua River from the Atlantic Ocean. Oysters, clams, and lobsters are harvested from these waters, as well as striped bass, bluefish, herring and smelt. Bald eagles, ducks, and geese spend the winter on the Bay's open waters.

Forest and Farmland

Great Bay Farm, Newington Rd, Greenland



New Hampshire is the second most forested state in the US, trailing Maine. Greenland is approximately 38% forested. Much of the forest in town has grown from abandoned agricultural land and is now mature. Agricultural land in Greenland is valued for the food that its farmers produce, some of which is locally available. It is also valued for its scenic beauty and diverse habitat.

Haines and Packer Brooks

Portsmouth Ave, Greenland



Haines Brook starts in the heart of Greenland within the large stratified drift aquifer underlying the center of town, and flows northeast before it joins up with Packer Brook. Both brooks are important for protection of water quality in Great Bay as well as for drinking water for Greenland residents.

Packer Bog

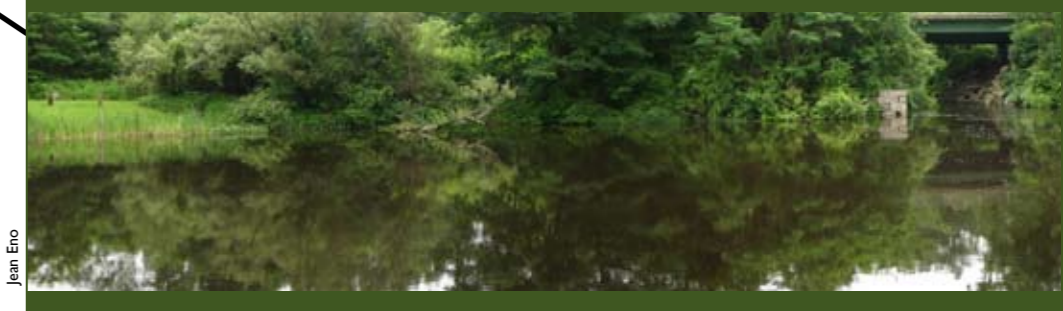
East of I-95, Greenland



Identified by the NH Natural Heritage Bureau as part of the larger Portsmouth Cedar Swamp, Packer Bog is a great example of an uncommon plant community known as an Atlantic white cedar/yellow birch/sweet pepperbush swamp. This unique ecosystem is home to several rare plants and the headwaters of Packer Brook.

Winnicut River

Former impoundment, Rte 33 & Bayside Rd, Greenland



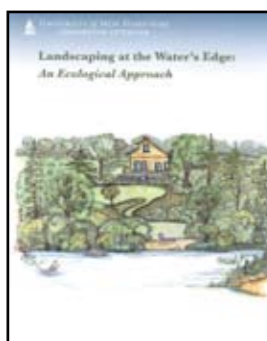
Four miles of the Winnicut River wind through Greenland, draining 27% of our land as it flows north towards the Great Bay. It is fed by seven perennial tributaries and two streams and supports high value wetlands and diverse upland habitats. Portions of the Winnicut River have been designated as conservation focus areas by the Land Conservation Plan for New Hampshire's Coastal Watersheds, including the Middle Winnicut River area and Lower Winnicut River area.

What Each Homeowner Can Do To Improve Greenland



The Landscape Design Process

Information for this article was excerpted by permission from "Landscaping at the Water's Edge: An Ecological Approach" by the UNH Cooperative Extension Service, 2007. Copies of this 92-page guide for \$20 may be ordered at extension.unh.edu or by calling 603-862-1564.



Living along a shoreline provides homeowners with beautiful views, the chance to explore nature, and often peace. But with it comes a responsibility to protect the soil, water, and wildlife that makes living on the property so special.

Your property is part of the larger watershed. Before making any landscape changes make sure you understand Greenland's regulations regarding shoreland protection, in addition to those within New Hampshire's Comprehensive Shoreland Protection Act.

Shoreline properties should have areas of aquatic, shoreline, lowland transition and upland buffers. All these areas work together to filter and slow water movement from rain storms, irrigation and snowmelt, helping protect the quality of the water.

