

Alternative Forest Uses

INTRODUCTION

Approximately 55 percent of Rhode Island is forested, however this resource is being lost and fragmented by intense development pressure. Due to the small size, low productivity, and short ownership tenure of forested parcels in Rhode Island, the production of traditional wood products often isn't feasible. Alternative uses may be an option for landowners who wish to actively manage their property and may provide an additional incentive for large landowners to retain their land.

Managing for Alternative Forest Uses may provide new ways for landowners to generate income; at least enough to pay property taxes and may have the potential to develop into a small business. This compliments other DEM programs, preventing fragmentation of forestland and promotes sustainability, and is meeting the needs of the current population without compromising the resource for future generations.

There is a series of brochures and fact sheets available on each of the subjects below. To access these resources on-line, go to the RI DEM website (www.state.ri.us/dem), click on Programs, then on Division of Forest Environment, and then on Alternative Forest Products. There is also a link at www.rifco.org. You can download the fact sheets, or link to other websites and suppliers for more information. For printed versions of these fact sheets, contact the RI Division of Forest Environment at (401)647-3367, or RIFCO at (401)568-3421.

EDIBLE PRODUCTS

Mushrooms

Collecting wild mushrooms is a traditional family activity in many cultures. The most common wild gathered mushrooms in Rhode Island are varieties known as honey mushrooms and chicken of the woods. The most important steps when gathering wild mushrooms are to either go with someone who is experienced in identifying mushrooms, and/or consult reliable publications.

Some varieties of mushrooms, like shiitake and oyster, can be cultivated. Basic steps for growing these mushrooms include obtaining spawn, preparing the logs, introducing the spawn to the logs, and keeping the logs cool and moist until the fungi colonize the log to form mushrooms.

Maple Syrup

The warm days and cool nights in late February and early March stimulates the sap to flow in maples. Maple syrup has been used as a sweetener on and in foods for generations.

Making maple syrup involves tapping trees, collecting the sap, and processing it into syrup by evaporating off the water. Large trees (over 10 inches in diameter) with large, well-formed crowns may be tapped to harvest the sap. Either buckets or plastic tubing can be used to collect the sap. Processing involves boiling the sap in an evaporator to boil off water and concentrate the sap into syrup. It takes about 40 gallons of sap to produce one gallon of maple syrup.

Most of the syrup produced is made in northern New England and Canada by tapping sugar maple trees. Although sugar maple is uncommon in Rhode Island's forests, red maple can also be used. Norway maple (an imported species) is also used since many planted in the past as ornamentals are now large and accessible for tapping. The sugar content of red and Norway maple sap is lower and the tapping season shorter than sugar maple.

MEDICINAL PRODUCTS

Ginseng

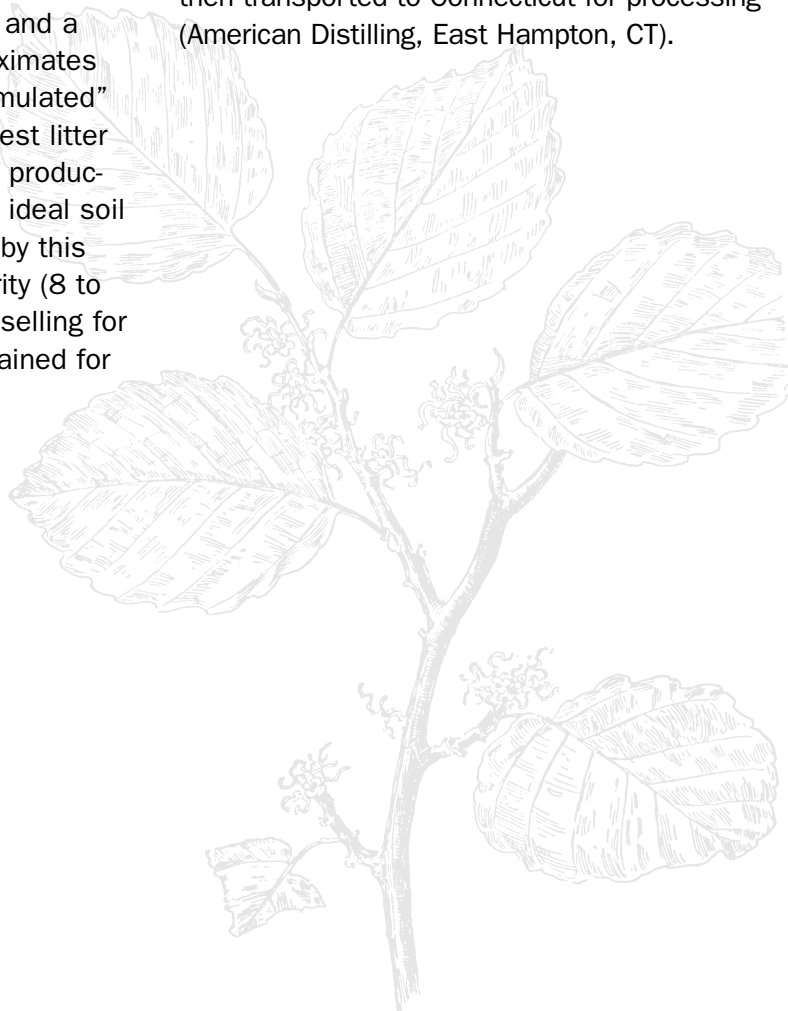
Ginseng is an herb that has been used for centuries for medicinal purposes, especially in Asia. Its use in the US, as well as other parts of the world, has increased dramatically with heightened interest in alternative medicine. Native ginseng has been decimated in China where high prices have led to the collection of plants even before they are large enough to produce seed.

Ginseng is native to the eastern U.S., growing in fertile, moist woodland soils as an understory plant. Ginseng can also be grown by cultivation in fields or under forest conditions. Forest-grown ginseng is also referred to as “wild simulated” ginseng because the forest environment, with partial shade and a minimum of site disturbance, approximates natural conditions. Growing “wild simulated” ginseng involves raking back the forest litter and broadcasting seed. This type of production is only appropriate on the most ideal soil conditions. Although ginseng grown by this method takes longer to reach maturity (8 to 10 years), it is more valuable, thus selling for high prices comparable to those attained for wild ginseng.

Witch Hazel

Witch hazel is one of the key components in many present-day topical ointments. The twigs and bark from witch hazel, a plant native to Rhode Island woodlands, are used to produce distillate. Witch hazel plant is a small tree, rarely over twenty feet tall. It is a slow growing tree which tolerates shade and is usually found growing in the understory of hardwood forests on fertile, moist soils.

Witch hazel plants are harvested in late fall and early winter, and are then chipped and boiled. The steam produced from this boiling process goes through a separator to a condenser, where it becomes astringent. There are several contractors who purchase and harvest raw witch hazel from local forests. It is chipped and then transported to Connecticut for processing (American Distilling, East Hampton, CT).



SPECIALTY PRODUCTS

Floral Greenery

Floral greenery has a rapidly expanding market. There are a variety of forest grown floral products that are used for decorative arrangements such as wreaths, backdrops for floral arrangements, and bouquets. Conifer boughs are popular holiday decorations and are mainly made from white pine and balsam fir. Markets boom during the holiday season with the sale of wreaths, garland, and swags. Princess pine, holly, and mountain laurel are native plants that are used for decorative purposes. Foliage can be harvested on a sustainable basis every two to three years. Although land is not usually managed solely for the purpose of producing floral greens, it can be achieved in conjunction with other objectives, like thinning a pine forest to increase tree growth.

Florist shops and local specialty shops are the most promising markets for forest grown floral greens. Market prices vary with plant species and product quality

Specialty Wood Products

Specialty wood products includes trees, or parts of trees, that are not usually considered valuable as forest products. This could be due to their species and form, or that the volume is so small that traditional harvesting operations are not economically viable. However, these raw materials can be turned into valuable products by skilled artisans! The product list is lengthy and quite diverse, but all crafts are unique. Items like furniture, carvings, musical instruments, bowls, baskets, table tops, walking sticks, wooden bats, and other crafts are among the many products.

There are two strategies for forestland owners; one is to manufacture the products themselves, the other is to sell wood or wood “debris” from the land to small woodworking businesses. Marketing prices vary with location and the target market. The product quality, demand and product availability all influence profitability.

RECREATIONAL USE OF FORESTLAND

As public recreation areas become more crowded, the use of private land is becoming more enticing to people seeking solitude and a “back to nature” experience. Recreational use of forestland includes leasing land for hunting and fishing, as well as charging fees for other outdoor activities like cross-country skiing, horseback riding, hiking or mountain biking.

Charging fees for using private land is not a new concept; there are well developed markets for hunting leases in the southern U.S. Ski areas in northern New England have developed into four season recreational areas featuring a variety of activities. The economic viability of this type of enterprise depends on the type of land and its location, as well as the scope of services offered. Hunting requires large acreage and high quality habitat for wildlife. Fishing requires access to ponds or streams. A well developed trail system is essential for dispersed recreation, such as hiking, cross-country skiing, trail biking, or horseback riding. An option for landowners with small acreage could be to work cooperatively in order to create larger acreage with more extensive trail system.

The issue of liability makes landowners reluctant to grant access to their property for any type of recreation. In Rhode Island, landowners are granted limited liability (RIGL 32-6-3) for land available for free public recreational use. Liability insurance is a necessity for any commercial enterprise. This may be available as a rider on your homeowners policy. A lease or another small form of written agreement is advisable to spell out the terms of using the property.