The first thing to consider in designing a landscape is how to protect the valuable features you already have, then move on to making improvements. For example, you may have a significant cluster of alders and winterberry shrubs along the bank of a pond and a large lawn that extends from the shoreline to your backdoor. You could shrink the size of your lawn by increasing the size of an existing shrub border, which in turn would increase woody plants, while decreasing the labor and cost of maintaining a large lawn.



Minimize pavement and concrete walkways to allow rainwater to seep into the soil.

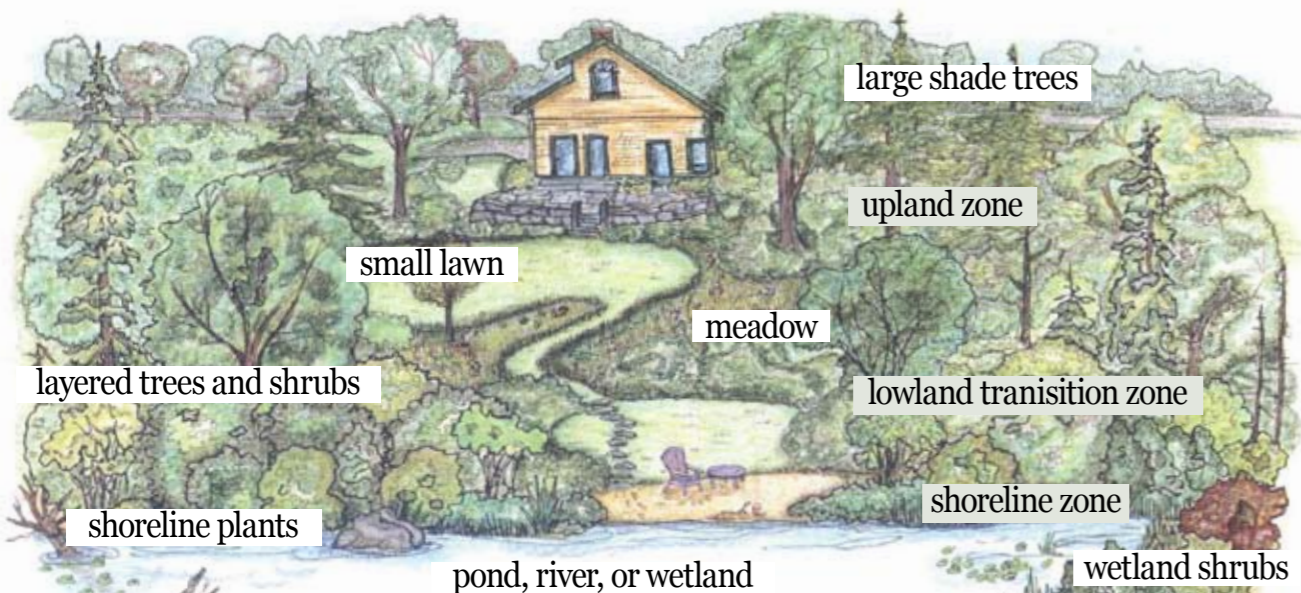


Illustration reprinted from "Landscaping at the Water's Edge: An Ecological Approach", 2007, UNH Cooperative Extension Service

The key to having effective buffers next to ponds, streams, rivers, and wetlands is to maximize diversity of plant types, vertical layers, and habitats. Build a landscape that slows and cleanses rainwater that flows from roofs and driveways.

Ten Design Principles To Help Protect and Improve Your Shoreland Property

Protect and Improve Soil - Improve poor soil with compost, and keep soil covered with plants or mulches to reduce compaction and erosion.

Maximize Layers - Keep buffers diverse with plants of varying heights. Diversify soil layers by keeping leaf litter and allowing seedlings to grow. Promote diverse root types that build a thick, deep mat of roots.

Pick the Right Plant - Install plants for Greenland's climate (hardiness zone Zone 4). Native plants provide wildlife habitat and may resist pests and diseases. For non-native plants, choose disease- and insect-resistant varieties. Match a plant's mature size to the landscape, to keep views open without pruning. Consider using plants to help block severe winds.

Think Rainwater Speed Bumps - Plants reduce the force and speed of rainwater flowing over land, especially on steep slopes. Densely layered plantings retain water, releasing it slowly, which conserves soil by reducing erosion. Plants between a stream and impervious surfaces, such as driveway, slow down rainwater and reduce downstream flooding.

Buddy-up Buffers - Maximize the benefit of a buffer by connecting yours with your neighbor's buffer.

Limit Impervious Surfaces - Replace existing asphalt or cement driveways and walkways with water-penetrating materials such as stone dust, brick, or pavers. This helps increase the amount of water soaking into the soil (plus they look great).

Rethink Your Lawn - Instead of all grass, consider using ground covers and vertical layers of plants. These rougher surfaces slow rainfall and help filter it.

Minimize Chemicals - Instead of spraying pesticides, prune and throw away infected plant parts. This will improve air circulation and reduce mold.

Strive for the Lazy Man's Landscape - Design choices, like keeping lawns small or using native plants, reduce the time and money needed to maintain a landscape. Low-maintenance landscapes limit the need for chemicals, which is also better for the environment.

Remember, "Your Land Matters" - Your actions on your land directly affect the ponds, streams, rivers, wetlands, and groundwater in Greenland. Detergents used in car washing, chemicals used in lawn treatments, gas and oil leaks from mowers may end up contaminating well water or wildlife. Some simple things, like using sand as a de-icer or choosing not to use fertilizer will improve our water resources.

Three fast fixes . . .

continued from page 1

gardens do not need to be "huge." Rather, they can be designed as small depressions to catch water from rooftop downspouts, driveways, and other hard surface areas. A good local example of a rain garden that catches parking lot runoff can be seen at the Great Bay Discovery Center.

The first step in creating a rain garden is to pick a good spot. Choose a depressed area near a downspout, drainage tile, or sump pump discharge. Check your soil drainage, because your rain garden should drain well. To test this, simply make a 10-12" hole, fill it with water, and see if it drains in about an hour.

The second step is to prepare the soil for the garden. Mix in compost and moderately fine pine bark to prepare the soil.

The last step is to choose plants that tolerate bouts of heavy water. To maximize wildlife habitat for butterflies, frogs or beneficial insects, choose a diversity of native flowers and textures. Focus on perennials, but mix in annuals.

Next up are rain barrels. There are many varieties, colors and sizes of rain barrels available (check with

Continued on page 12



Rainbarrels come in a variety of designs but all improve water quality by helping to recharge your groundwater and to grow your plants without using your well water.

What Kinds of Plants Grow in Buffers?

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Natural vegetation adjacent to ponds and streams includes shoreline plants, plants in lowlands, and upland plants. Homeowners wishing to fortify their landscape at the local nursery should match the type of plant to the buffer zone (see figure).

Shoreline Zone: Bordering on the water, common plants of this type include willows, elderberry, viburnums, dogwoods, winterberry, buttonbush, summersweet, blue flag iris, and marsh marigold.

Lowland Transition Zone: Beginning about 10 feet from the water's edge, shrubs, small trees, and groundcovers dominate this zone. Common plants include alders, high-bush blueberry, serviceberry, swamp azalea, ferns, asters, jewelweed, and Joe-pye weed. These plants tolerate occasional flooding.

Upland Zone: Rarely flooded, this zone may include lawns, gardens, and landscaped areas. Upland forests have maples, beech, oak, and/or pine trees.

Greenland residents near Great Bay may need salt tolerant plants in the buffer, including red cedar, heather, bayberry, elderberry, grape, and various roses.

Talk of the Town



What do you feel are the values of Greenland's rivers, streams, ponds, wetlands and/or Great Bay?



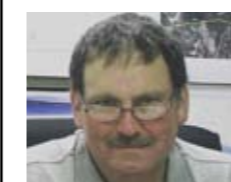
Rick Mauer, Chairman
Conservation Commission

The value of the land can be easily summed up by tallying the land values on the tax records. But, that doesn't truly value what the land in its current natural state is worth. Keeping our lands open and free from unfettered development will insure the our ecosystem will remain vibrant for generations to come. Greenland is geographically special and unique. Our lands encompass a salt water estuary system. Our eco-diversity can't be duplicated in Marion, OH or even Raymond, NH. We have the great privilege to be living in a community that still has many parcels of undeveloped land where nature can thrive. By keeping these parcels open and free we are aiding in the long term public health of the local community and in part to the global community. Our land and waters spawn life that trickles into the Great Bay and its offspring travel the world oceans. These lands and waters are a window into our collective history and a mirror of who we are today, their value is immeasurable.