Prior to deciding upon an Alternative Forest Business, make sure you consider the following:

SITE ASSESSMENTS

Your forest land must be compatible with your product of interest. Soils, slope, vegetation, and access are only a few of the considerations. Please refer to the fact sheet on site assessments available through the RI DEM Alternative Forest Uses Program and included in the RI Conservation Management Practices Guide.

MARKETING YOUR PRODUCTS

A marketing plan is essential for a successful product-oriented business. How will you sell what you grow? What is the current potential, or can you create a new market for your product? Business plans typically include a marketing component, and you can get help with a business plan through agencies such as the RI Rural Development Council.

RESOURCES & PUBLICATIONS:

Websites & Organizations:

RI DEM website on Alternative Forest Based Businesses

www.state.ri.us/dem/programs, click on Division of Forest Environment, click on Alternative Forest Uses

No. American Mycological Association:
www.namyo.org (503) 657-7358

"*Learning to Grow American Ginseng*", by Mountain Top Farms
www.mountainfarm.com/ginstart.htm

www.hort.purdue.edu/newcrop

American Association of Woodturners:
www.woodturner.org

Ocean Woodturners (RI Chapter of AAW):
(401) 789-9037

National Wood Carvers Association:
www.chipchats.org PO Box 43218, Cincinnati, OH 45243.

Publications:

RI DEM Fact Sheets: (download from Alternative Forest Based Businesses website, obtain the CD that includes .pdf files with these fact sheets, or contact RI Division of Forest Environment at (401)647-3367 for a copy)

Producing Maple Syrup

Growing Ginseng

Cultivating Mushrooms

Hunting Leases on Private Lands

Evaluating Your Land

No. American Maple Syrup Producer's Manual. Ohio State University.
(614)292-1607

The Herb Hunter's Guide – American Medicinal Plants of Commercial Importance.

A.F. Sievers, USDA Publication #77.
Available online at

www.hort.purdue.edu/newcrop/HerbHunters

This Alternative Forest Uses fact sheet is part of the RI Conservation Management Practices Guidebook produced by the RI Forest Conservator's Organization (RIFCO). For your complete binder set of the Guidebook, contact RIFCO at (401) 568-3421, PO Box 53, No. Scituate, RI 02857, or visit www.rifco.org.

Carbon Sequestration

INTRODUCTION:

The World's climate comes from the interaction of solar radiation from the sun and the blanket of gases surrounding the earth known as the atmosphere. These natural gases in the atmosphere act like a roof in a greenhouse, allowing the sun's light in while preventing all the heat from escaping. This natural phenomenon that makes the earth inhabitable to life as we know it is known as the "Greenhouse Effect." Through the burning of fossil fuels, human activities are altering the chemical composition of the atmosphere.

The increase of greenhouse gases, including carbon dioxide, in the atmosphere from fossil fuels allow less of the energy generated by the sun to be released back into space and causes more of the heat to be trapped in the earth's atmosphere. Many believe this is causing global warming where the earth's temperature is rising which in turn is changing precipitation patterns, soil moisture and sea levels.

The ability of trees and plants to "tie up" carbon dioxide as woody carbon is now referred to as carbon sequestration and carbon sink. It is thought that this is one way to limit and even decrease the amount of carbon dioxide in the atmosphere and reverse the global warming trend. Other strategies include cleaner energy, increases in energy efficiencies, and recapturing and reusing greenhouse gases that would otherwise be emitted into the atmosphere.

When a tree grows it goes through a process called photosynthesis whereby carbon dioxide (CO₂) is taken from the atmosphere and water (H₂O) from the wet earth, then using heat energy from the sun, makes wood and oxygen (O₂). This process is illustrated in Figure 1.

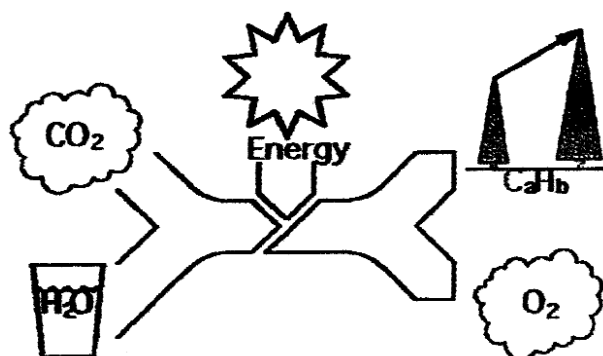


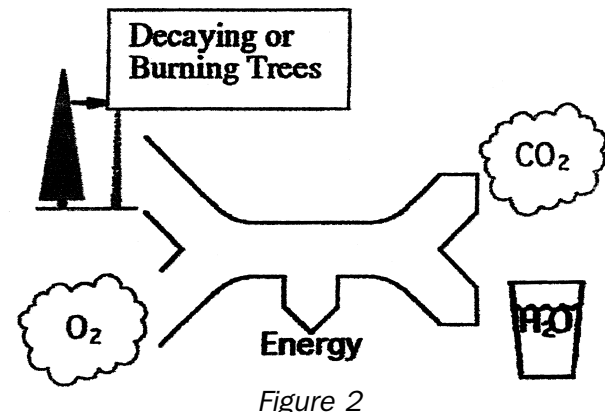
Figure 1

Most of the oxygen is released to the atmosphere so we and other animal life will have healthy air to breathe. These processes are the most fascinating aspects of the plant-animal life cycle.

There is an important and direct relationship between the pounds of carbon dioxide taken from the air and water from the earth, and the pounds of oxygen put into the air and the pounds of wood grown. The more the tree grows, the more oxygen is created in the air, as shown in Figure 1 above. Since the rate of air cleansing is related to tree growth, in pounds of wood, oxygen generation is greatest when tree growth is greatest or fastest.

2 FACT SHEET **Carbon Sequestration**

When trees (wood) are allowed to burn or decay, the cycle shown in Figure 2 occurs.



This is the reverse of what happens in Figure 1. In this degenerating process, the trees turn the oxygen from the air and wood into carbon dioxide and water. This process dirties up the atmosphere adding excess carbon dioxide to that generated by fossil fuel energy and heat conversion that we need. Do trees that lie there and rot on the forest floor or go up in flames in a forest fire really make sense when we have worldwide concerns about excessive carbon dioxide in the atmosphere?

SO WHAT IS BEING DONE?

In December of 1997, the Kyoto Protocol for reducing greenhouse gas emission was formulated. This required industrialized countries to reduce its emission of greenhouse gases by the period of 2008-2012 to a specific level related to 1990 emissions. The Kyoto Protocol allows for industries and companies within a country that are not able to meet their reduction goals through other means to acquire and use carbon credits to come into compliance. Land use projects that sequester additional carbon will result in carbon credits or carbon offsets. Activities such as planting trees, agro-forestry, increasing tree growth rates, or changes in farming practices to increase carbon retention in the soil (such as no-till methods) all have the potential to create credits.

WHAT CAN LAND OWNERS DO TO HELP?

The Growth versus Age graph, shown in Figure 3 below, illustrates the approximate growth of most forest trees as they go through their life cycle.