Jean Eno, Member
Conservation Commission

Our waters provide invaluable habitat for so many species of wildlife: herons, hawks, mergansers, otters, fox, deer, turtles, frogs, salamanders, and countless beneficial insects, just to name a few. These "co-inhabitants" that we share Earth's natural resources with depend on healthy water every bit as much as we do; the more we protect our waters, the more we protect ourselves and them.



Chip Hussey, Co-Chairman
Conservation Commission

They are (except the occasional problem with Pickering Brook) not polluted. Greenland's water is its biggest natural resource and protecting that resource will always be an ongoing project.



Charlie Cummings, Member
Board of Selectmen

[They support] habitat for a wide range of plants and animals and serve as a link between fragmented habitats in urbanized and rural areas.



Mo Sandini, Chairman
Board of Selectmen

I feel that Greenland's rivers, streams, ponds, and of course our proximity to Great Bay is what makes Greenland special. We are truly very fortunate to live in a rural town in the Seacoast area. We have the challenge to expand our population and protect the natural beauty of our resources. We have accomplished this, I feel, with a good effort on the Town's Master Plan and the residents' use of land conservation measures such as current use and conservation easements. These areas such as Great Bay and the Winnicut River area are habitat to many species of birds and other wildlife and must be maintained to continue this use.



Bill Bilodeau, Vice-Chair
Planning Board

Personally, I use the river for canoeing and fishing and to take advantage and enjoy the wildlife that can be seen on the Winnicut River.



Jane Man, Member
Conservation Commission

I think they have an aesthetic value besides being important resources for wildlife and mankind. I think they should be protected because water is a necessary resource that can not be manufactured.

What do you consider to be the most important thing citizens can do to protect Greenland waters?



Mo Sandini, Chairman
Board of Selectmen

I feel that the citizens of Greenland can best protect these natural resources by being informed and educated members of the community. I feel that involvement on the various land use boards as either an elected member or an alternate would be beneficial to both the town and the natural resources. They could at the very least go to the town website and follow the minutes of the various boards and committees and be educated when it comes time to vote on changes to the ordinances or to vote on Warrant Articles that affect our environment.



Jane Man, Member
Conservation Commission

I think citizens need to be aware of and utilize sound ecological practices that safeguard our water resources. I think residential and commercial development needs to be monitored so that it has the least negative impact on this valuable resource.



Chip Hussey, Co-Chairman
Conservation Commission

Citizens need to be educated on what not to do, and what can be done to protect these waters. The GCC must be careful not to cram things down citizen's throats, but to educate starting with the young.



John McDevitt, Chairman
Planning Board

Support well reasoned efforts to protect private property rights while preserving our water resources.



Rick Mauer, Chairman
Conservation Commission

Volunteer / get personally involved with our local boards and committees to assure that we are husbanding our waters in a fashion that will be sustaining for generations to come. It is up to us individually to vote in good stewards, and vote out of office those that don't "get the value" of our local waters.



Bill Bilodeau, Vice-Chair
Planning Board

Be concerned about hazardous waste that can flow into the waterways.



Charlie Cummings, Member
Board of Selectmen

Exercise control of potential pollutants which can be discharged to storm water drainage systems.



Jean Eno, Member
Conservation Commission

Greenland has its fair share of sweeping lawns, many of which, unfortunately, receive regular doses of pesticides and fertilizers. This is most unfortunate, as stormwater runoff -- particularly across lawns -- is a very efficient mover of chemical and nutrient residues into our water bodies, whether surface or groundwater. Explore ecologically sound alternatives; there are superb sources of information available -- just ask!

Tell us what you think about Greenland's water resources. Email your thoughts or questions about Greenland's water resources to the Conservation Commission at conservation@greenland-nh.com

Balancing Development and Open Space



Smart Growth Begins with Conservation Subdivision Design

As Greenland grows, careful planning becomes more important to ensure that our natural resources are protected.

by Jill Scahill, Conservation Commission Member

There are 4 assumptions that can be made in regards to Greenland:

1. Growth in Greenland will continue.
2. Greenland citizens want to preserve the town's open space and historical areas.
3. Current conventional subdivision regulations do not adequately protect open space.
4. There needs to be a subdivision process that is fair and equitable to established and incoming residents of Greenland as well as developers.

Introducing – Conservation Subdivision Design

Conservation subdivision design goes beyond the simple goal of clustering buildings together and preserving a portion of the parcel as open space.

Conservation subdivision design accommodates the natural and cultural resource attributes of a property and reflects the broader environmental and social goals of the community. It allows for greater flexibility in design to provide for greater natural resource protection.

There are three steps that are taken in conservation subdivisions designs that set it apart from conventional designs:

1. Developers take a detailed site inventory of the parcel features and identify natural and cultural features vital to preserve prior to developing a site plan or formal application. These features and resources include: slopes, soil types, wetlands/vernal pools, small streams, aquifers, floodplains, wildlife habitats, corridors and rare habitats, historic and cultural features such as stone walls, aesthetic views, and trails.
2. The approach to the design of the site is responsive to and reflective of the features identified in the inventory. If there is a wetland on site the buildings are placed in order to provide an appropriate buffer and preserve the area, not fill it. If there is a large trail system abutting the site the design of the buildings would allow access to the trails for the residents.
3. The building areas, lot lines, driveways, and roads are placed after the conservation areas and natural features are identified and preserved. A strong effort is made to minimize the need for impervious surfaces.

New Hampshire RSA 674:21 gives communities the authority to adopt innovative land use controls such as open space development and many communities throughout the Seacoast have done just that. At 2001's Town Meeting, Stratham voters adopted a progressive open space development ordinance that has proven to be quite successful at maintaining and protecting open space while allowing for continued growth.

In conservation subdivision designs, the buildings and site plan are altered to fit the landscape, the landscape is not altered to fit the buildings.

Conventional Subdivision



Conventional subdivision standards create more impervious surfaces because longer, wider roads and driveways, are needed to connect houses with bigger lawns that are spread throughout an area (top). Conservation subdivision standards enable shorter driveways, narrower, shorter roads, less lawn, and more natural open space (bottom).

Conservation subdivision design is a proactive way for Greenland to smartly manage its imminent population increase while also protecting the resources that all residents enjoy.

Conservation Subdivision



ADVANTAGES OF CONSERVATION SUBDIVISIONS

Compared with conventional layouts, conservation subdivisions offer many potential economic, environmental, and social advantages.

- Open space enhances a town's quality of life, which is an asset that attracts quality businesses and economic growth.
- Because homes are not widely scattered, town services cost less and installing utility lines, streets, driveways, and sidewalks is cheaper.
- Open space can be used as public recreation land.
- Site plan approval can be faster because designs match local planning objectives.
- Home value increases when adjacent to protected open space.
- Homes tend to appreciate faster than those in conventional developments.
- Open space can be a buffer that protects wetlands, streams, and ponds.
- Water quality is enhanced when streets and driveways are minimized.
- Open space can provide wildlife habitat that connects wildlife preserves or protects unique or fragile areas.
- Smaller yards are less expensive to maintain.

SOURCES - SEE REFERENCE LIST ON PAGE 12

Having Fun with Conservation



Juan Eno

Believe it or not, there is a frog over your head

The grey tree frog is a common, if not often seen, Greenland resident.

Grey tree frogs live mostly in wooded areas, especially wetland or riparian buffers. They are nocturnal and eat insects. They are well-designed for living in trees with sticky toe pads and the ability to change color from grey to bright green to blend into their surroundings. The frog pictured to the left, was found in Greenland on a small beech tree. It changed color to match the bark. The grey tree frog below is green to match a leaf.



Heidi Bakk-Hansen



Who Knew?

More than 50 different kinds of dragonflies can be found in Greenland.