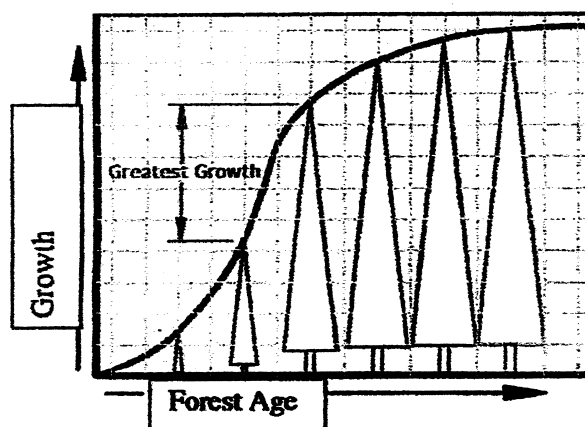


Figure 3

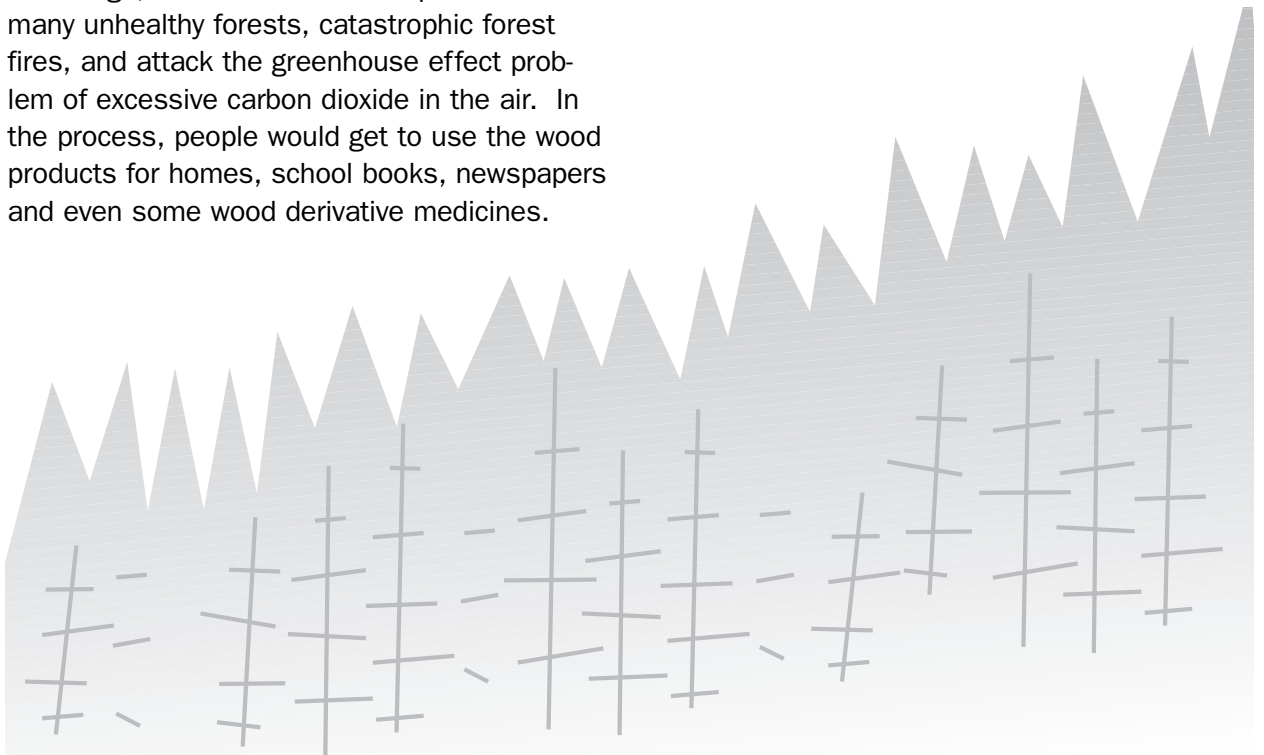
This growth is in pounds of wood in the tree. The growth is highest when the line is steepest as per the segment identified as "Greatest Growth."

Back to the question, "What can landowners do to help?" One way we can retain the greatest atmospheric gain is to hold the forest inside the Greatest Growth range. We have known for years how to manage the forest for greatest growth by thinning and, in some species, clear-cutting the forest.

The key to long-term sequestration is to lock up the carbon; that is to make something out of the wood which prevents it from going into the reverse natural cycle by decay or fire. Herein lies the question, "Do trees that lie there and rot on the forest floor or go up in flames in a forest fire really make sense when we have worldwide concern about excessive carbon dioxide in the atmosphere?"

Our forests are capable of more oxygen conservation than we are achieving with some of our political influences. If we let our forest professionals manage the forest to the public's advantage, we could reduce the problems of many unhealthy forests, catastrophic forest fires, and attack the greenhouse effect problem of excessive carbon dioxide in the air. In the process, people would get to use the wood products for homes, school books, newspapers and even some wood derivative medicines.

A Rhode Island Greenhouse Gas Action Plan was recommended. For a land use project to create carbon offset (credits) it must meet eligibility requirements which can be complex. In determining if a land use project will create carbon credits (offsets), the qualifications of existing carbon and flow (both in and out) for the area must be determined. This needs to be accomplished for both the baseline, natural conditions, and for the proposed project to determine the net increase in carbon storage. The evaluation process contains a number of different steps that need to be followed; it is recommended that you contact a professional forester to help.



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RESOURCES & PUBLICATIONS:

Websites:

U.S. Dept. of Energy sites
www.carbonsq.com

www.science.doe.gov

csite.esd.ornl.gov/scott.pdf – Economically Viable Forest Harvesting Practices That Increase Carbon Sequestration

Dept. of Energy's Voluntary Reporting of Greenhouse Gases Program
<http://www.eia.doe.gov/oiaf/1605/frntvrvgg.html>

Details on the Kyoto Protocol are available on: www.unfccc.int

Reports & Articles

For a copy contact RIFCO at 401.568.3421

How to Estimate Carbon Sequestration of Small Forest Tracts

Hoover, Birdsey, Heath, & Stout. 2000.
Journal of Forestry 98 (9): 13-19

*RI Greenhouse Gas Action Plan
Phase I: Developing a GHG Reduction Framework*

2001. Tellus Institute. Development of Options: Scoping Paper for the Working Group on Transportation and Land-Use.

This Carbon Sequestration fact sheet is part of the RI Conservation Management Practices Guidebook produced by the RI Forest Conservator's Organization (RIFCO). For your complete binder set of the Guidebook, contact RIFCO at (401) 568-3421, PO Box 53, No. Scituate, RI 02857, or visit www.rifco.org.

Farm, Forest, Open Space

INTRODUCTION:

Chapter 44-27 of the RI General Laws provides for land enrolled in the Farm, Forest, Open Space (FFOS) Program to be assessed at its current use value, not at its potential value as buildable land.

The purpose of the law is to conserve Rhode Island's productive agricultural and forest lands, and to protect open space benefits. The law does not guarantee that property taxes will be reduced, only that the assessment will be based upon its value as farm, forest, and open space land.

The RI Farm, Forest, Open Space Valuation Subcommittee was established in 1999 to develop defensible methodologies for determining recommended, statewide current-use value.

The following values for various categories within each designation have been recommended as of January, 2003. These values may be again updated in the future, and towns will typically implement new values every 3 years during a statistical or full revaluation.

Open Space

Soils with Slight Limitations for use: 30% of Fair Market Value

Soils with Moderate Limitations: 20% of FMV

Soils with Severe Limitations: 10% of FMV

Size: 10 acres of undeveloped land, exclusive of housesite

Farm

Ornamental crops: \$1,955 per acre*
Includes nursery, turf, land under greenhouses, floriculture

Vegetable and Orchards: \$650/acre*
Includes small fruits, potatoes, cranberries, Christmas trees

Dairy and Livestock: \$300/acre*
Includes forage crops, hay, grain, silage corn

Wetlands & Woodlands: \$100/acre*

Size: Five (5) acres devoted to agricultural use.

Requirements:

- Annual income from sale of farm products of \$2,500 in one of two previous years;
- Farmer must have a soil conservation plan, or have applied for one, from local Conservation District

**2003 recommended values. Call the RI Division of Agriculture for updated values.*

Farm, Forest, Open Space

Forest

All DEM– certified managed woodlands: \$100 per acre*

Size: Ten (10) acres or larger, not including zoned house lot or one (1) acre, whichever is smaller.

Requirements:

- Plantations must bear at least 500 trees per acre, and be established at least one year old.
- The forest must be actively managed in accordance with a written forest management plan, approved by the RI Division of Forest Environment.
- Re-certification every five (5) years is required.

** 2003 recommended value. Call the RI Division of Forest Environment for updated value.*

Application Process

Open Space: Application directly to Tax Assessor's Office in your city/town.

Farm: DEM application form, signed by Tax Assessor and Conservation District official, to DEM with check for \$10.

Forest: DEM application form, signed by Tax Assessor, with 2 copies of forest management plan, to DEM with check for \$10.

The application form for either Farm or Forest certification is included in the Citizen's Guide to the Farm, Forest, Open Space Act, available from the RI DEM. Call the RI Division of Forest Environment or the RI Division of Agriculture for a copy, or your Tax Assessor may have one available.



YOUR FOREST MANAGEMENT PLAN

The RI Division of Forest Environment (DFE) is responsible for certification of forest land under the FFOS Program. The DFE has regulations to guide landowners on the certification process, which requires development and adherence to a forest management plan.

A forest management plan must include:

- Property map with forest stands identified
- Description of the forest stands
- Management objectives
- Recommendations and Timetable for forestry activities

Forest stand descriptions must include information on stocking level, basal area, average tree diameter, trees per acre, site index, and management recommendations.

Certification is good for five (5) years, at which time the DFE service forester will review the progress you have made in following your plan, to determine your re-certification for another five years. Management plans must also be kept up-to-date. Typically a plan will be valid for 10 years.

A landowner unable to complete the activities outlined in their management plan may submit a written request to amend the plan to the Director of the RI DEM. If, through willful neglect, a landowner fails to complete the activities in the management plan, DEM will cancel designation of the land and the property will be assessed at fair market value. You will also have the option of changing your designation to Open Space through application to the Tax Assessor. No change of use penalties are due until the parcel is developed.

Only those landowners who are serious about actively managing their woodlands should participate in the forestry component of the FFOS Program.

For assistance in the development of your forest management plan, contact a consulting forester, who will prepare the plan, according to your management objectives, for a fee. For a list of consulting foresters that operate in Rhode Island, contact the RI Division of Forest Environment.

DETAILS

House sites:

Typically, the developed portion of your property will be assessed as a house site, and your undeveloped acreage must meet the criteria. The definitions specified under 44-27-2 specifies that a house site be the zoned lot size or one (1) acre, whichever is smaller. If there is no house on the property, then no house site is excluded from the program. You should not be assessed for a house site on undeveloped acreage that meets the criteria of the program.

Openings and Christmas trees in a Forest designation:

Small openings within wooded areas can be considered wildlife habitat and can be incorporated into a forest management plan. Christmas tree operations of less than five (5) acres can also be included in a forest management plan. If you have a combination of wooded land and open hayfields, you must place the open acreage into Open Space, assuming you don't qualify for the Farm designation's income requirements.

Land Use Change Tax:

44-27-39 subjects land withdrawn from the program within 15 years of its enrollment to a penalty tax. This tax is assessed upon withdrawal, and due upon actual change of use. The tax amounts to 10% of fair market value during the first five years, and decreases one percent per year. No land use change tax can be applied after the 15 year period.

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FACT SHEET **Farm, Forest, Open Space**

RESOURCES & PUBLICATIONS:

A Citizen's Guide to the Farm, Forest, and Open Space Act, RI DEM

RI's Farm, Forest, Open Space Valuations (brochure), RIFCO

The Forest Certification and Assessment Process (brochure), RIFCO

Foresters and the Care of Your Land (brochure), SNEFC

RI DEM, Division of Forest Environment
1037 Hartford Pike, No. Scituate
401-647-3367

RI DEM, Division of Agriculture, 235
Promenade Street, Prov., 02908
401-222-2781

RI Forest Conservator's Organization (RIFCO)
www.rifco.org
401-568-3421

RI Farm Bureau,
2227 Plainfield Pike, Johnston, RI 02917
401-647-3570

No. RI Conservation District
17 Smith Ave, Greenville, RI 02828
401-949-1480

So. RI Conservation District
60 Quaker Lane, Suite 46, Warwick, 02886
401-822-8832

Eastern RI Cons. District
2490 Main Rd., Tiverton, RI, 02878
401-624-7490

Southern New England Forest Consortium
(SNEFC), www.snefc.org
401-568-1610

Your Local Tax Assessor:

This Farm, Forest, Open Space fact sheet is part of the RI Conservation Management Practices Guidebook produced by the RI Forest Conservator's Organization (RIFCO). For your complete binder set of the Guidebook, contact RIFCO at (401) 568-3421, PO Box 53, No. Scituate, RI 02857, or visit www.rifco.org.

Water Quality Protection



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Original Illustrations by James E. Taylor

First edition, 1996 • Second edition, 2003

2 FACT SHEET **Water Quality Protection**

Dear Reader:

As users of our natural resources, we have a responsibility to be good stewards of the land. Rhode Island's Forestry Best Management Practices (BMP's) for water quality are designed to help loggers, landowners, and land managers be good stewards by protecting water quality during forest management activities.

This manual provides recommended voluntary guidelines and highlights the enforceable restrictions for the conduct of timber harvesting operations in forested wetlands. The BMP's may be modified for specific site conditions with guidance from a natural resource professional. Any modifications will be done only to provide equal or better water quality protection.

The use and effectiveness of BMP's in protecting water quality will be reviewed as we monitor timber harvesting operations throughout the state. This field manual will be updated periodically as we learn about impacts on water quality and the effectiveness of these BMP's. Persons using this manual are welcome to offer comments and participate in future revisions.

You may reproduce or copy any portion of this manual. Acknowledgement of this manual as a source of materials would be appreciated. I especially want to thank the Rhode Island Forest Conservator's Organization, Inc., whose assistance with producing this manual has been greatly appreciated.

*Thomas Dupree, Chief
RI Division of Forest Environment
March, 1996*

PREFACE

This manual has been prepared in response to a need to protect water quality from impacts resulting from forest management operations. Section 208 of the 1977 Clean Water Act requires each state to develop plans and procedures to control "silviculturally related non-point sources of pollution. . . to the extent feasible." Section 319 of that act requires each state to develop and implement a program to reduce non-point source (NPS) pollution to the "maximum extent practicable."

In order to accomplish a reduction of NPS pollution from forestry activities, the applica-

tion of soil and water protection measures by woods operators and forest landowners is an accepted industry practice. These measures are referred to as Best Management Practices (BMPs), in both Rule 6.02, "Exempt Activities", of the Rules and Regulations governing the RI Freshwater Wetlands Act (2-1-20, General Laws of Rhode Island, 1956, as amended), and the Woods Operator Registration Law (2-15-2, RIGL, 1956 as amended).

In order that sensible, low impact operations can proceed without regulatory overburden, Rule 6.02 allows timber harvesting oper-

ations in forested wetlands, riverbank wetlands, and perimeter wetlands, as an exempt activity within approved Best Management Practice guidelines and monitoring by the RI Dept. of Environmental Management's Division of Forest Environment (RI DFE). The Water Quality Conservation Management Practices guidelines contained in this manual are those approved guidelines for the purpose of complying with the Freshwater Wetlands Act and its rules and regulations.

The production of this manual is the result of input and funding from a variety of sources.

The RI Forest Conservator's Organization, Inc. (RIFCO), a non-profit forest landowner and conservationist organization, has procured the grant to publish this manual, and provided organizational oversight for its editing and production.

The RI Department of Environmental Management's (RIDEM) Division of Forest Environment (DFE), a state agency responsible for the management of Rhode Island's forest resources, monitors timber harvesting practices through the Intent to Cut process.

The RI DEM's Office of Water Resources, Freshwater Wetlands Program (FWP) and Office of Compliance and Inspection, Wetland Enforcement Program provided valuable input to clarify the regulations that are referenced in the Water Quality Protection section of this Manual.

The RI Chapter of the Society of American Foresters, representing the forestry profession in Rhode Island, shares the educational goals of the DFE and RIFCO, and provided review input to the formation of this manual.

Providence Water, Rhode Island's largest municipal water supplier and manager of the Scituate Reservoir and its watershed lands, is interested in the quality of timber harvesting practices of forest landowners within its 92.8 square mile watershed area. Providence Water staff provided review input for the production of this manual.

The RI Tree Farm Program, which recognizes and certifies forest landowners as good stewards of the land, provided a grant to cover part of the costs of producing this manual.

The producers of this manual would like to thank the USDA Forest Service for the grant to publish this manual and to conduct landowner/logger workshops.

This Water Quality Protection fact sheet is part of the RI Conservation Management Practices Guidebook produced by the RI Forest Conservator's Organization (RIFCO). For your complete binder set of the Guidebook, contact RIFCO at (401) 568-3421, PO Box 53, No. Scituate, RI 02857, or visit www.rifco.org.

WHY PROTECT OUR FORESTED WETLANDS?

Forested wetlands are areas inundated with surface or groundwater at a frequency and duration sufficient to support vegetation adapted for life in saturated soil. Forests have the ability to stabilize and protect the quantity and quality of the water. Water quality is related to the physical, chemical, and biological characteristics of the water. Without disturbance by humans water quality in an area is ordinarily related to the conditions of the environment through which the water passes. Forested wetlands can be identified based on three general characteristics: vegetation, soils, and hydrology (EPA, 1989).

Wetlands provide many functional values in the ecosystem, among them:

- **Water Quality Protection** - Wetlands store and filter pollutants such as sediment and the nutrients in sediment. Wetland plants and retention can also transform some pollutants into non-polluting forms.
- **Flood Protection** - By storing runoff from heavy rain and snowmelt, wetlands can reduce flood damage.
- **Groundwater Recharge and Discharge** - Some wetlands recharge groundwater by moving surface water into the ground, while discharging wetlands do the reverse. Recharge is important for groundwater well supplies, and discharge is important to provide stream baseflows during dry periods.
- **Animal and Plant Habitat** - Many animals spend their lives in wetlands, while others use wetlands for feeding, breeding, nesting, escape cover, or travel corridors. Wetland plants provide food and shelter for many animal species, including endangered species.

Forestry BMP's in wetlands protect water quality by controlling erosion and minimizing changes to the surface water flows that can occur from rutting and road building. Changing the surface water flow can affect the health of the wetland ecosystem and its flood protection function.

BEFORE YOU SELL OR CUT TREES ON YOUR PROPERTY

Planning

Careful planning for forest management activities, such as road construction and timber harvesting, will minimize non-point source (NPS) pollution. A plan will lead to harvest operations that use BMPs, remove forest products efficiently and profitably, and promote sustainable forest growth and water quality protection.

When planning to harvest in a wetland area, wait until the driest time of the year or until the ground is frozen. During seasonally dry periods a well-planned harvest may be executed with a minimum of site degradation. Use of harvesting equipment during unsuitable weather and soil conditions may lead to considerable site degradation.

The first step is to develop a comprehensive forest management plan that includes forestry BMPs. The plan should be flexible and adaptable to changing conditions. Landowners and land managers should select the best management strategy to protect water quality specific to the soil and slope conditions of the property.

Consulting or industrial foresters can work with landowners on developing a written forest management plan. Cost-sharing assistance may be available for written plans through programs administered by the Division of Forest Environment.

Following are some of the planning guidelines that you should use:

- Consider overall objectives, and how the wetlands and water resources fit in;
- Identify on a map all wetlands, sensitive areas, access roads, and other natural features;
- Use this map and site visits to lay out proposed logging trails, landings, and stream crossings;
- Incorporate site-specific BMPs into timber sale contracts;

- Incorporate inspection and enforcement conditions into timber sale contracts which will require woods operators to adhere to planned BMPs, and will provide bonding for repair work if it's needed;
- Plan to stabilize bare soil as soon as possible after exposing it to prevent erosion and sedimentation;
- Incorporate seeding and slash cover BMPs into timber sale contracts.

REGULATION OF WETLAND ACTIVITIES

There are several agencies responsible for the regulation of wetland activities within the State of Rhode Island. The Wetland Enforcement Program within the Office of Compliance and Inspection at the Rhode Island Department of Environmental Management (RIDEM) is responsible for regulatory enforcement activities related to Freshwater Wetlands. Specifically, they investigate complaints and suspected violations of environmental laws and regulations relating to freshwater wetlands and issue orders to remediate any unauthorized work.