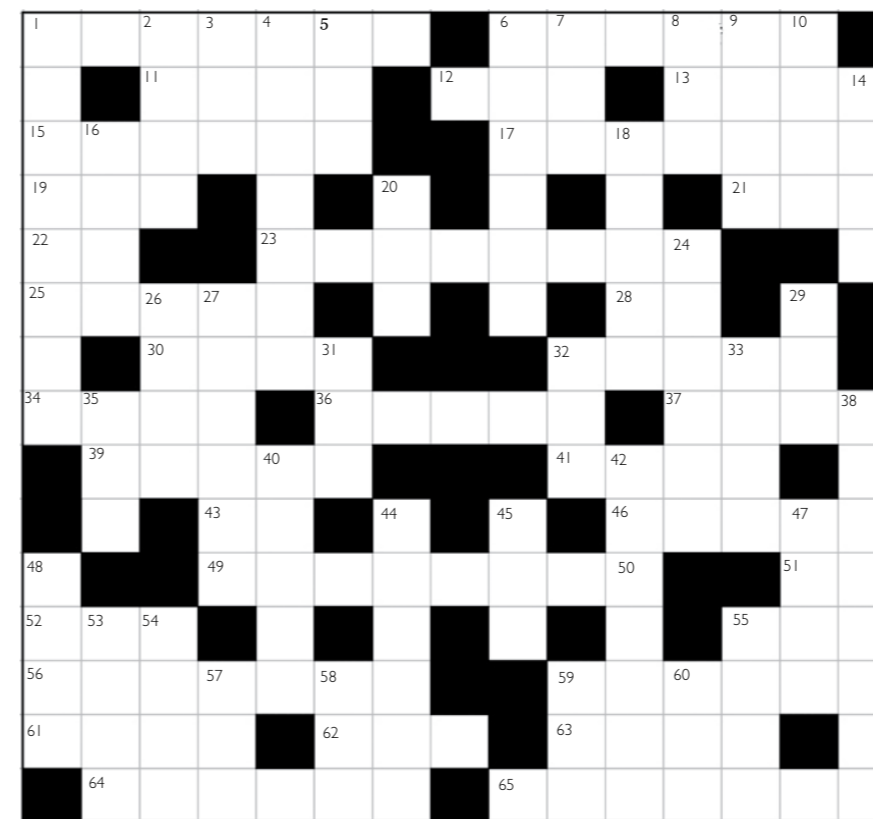
Did You Know?

Impervious Surfaces Are A Problem In Greenland

Research shows that once a watershed is covered with more than 10% impervious cover (like roads, buildings, and parking lots), the water in streams begins to show signs of decline.

In 2005 (the last time it was measured), impervious surfaces covered 12.5% of Greenland. This means water in our streams is already being negatively impacted.

Approving town regulations that increase open space and managing stormwater around the home are a few ways Greenland residents can help lessen the impact of impervious surfaces on our water.



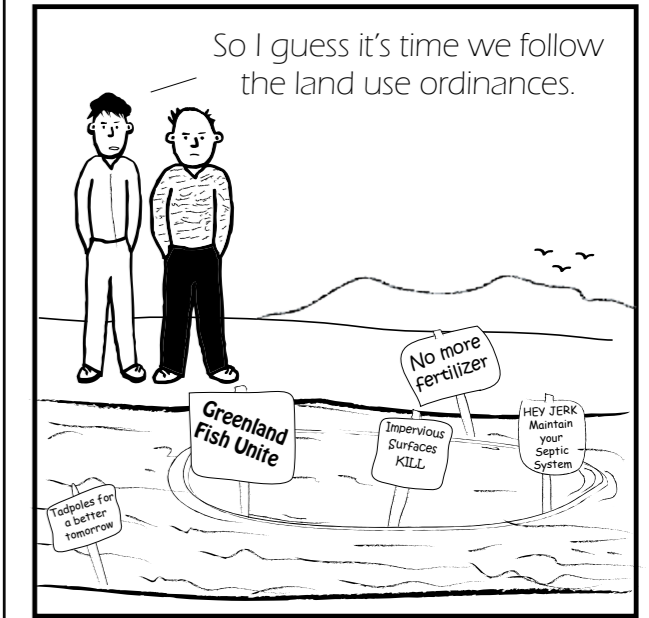
ACROSS

1. One of the three R's to green living
6. UNH volunteer who teaches marine issues
11. local marine mammal
12. HELP
13. corrective year
15. to strike with disgust or revulsion
17. protective areas around wetlands and streams
19. death certificate descriptor (abr.)
21. old computer operating system
22. Main _____ America (abr.)
23. garden structures
25. woodstove byproducts
28. Big Sky state (abr.)
30. orchestral woodwind