The Freshwater Wetland Program within the Office of Water Resources at RIDEM is the agency responsible for regulating alterations of Rhode Island's freshwater wetlands through an orderly application process that verifies delineated wetland edges, determines the presence of wetlands, and reviews proposed projects in and adjacent to freshwater wetlands for any applicant who is the owner of the property in question.

The Coastal Resources Management Council (CRMC) is responsible for regulating alterations of Rhode Island's Freshwater and Coastal Wetlands in the vicinity of the coast. Maps illustrating the jurisdiction lines between CRMC and RI DEM are available from the state. The CRMC applies the same exemptions as the RI DEM for activities within a wetland and its buffer.

Definition of Wetlands:

Freshwater wetlands, by law, includes any marsh, bog, pond, swamp, river, riverbank, area of land within 50 feet of a marsh, bog, pond, or swamp, areas subject to flooding, areas subject to storm flowage, floodway, flood plain, flowing body of water, stream, intermittent stream, perimeter wetland, submergent and emergent plant communities, special aquatic sites, and shrub and forested wetlands. Riverbank wetland is defined as that area of land within 200 feet of the edge of any flowing body of water having a width of ten feet or more, and that area of land within 100 feet of the edge of any flowing body of water having a width of less than ten feet during normal flow. In addition, operations conducted outside wetlands may be considered alteration of a wetland if the activity subsequently impacts an area classified as a wetland.

Perimeter and Riverbank wetlands (buffer zones) are not applied to the following wetland types:

1. Areas subject to storm flowage
 2. Floodplains
 3. Forested Wetlands less than 3 acres in size
- A pond is further defined as a permanent body of water larger than one-quarter acre in size.

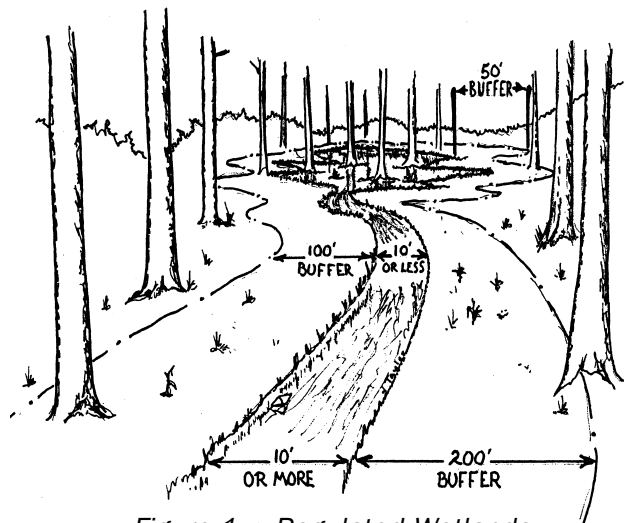


Figure 1 • Regulated Wetlands

FOREST MANAGEMENT IN WETLANDS

Forest management activities in and around wetlands, especially timber harvesting, can affect our wetlands when soil, vegetation, and surface water flow conditions are altered. Sediment is the dominant source of nonpoint pollution caused by harvesting operations, yet is the easiest to control by the use of BMP's. Most of this is associated with runoff from haul roads and skid trails as well as with stream crossings. Poorly planned or improperly executed silvicultural operations can increase nonpoint source pollution by:

- Exposing mineral soil, leading to increased erosion and sedimentation.
- Removing shade from streams, which increases water temperature.
- Adding nutrients, which increases aquatic plant growth, and then reduces the Dissolved Oxygen (DO) levels in the water when decomposition of that plant matter occurs.
- Removal and disturbance of vegetation that help remove pollutants from stormwater entering the wetland system.

HARVESTING OF FOREST PRODUCTS

The Division of Forest Environment, through the Intent to Cut process, oversees harvesting operations on Rhode Island forestlands, including forested wetlands. A Notification of Intent to Cut or Saw, filed by the woods operator, or a written, approved management plan under either the Forestland Certification of the RI Farm, Forest, Open Space Act, or the Forest Stewardship Program, eliminates the need for a wetlands permit for the harvesting operation, as long as the harvesting is being conducted according to Best Management Practices and Rule 6.02 (exempt activities) of DEM's regulations governing the Freshwater Wetlands Act.

Forest Management activities in and around wetlands and their buffers, including but not limited to the harvesting of fuelwood, timber, and wood products, are allowed without prior approval from the RI DEM's Freshwater Wetlands Program (FWP), providing the minimum guidelines established in this handbook and all applicable State and Federal Regulations are strictly adhered to. An "Intent To Cut" Form must be filed with the Division of Forest Environment prior to the commencement of a commercial harvest. A permit must be filed with the FWP for any activities that deviate from the prescribed BMP's in wetland areas.

The objective of most silvicultural treatments is to regulate stand density; therefore, the impact of harvesting on a wetland is related to the amount of woody material cut or left. Disturbance in riparian areas should be limited. Selective tree cutting where there is no disruption of soil stability or topography is allowed.

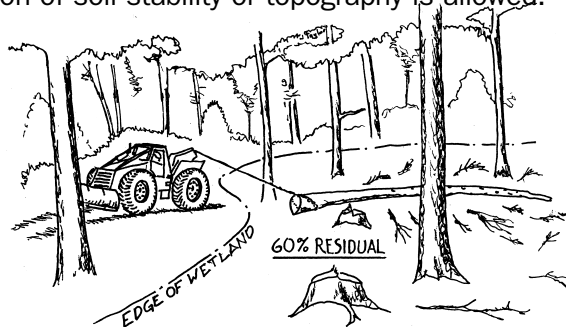


Figure 2 • Wetland harvesting guidelines

BMP GUIDELINES FOR HARVESTING WITHIN FORESTED WETLANDS

Trees within forested wetlands may be harvested but post-harvest stocking must be at least 60% on appropriate stocking guides (Figure 3 & 3A). Situations that could result in a lower residual stocking level must be reviewed by DFE and/or FWP prior to the harvest.

Use of the following stocking guides is not a do-it-yourself project. Landowners and loggers should seek professional advice from a forester for the application of the stocking guide, and trees to be cut and/or left standing should be clearly designated prior to applying for the Intent to Cut to clarify harvest intensity.

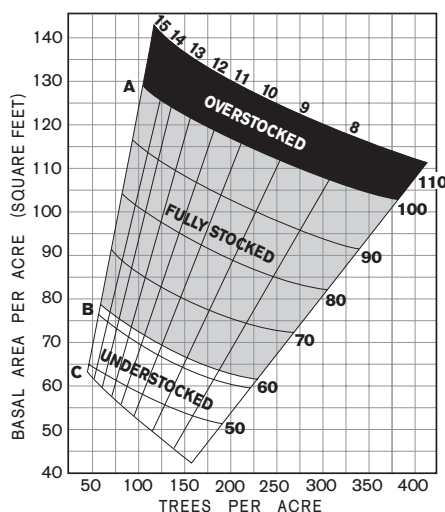


Figure #3

Upland Central Hardwood Stocking Guide

(NB: This is the guide commonly used by DFE)

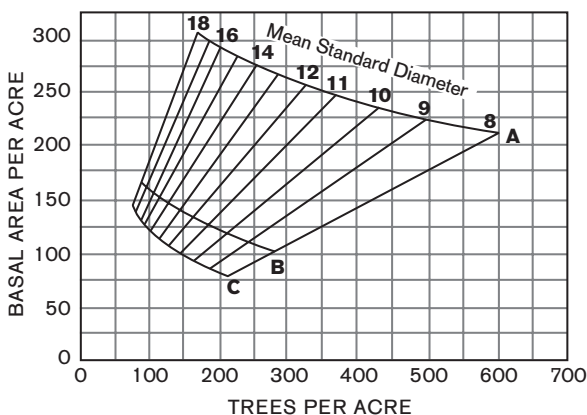


Figure 3A • Eastern White Pine Stocking Guide.

General Considerations:

- Install and Maintain erosion control devices, where appropriate, as outlined in later sections of this manual.
- Re-vegetate disturbed soil as soon as possible. The Natural Resources Conservation Service guidelines for erosion control are listed in Table # 4.
- Maintain wetlands vegetation in a healthy condition to trap soil and other pollutants. Various silvicultural practices can improve the health and vigor of the trees. Care should be exercised to prevent injury to the roots, trunk, and lower branches while harvesting.
- Limiting disturbance to periodic harvests of not more than every 5 years should reduce the amount of harvest-related stress on the remaining trees.
- During entry of the stand for periodic harvests care should be taken to avoid soil puddling and compaction and to prevent damage to the residual stand (SCFC, 1988).

Buffer Zones:

Buffer Zones should be designated in which forestry practices are limited to avoid adverse impact on streams and wetlands. These wetland areas are sensitive and must be protected from degradation associated with sediment, nutrients, and temperature fluctuation.

The optimal size of a Buffer Zone should be correlated to its value as wildlife habitat, ability to provide water quality protection, and other related functions. This in turn relates to existing vegetation, slope, depth to water table, soil type, and the intensity of management in surrounding areas.

The most important conditions in these Zones are:

- Minimize the disturbance of the forest floor;
- Prevent disruption of the natural drainage patterns and interruption of surface flows;
- Residual native vegetation should be maintained in a healthy condition.

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The following practices must be followed within buffer zones to protect all water courses (rivers, streams, intermittent streams):

A minimum filter strip width of 25 feet from the bank of the water course will be designated. Soil disturbance with harvesting equipment is restricted in these areas, except at crossings.