DOWN

32. unhealthy bacteria found in polluted lakes
34. mummy's pad
36. tapes displaced by DVDs
37. _____ and tell
39. fish net
41. sink or do this
43. not yes
46. balance sheet item
49. Greenland natural resource worth protecting
51. element of salt (abr.)
52. conference that houses the Pats, Jets, and Bills
55. sound of understanding
56. air passage in the throat
59. fast raptor
61. Men in Black actor: Rip _____
62. hotel discount category
63. pants on fire
64. The Great Bay Discovery Center is part of this reserve (abr.)
65. Venus, for one
1. common water pollutant
2. state regulation that protects shoreland (abr.)
3. a yes vote
4. Cousteau's ride
5. breast feeding advocacy group (abr.)
6. hellegramite adult form: _____ fly
7. Buckeye alma mater (abr.)
8. 2003 Will Ferrell movie
9. a "must have"
10. root that is the base for Hawaiian poi
14. used to gain attention quietly
16. holders of flowers and house plants.
18. water can be this, if polluted with detergents.
20. A study that identified Greenland's natural resources (abr.)
24. a state of balance, motionless
26. this is where the heart is
27. term for a tide that is receding.
29. dog byproduct that pollutes stormwater
31. Adam's roommate
32. trigonometry term (abr.)
33. Granite State NASCAR spot (abr.)
35. organization that employed the Six Million Dollar Man and the Bionic Woman (abr.)
38. important natural resources that purify drinking water, provide wildlife habitat, and help reduce flood damage.
40. Great Bay is on this side of Greenland.
42. ambushed
44. open market
45. organization that includes Hawks, Bucks, Hornets and Timberwolves (abr.)
47. bounce back
48. unit of electricity
53. Wood, Leopard, Bull, or Green
54. dieter's nemesis
55. unit of land
57. news network
58. auditory receptor
59. nickname for Florence
60. young man

Conservationist Chuck L.



Buffer Plant Spotlight: Orange Jewelweed

Orange jewelweed can be found in many buffers in Greenland where its seeds wait to explode when handled too roughly.



Orange jewelweed can be found in many buffers in Greenland where its seeds wait to explode when handled too roughly.

Orange jewelweed is an annual plant native to North America and can be easily found in Greenland. It thrives in wet soils, ditches, and along creeks.

The trumpet-shaped flowers are orange with three petals.

The leaves are slightly lobed and repel water. The droplets that form on the leaves after a rain shine in the sun. They look like tiny diamonds, which is how the plant was given its common name. Similarly, if you submerge the leaves in water their undersides will take on a silvery sheen.

The ripe seed pods hang from the plant and have projectile seeds that explode out of the pods when they are lightly touched. This is the origin of another common name for the plant: touch-me-not.

Jewelweed it is a traditional remedy for skin rashes and fresh jewelweed juice is said to ease itching of stinging nettles.

Invasive Plants

An invasive plant is any vegetation that is a non-native species that monopolizes light, water, nutrients, and space - to the detriment of other species. Many of these plants are exotics, introduced either intentionally or accidentally from another country. Exotic invasive species are able to grow rapidly and spread quickly in a short period of time.

Watch out for invasive species in your wetland and shoreland buffers. When possible pull these plants out and throw them away in the garbage to avoid spreading the plant.

If you suspect you have an invasive species on your property, contact Rachel Stevens, Land Stewardship Coordinator of the Great Bay National Estuarine Research Reserve in Greenland, at 778-0015 or rachel.stevens@wildlife.nh.gov

Plants to watch out for in Greenland



Called bamboo locally, **Japanese knotweed** is one of the worst invasive species in Greenland because it completely takes over areas along roadways and in yards. Care must be taken when removing because clippings can grow a new plant. Careful cutting and disposal is needed over several years.



Asiatic bittersweet's bright orange berries are beautiful in a holiday wreath, but the vines strangle trees and can completely overwhelm buffer areas. The vines spread by seeds and lone underground runners that can seemingly sprout up from no where. Vigilantly pulling down and throwing away the vines is needed to control this plant.