The following guidelines may be used to provide additional protection in riparian corridors:

- 15-foot no-cut buffer
- avoid soil compaction and rutting within 200 feet of a stream
- avoid the cutting of trees directly on the streambanks

Special Aquatic Sites (Vernal Pools):

Vernal Pools are small temporary bodies of water that are often found in woodlands of the Northeast. They play an important part in the food chain and the reproduction of many species of wildlife (salamanders, frogs). To determine where these sites are, look for water marks on trees, matted down, darkly-stained leaves, or small dips in the surrounding area. Small areas of standing water are good indications of Vernal Pools.

The Rules and Regulations governing the Freshwater Wetlands Act protects special aquatic sites, and defines them as less than one-quarter acre in size.

To protect these sites the RI DEM strongly recommends that the following practices should be followed:

- Skid trails and landings should not be placed in or within 200 feet of these areas.
- Restrict the use of equipment within 50 feet of these areas.

Remember, any pool larger than one-quarter acre in size is considered a pond, which requires a 50' buffer.

The area in a 50 foot radius of the vernal pool is critical in providing shade and filtering sediment from entering the pool. When harvesting adjacent to vernal pools you should leave a buffer of 25 feet where no tree cutting occurs. An additional 25 feet should be left mostly undisturbed with residual stocking levels of at least 60% (Figure 3 and 3A). Avoid making ruts greater than six inches deep within 200 feet of these pools. (see Figure 4)

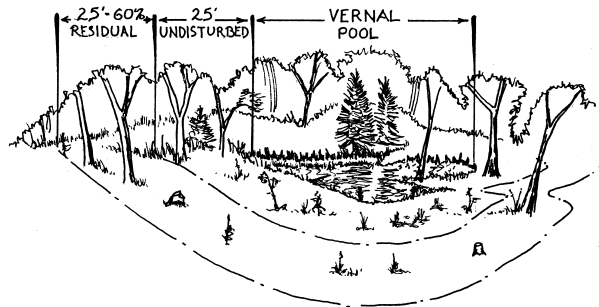


Figure 4 • Vernal Pool with buffers

EQUIPMENT ACCESS IN AND THROUGH WETLANDS:

Logging access in wetland areas should be minimized to avoid impacts to the wetlands. The natural hydrologic flow and characteristics that exist on site should be maintained.

Disruption of natural drainage patterns can channel large volumes of storm flow directly into wetlands. Control measures must be used to divert runoff from disturbed areas, which will allow filtering and gradual seepage into adjacent wetlands.

Logging access should be done when the ground is either frozen or dry. Winching trees in from higher ground should be done whenever possible. Proper planning will reduce the number of trips within the wetland necessary to remove the timber. Special flotation tires are available for skidding equipment, which helps distribute the load of the machine, reducing the rutting potential. These wide tires do increase the width of the machine, which may result in an increase in residual stand damage.

Wetland Crossings:

The Freshwater Wetland Program or the Rhode Island Coastal Resource Management Council must be contacted prior to the construction or alteration of any permanent crossings.

Temporary crossings are permissible (Figure #5), but disturbed areas should be restored to a natural, stabilized condition, with the stream's flow being restored to its original condition. Locations for wetland crossings should be carefully selected using the guidelines established in the following section.



Figure #5 • Courdoroy Wetland Crossing.

LOGGING ROADS, SKID TRAILS, AND LANDINGS

A plan should be made prior to starting the timber harvest to locate the necessary haul roads and skid trails. A good plan will reduce non-point source pollution and increase the efficiency of the operations. Studies have shown that good planning reduces the amount of land disturbed by roads from 15% or more to only 7% of the land area.

Locating Timber Harvest Access:

Preplanning of your access saves time and construction costs. Walk the entire harvest site to become familiar with the terrain and soil conditions. The slope of the land, soil types, sensitive areas, access to harvest areas, landings, and obstacles all must be considered before proceeding to the harvesting stage.

Landings:

The first step is to decide on locations for the proposed landings. Road frontage, topography, power lines, type of equipment, harvesting methods, and product sorting needs will dictate the location and size of the landing required.

- Landings should be located on gently sloping sites with well-drained soils, and be located outside of wetland areas. See Table #1 for recommended widths for filter strips, which can be applied for distances between landings and wetlands.
- Use of Hay Bales or other erosion control devices adjacent to abutting wetlands should be used to eliminate erosion and sedimentation.
- To prevent mud and other debris from getting onto paved roads, gravel or stone should be placed at the entrance.
- Following completion of the harvest, landings should be re-graded and re-seeded (table #4). In some instances gates and/or fencing may be desirable to prevent unauthorized dumping and access.

Locating Roads and Skid Trails:

Planning the road access system needed to move wood products to landings requires careful consideration of the following:

Basic considerations

Grade - The slope of the road is called the grade. This is the change in elevation over a distance (Rise in elevation divided by the distance, or rise/run) and is expressed in percent. Long, steady grades without diversions can yield a

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large volume of water, which can increase erosion of the road's surface. The grade of logging roads or trails should be kept below 10%, with 3-5% being the most desirable (Haussman, 1978).

Slope - Side hill positions are more desirable settings for road location than directly up or down hillsides. Soils on steep slopes are more highly erodable than other areas.

Obstacles - Rock outcrops, ledges, wet areas, streams, and other features should be avoided due to difficulty in construction. Plan ahead to avoid obstacles.

Drainage - Existing drainage patterns should be maintained. Consult topographic, soils, wetland and vegetation maps when planning road and skid trail locations.

- Approaches to streams should have as low a grade as possible, never exceeding 10% within 100 feet of the stream.
- Skid trails and road grades should be kept as low as possible.
- Erosion control devices, such as filter strips, culverts, and water bars, should be installed when necessary to maintain water drainage and to minimize sedimentation in downslope wetlands.
- Plan the approach to streams so they can be crossed at right angles.
- Avoid long, straight grades. Broad based dips should be placed at certain intervals (see Table 2) to facilitate draining water off the road surface.
- Build skid trails and roads from the highest elevation down.

Filter Strips

Runoff from road and skid trail surfaces should be prevented from directly entering wetlands and streams by leaving an area of undisturbed vegetation to act as a filter for runoff. This undisturbed zone will slow the water velocity and prevent erosion. The width of the filter strip will vary with the size and type of wetland as well as other site conditions, such as slope.

Sediment laden water should be prevented from entering streams by erecting lines of silt fencing and/or haybales between the stream and the sediment source. These erosion controls should be installed as close to the sediment source as possible to prevent degradation of the undisturbed resource downslope. In addition, an area of undisturbed vegetation should be maintained to act as a filter.

Recommended widths for filter strips are shown in Table 1. Larger filter strips should be retained on steeper slopes or in areas with important fish and wildlife value. These recommended distances should be doubled in public water supply watersheds.

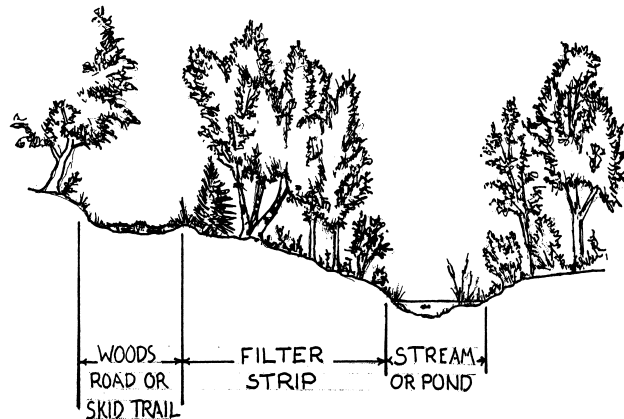


Figure # 6. • Filter Strip.

TABLE 1. Recommended Widths for Filter Strips Between Logging Roads and Streams (Haussman, 1978).

Slope of Land (percent)	Width of Strip (feet)
0	25
10	45
20	65
30	85
40	105
50	125
60	145
70	165

STREAM CROSSINGS

Crossing streams should be avoided whenever possible.

Equipment crossings are limited to wetland types consisting of areas subject to storm flowage or intermittent streams, or a river less than ten feet (10') wide through the use of temporary measures. These temporary crossings must not restrict natural flow patterns and wildlife movements and must be removed immediately following the harvesting operation. All disturbed wetland areas in the vicinity of the crossing must be restored to a natural condition and stabilized.

These temporary measures include log corduroys, culverts, bridges, or other similar methods which may be used provided the appropriate BMP's are utilized.

Streams less than ten (10) feet in width can be crossed without a wetlands permit as long as the following BMP's are followed. (See Figure #7)

- Use existing bridges or culverts for crossing if possible.
- All crossings should be made in a manner that will cause the least amount of disturbance. The site of the crossing should be selected where the stream is narrow and banks and stream beds are stable.
- The approach to the stream should be located on slopes less than 10%. Crossings should be made at 90 degrees to the stream (right angles).
- The trails approaching and leaving the riparian area along the stream bank should be well planned and maintained.
- Hay mulch or wood residues can be used to temporarily stabilize the disturbed area during a harvesting operation. Permanent vegetative cover should be reestablished on disturbed areas as soon as possible.
- Hay Bales or Silt Fence should be installed down stream from the crossing to limit excessive amounts of debris from entering the main water course.

- Debris resulting from logging operations should be removed from streams as soon as possible.