Black swallow-wort is a relative newcomer to Greenland, where it has been found in a few spots. Where found, it has covered and killed native plants. To identify the plant, look for a twining vine with five-petaled star shaped flowers or 2-3 inch seed pods. If you find a patch of swallow-wort, report it to Rachel Stevens (778-0015 or rachel.stevens@wildlife.nh.gov).

Three fast fixes . . .

continued from page 8

local garden centers, hardware stores, or look on the Internet), and they are an easy do-it-yourself green technique for collecting rooftop runoff water for later use.

Rain barrels alone help to dramatically reduce the impact of water that's coming off of your property. Look for barrels with a tap and hose at the bottom of the barrel which allows for easy access to the water, and a screened opening at the top to keep mosquitoes out. Also look for a downspout diverter insert for directing water flow into your barrel, making for easy collection. In some cases a "rain chain," a decorative chain that hangs from the valley or gutter point of your roof, is useful, although these are not as effective in directing water into your barrel.

Last but not least, many businesses, institutions and residences are implementing green roof strategies. Green roofs are roofs that have had specially designed trays of vegetation laid on them. The trays are designed for maximum water absorption and climate conditions, as are the plants, and can be easily installed by non-professionals. Pathways and seating areas can be created for aesthetic appeal, allowing for a place to retreat (if accessibility and codes allow), or the roof can be completely transformed for maximum runoff control.



A greenroof installed on City Hall in Manchester in 2002.

The UNH Cooperative Extension worked with the City of Manchester in creating a green roof on a portion of its City Hall building using a system called GreenGrid. GreenGrid is a modular green roof system composed of a series of pre-planted modules made of recycled plastics that can easily be placed directly on a roof or other structure with sufficient structural capacity.

Many of the benefits gained from implementing a green roof can include:

- * Reducing the energy needed to heat and cool the building below.
- * Saving money by extending the life of the original roof.
- * Filtering air pollutants.
- * Improving air quality.
- * Absorbing noise.
- * Reducing the risk of flooding and overflowing sewers.
- * Providing habitat for butterflies and other pollinators.

To sum up, rain gardens not only reduce water runoff or provide wildlife habitat, they also improve the aesthetic value of your home or business. Rain barrels are a very easy way for homeowners to save money on water bills, conserve water, and help protect the environment. Green roofs, while perhaps not a first choice for some, are quickly gaining ground as a smart way to beat soaring energy costs, let alone stormwater runoff. Installing these green techniques at your home or business can help protect our streams, rivers, and ponds, make our community more sustainable, and address some of the larger pollution issues faced by Great Bay by reducing the impacts associated with stormwater runoff. You can make a difference!

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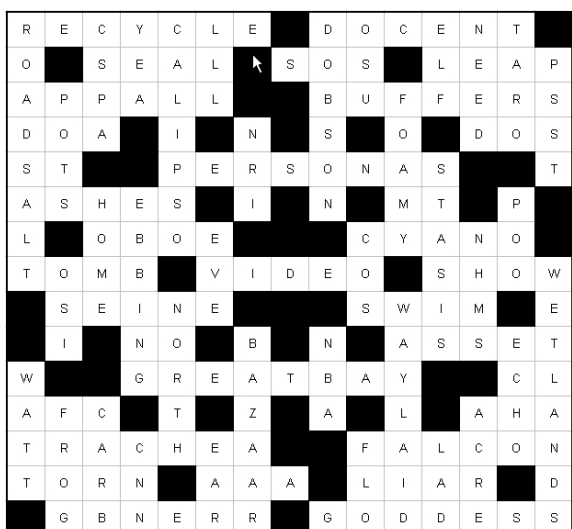
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There are no bad dogs, just bad dog owners.

In some Greenland neighborhoods, dog waste is a major source of bacteria in streams. Dog owners can eliminate this pollution by simply picking up after their dog and burying the waste or putting it in the trash. Routinely cleaning dog waste from pens and play yards prevents rainwater from flushing bacteria into streams. If you walk your dog(s) at Greenland Recreation Field, Caswell Field, or Krasko Field, please use the newly installed dog waste receptacles.

NEVER DUMP DOG WASTE DIRECTLY INTO A STORMDRAIN