Pre-existing stream crossings may be maintained and repaired as an exempt activity. The Wetlands exemption for this activity requires that you document the pre-existing condition and any improvement activities with measured drawings. Photographs are strongly recommended. You cannot enlarge the footprint of the crossing, nor can you alter the existing hydrology of the stream or wetland. This means that you cannot enlarge the existing culvert capacity without applying for a wetlands alteration permit.

Contact the Division of Forest Environment before crossing any streams to receive approval and/or technical assistance.

Temporary crossing of streams greater than 10 feet in width require approval by the Freshwater Wetlands Permitting Program. The DFE has a good working relationship with the FWPP, and can often help to streamline this process.

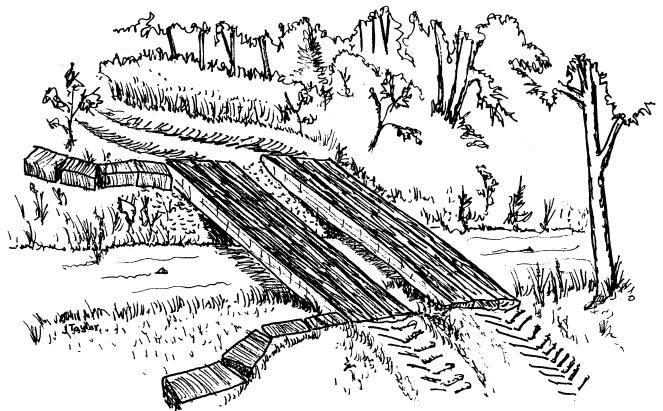


Figure #7 • Skidder Bridge

EROSION CONTROL

All erosion control measures should be installed in strict conformance with the standards and specifications outlined in the RI Soil Erosion and Sediment Control Handbook.

Water diversion culverts and broad based dips ("Thank You Ma'ams"), should be installed

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where needed to divert surface water away from streams (Figure 8). Recommended spacing between permanent drainage structures is listed in Table #2.

Creating diversions at intervals, utilizing water bars, broad-based dips or a natural change in grade, permits water to drain off the roads before the water can achieve the speed and/or volume that causes erosion. (See Figure 9).

Thank-You M'am Type
Water Bar Construction
for Skid Roads

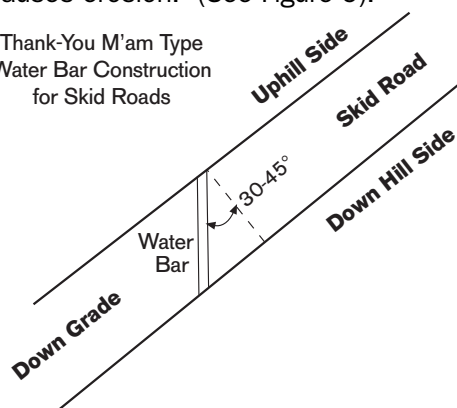


Figure 8 • Placement of water diversions

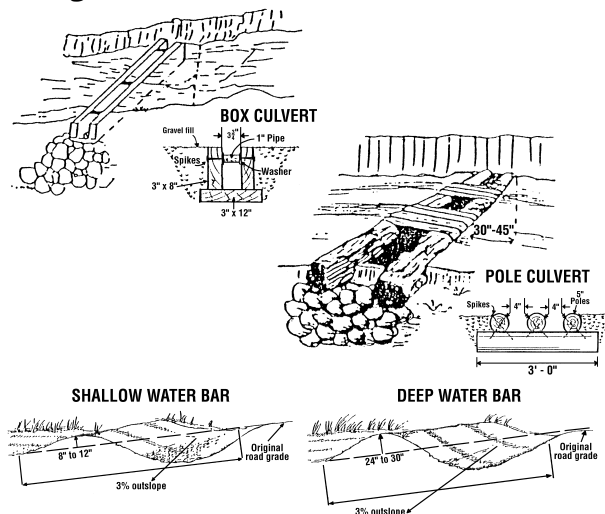


Figure 9 • Various types of water diversions.

Table 2. Suggested Distances between Open-top Culverts and Broad-based Dips (Haussman, 1978).

Road Grade (percent)	Spacing (feet)
2	300
4	200
6	167
10	140
20	120

Table 3. Suggested Dimensions of Broad-based Dips

Road Grade	Dam Height	Dip Depth	Dip Grade
2	0.8'	1.6'	3.3
4	0.8'	2.4'	6.0
6	0.8'	3.2'	8.7
8	0.8'	4.0'	11.3
10	0.8'	4.8'	14.0

MAINTENANCE OF ROADS

During the logging operation:

- Logging roads and skid trails should not be used during unsuitable weather and soil conditions.
- Temporary drainage structures should be installed as prescribed when necessary. (Figure 9).
- Periodic grading may be necessary to maintain the proper gradient and water-shedding shape of road surfaces.

After logging:

- Fill in and grade any ruts and berms, and eliminate ditches.
- Damaged trees and other hazardous obstacles should be removed.
- Logging roads or skid trails that cross streams or intermittent water courses should be restored to their original condition.
- Disturbed soils should be stabilized with grass seed and mulched with a mat of loose hay (See Table 4).
- Access to the restored and stabilized areas should be restricted to prevent unauthorized use and degradation.
- A continuous line of staked haybales or silt fence should be installed between all areas of unstable soil and any adjacent wetlands. (Figure 10)
- The road should be protected from erosion during extended periods of non-use.

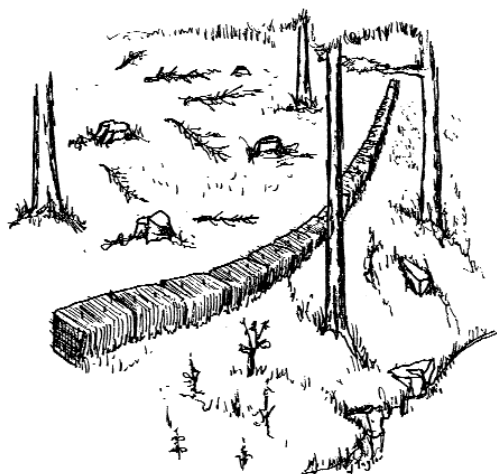


Figure 10 • Hay Bales along Buffer.

Table #4. Recommended General Purpose Seeding Mix For Stabilizing Disturbed Soils (R.I. Soil Erosion & Sediment Control Handbook 1989)

Creeping Red Fescue	75 lbs/acre
Perennial Ryegrass	5 lbs/acre
Birdsfoot Trefoil 'Empire'	15 lbs/acre
Colonial bentgrass, 'Exeter'	5 lbs./acre
agricultural lime	1 ton/acre
10-10-10 fertilizer	0.5 ton/acre
hay mulch	.25 ton/acre

FUELS, LUBRICANTS, AND WASTE

Logging, road building, and other forest activities usually require motorized equipment. Anti-freeze, fuels and lubricants used in machinery can potentially pollute lakes, streams, wetlands, and groundwater. Planning for forestry operations should include practices to handle solid and liquid wastes generated in the field.

The following practices will help prevent non-point source pollution from fuels, lubricants, and wastes during mechanized forest management activities:

- Use biodegradable lubricants whenever practical. Biodegradable lubricants are less toxic than other lubricants but still need to

be disposed of properly.

- Maintain equipment regularly. Check hoses, fittings and seals to prevent leaks or spills.
- Locate specific sites for equipment maintenance and fueling. These sites should be on level terrain, a minimum of 100 feet from all streams, lakes, and wetlands.
- Collect all waste lubricants, containers, and trash. Store them in separate, leak-proof containers until they can be transported off-site for recycling, reuse, or disposal at an approved site. Mixing wastes can create 'hazardous waste', which is expensive to dispose of.

It is illegal to dump fuel and lubricants on the land or waters in the state of Rhode Island.

SPILLS

Fuel, lubricant, and pesticide spills during forest management operations can occur as a result of fueling, hydraulic hose breaks, mechanical damage and accidents, or vandalism.

The following practices are suggested:

- Maintain a spill-containment and cleanup kit appropriate for the materials in use. At a minimum, a kit for petroleum products should include:
 - plugs and clamps to control a hydraulic line break
 - a container to catch leaking fuel
 - a shovel
 - absorbent material such as sawdust or clay granules to absorb fluid
- Become familiar with emergency response agencies in your area, and the location of the nearest telephone.

All significant spills must be reported to the RI DEM Office of Compliance & Inspection at 222-1360 or 222-3070.

Above all, use common sense and recognize the hazards.

Appendix I Selected RI General Laws

2-15-1. Registration of wood cutting operations -

No person, firm or corporation, or any authorized agent of such person, firm or corporation, shall cut or saw standing or growing trees, shrubs or vegetation for commercial forest products, other than for the owner's own domestic use, unless such person, firm or corporation shall be registered as a woods operator with the Division of Forest Environment. Application for a registration certificate shall be made in writing on or after July 1 of each year on forms prepared by the division of forests accompanied by a fee as authorized by regulation 2-10-3.1 (currently \$20.00) for each certificate, and all registration certificates shall expire on June 30 of the year following the issuance thereof. Funds collected from registration fees as provided herein shall be deposited with 'the state forestry fund' as provided for in 2-10-3.

2-15-2. Reports to division - Suspensions. - Before any such person, firm or corporation shall cut or saw, as herein provided, he shall at least five (5) days prior to such cutting or sawing notify the division of forests, on forms prepared by said division, of the location of the area and/or property. The five (5) day notice contained in this section may be reduced to any length of time, including a complete waiver of said five (5) day notice by said division, if in the discretion of said division said reduction is warranted. Failure to give the required notice shall be considered sufficient cause to suspend a registration certificate for a period not exceeding thirty (30) days; provided, however, that no such person, firm or corporation which is alleged to have failed to give the required notice shall have been notified of the alleged failure and shall have also had an opportunity to be heard thereon. Any such person, firm or corporation shall utilize best management practices while harvesting trees as provided for in this chapter. Administrative fees for filing of five day notices shall be collected as provided for in 2-10-3.1 and deposited in 'state forestry fund' as provided for in 2-10-3.

2-15-3. Violations. - Any person, firm or corporation or agent who cuts or saws standing or growing trees, shrubs, or vegetation for commercial forest products from any one location without first receiving a registration certificate shall be guilty of a misdemeanor and shall be fined five hundred dollars (\$500.00),

2-15-4. Exemptions. - The provisions of pps. 2-15-1 to 2-15-3, inclusive, as amended, shall not be construed to mean the cutting of shade trees or shrubs, or to cutting or sawing on single holdings of less than five (5) acres or to woodland owners who cut or saw, for sale to others, no more than five thousand (5,000) board feet or twenty-five (25) cords of the items described in p. 2-15-1 of this act in any one registration year.

43-20-1. Liability for unauthorized cutting of trees or wood. - Every person who shall cut, destroy, or carry away any tree, timber, wood, or underwood whatsoever, lying or growing on the land of any other person, without leave of the owner thereof, shall, for every such trespass, pay the party injured twice the value of any tree so cut, destroyed, or carried away; and for the wood or underwood, thrice the value thereof; to be recovered by civil action.

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- Cullen J.B.
*Best Management Practices for Erosion Control on Timber
Harvesting Operations in New Hampshire*
NH Department of Resources and Economic Development
Division of Forest and Lands

Appendix III Government Agencies

STATE:

Rhode Island Division of Forest Environment
Division Headquarters
1037 Hartford Pike, North Scituate, R.I. 02857
(401) 647-3367

District 1

George Washington Headquarters • (401) 568-2013

District 2

Arcadia Headquarters • (401) 539-2356

R.I. Division of Fish and Wildlife

Oliver Stedman Government Center
4808 Tower Hill Road, Wakefield, Rhode Island
02879
(401) 789-3094

R.I. DEM, Office of Water Resources

235 Promenade Street, Providence
Rhode Island 02908 • (401) 222-6820

Coastal Resource Management Commission

Oliver Stedman Government Center
Wakefield, Rhode Island 02879 • (401) 222-2476

FEDERAL:

Natural Resource Conservation Service
60 Quaker Lane, Suite 46, Warwick, RI 02886
(401) 828-1300

R.I. CONSERVATION DISTRICTS:

Eastern RI

2490 Main Road
Tiverton, RI 02878
(401) 624-7490

Southern RI

60 Quaker Lane, Suite 46
Warwick, RI 02886
(401) 822-8832

Northern RI

17 Smith Ave
Greenville, RI 02828
(401) 949-1480

Glossary of Forestry Terms

Basal area: The cross sectional area, in square feet, of a tree stem at 4 1/2 feet above the ground. Total basal area of all tree stems on an acre provides a measurement of stand density.

Biodiversity: Refers to the variety and abundance of species, their genetic composition, and the communities, ecosystems, and landscapes in which they occur.

Blaze: A scrape in the stem of a tree that removes a portion of the bark and exposes sapwood. This wounding of a tree is usually done to mark a trail or a boundary. Weather resistant paint is usually applied over the blaze to provide high visibility evidence of a boundary line.

B level stocking: An expression of the density of a forest stand. A stand of trees at the "B-line" is about 60% stocked. At this level of stocking each tree has all the space it needs to grow yet there are no large openings in the stand of unoccupied growing space.

Board foot: A unit of measure representing a board 1 foot long by 1 foot wide and 1 inch thick or a combination equaling 144 cubic inches. The volume of a tree can be estimated in board feet which is a prediction of the amount of lumber that tree contains.

Buck: Sawing the stem of a felled tree into the length of a sawlog. The minimum length is 8 feet with an additional 4 inches of trim. Softwoods are usually marketed in two foot increments (8,10,12 feet), while hardwoods one foot.

Buffer Strip (or Zone): A forest area where little or no cutting is done. The purpose of these areas are to protect critical areas and to enhance aesthetics.

Cambium: The layer of plant cells just beneath the bark from which the growth of the tree originates.

Canopy: The uppermost spreading branches of the trees which make up the forest cover.

Cavity Tree: A large tree with a hollow or opening which can be used as shelter by wildlife.

Clearcut: This involves removing all trees greater than 2 inches in diameter at breast height (DBH). This results in the new stand of even aged trees. This method is usually reserved for regenerating tree species which require a lot of sunlight, such as birch. Clearcut can also be used to provide habitat for wildlife species which require early successional vegetation in some part of their life cycle.

C-Line Stocking: A measure of stand density relating to a stand of trees which is understocked according to a stocking guide for that forest type. At this stocking, when about 30% of the growing space is being used, growing space is wasted and it will take 10+ years to obtain B-Line Stocking.

Co-Dominant: Those trees with crowns in the upper forest canopy, subjected to space limitations by other co-dominant and dominant trees. (See dominant)

Commercial Species: Tree species used in the production of wood products.

Conifer: A softwood species of tree which reproduces using cones. This includes pine, spruces, and hemlock.

Glossary of Forestry Terms

Consulting forester: an independent, private professional forester who works on a fee basis for private woodland owners, managing forests and marketing forest products.

Cord: A unit of measure of stacked wood. The standard is a pile of wood 4' by 4' by 8' or a combination of 128 cubic feet of wood and air.

Crop Tree: A tree that is favored in intermediate cuttings so that it will increase in value, either for timber, wildlife, or aesthetic purposes.

Crown: The upper portion of the tree consisting of branches and foliage.

Cruise: An inventory of a forest to determine the location, species composition, size, quality, or other characteristics. Utilized for developing forest management recommendations and/or marketable volume and value of timber.

Cull: A tree which has no merchantable value for sawtimber or fuelwood due to defects or rot.

DBH: Diameter at breast height. The standard for estimating the volumes of trees is to measure them at 4 1/2 feet off the ground (DBH).

Den Tree: Usually a large dead tree in which animals make their homes.

Dominant: Trees with their crowns above the general level of the canopy and receiving full sunlight from above and partial sunlight from the sides. These trees have well-developed crowns and are generally the larger trees in the stand.

Duff: The litter on the forest floor comprised of un-decomposed organic material.

Edge: The zone where two or more types of forest cover meet. This is important for wildlife since access to more than one type of habitat is provided at close proximity.

Even-aged: An area of trees of approximately the same age and size.

Filter Strip: A forested area bordering a stream or river left undisturbed. This action will prevent soil compaction, erosion and degradation of nearby water sources, and allow for filtering of adjacent sediment-laden runoff.

Forest Canopy: The upper layer in a forest made up of tree crowns.

Forest Type or Forest Stand: A homogeneous group of trees growing together, but different from another area because of species, mixture of species, age or size.

Girdle: Killing an undesirable tree by cutting a ring around the tree into the sapwood. This destroys the conducting tissue and restricts the flow of water and nutrients which slowly causes the tree to die.

Group Selection: This method removes small groups of trees and results in a forest which is uneven-aged. Species which tolerate shade, such as hemlock, beech, or sugar maple, can be perpetuated using this type of harvest as well as less tolerant species. The openings are usually less than 1/4 acre in size (100 x 150) but can be made larger if regeneration of species which require more sunlight, like oaks, is desired.

Habitat: The type of ecosystem in which a given wildlife species is commonly found.

Heartwood: The inner core of the tree. This zone of wood is composed of non-living cells and provides the primary means of support. In some species this area is darker in color than the sapwood.

Improvement Cut: An improvement cutting is typically done in pole-sized or larger stands that have received no previous treatments. The goal of this cutting is to enhance the overall quality of the stand by removing undesirable trees. This can sometimes be a commercial treatment but usually fuelwood is the only product removed.

Individual Tree Selection: This harvest and regeneration method removes trees of various ages and sizes throughout the forest. The openings created by removing individual trees is very small and only species tolerant of shade can be regenerated through this method.

Intermediate treatment: A silvicultural treatment done in an immature stand to meet objectives by modifying the composition or growth.

Lopping: Cutting slash up to lay close to the ground.

Log Rule: a method of calculating the wood volume in a tree or log. The International 1/4 inch rule is the legal and standard rule for Rhode Island.

MBF: Thousand Board Feet.

Poletimber: Trees from 4 inches to 10 inches dbh.

Pruning: Removal of limbs from the lower portion of a tree to produce clear, high quality lumber.

Regeneration: the seedlings and saplings which will make up the next forest stand.

Release: This treatment removes larger, overtopping trees in a stand to allow the regeneration to receive sunlight.

Saplings: Young trees from 1 to 4 inches dbh.

Sawtimber (Small): Trees from 10-16 inches dbh.

Sawtimber (Large): Trees 16 inches and larger dbh.

Seed Tree: This method removes all of the trees except for a few well spaced, seed producing trees. This results in an even-aged stand and is usually used to perpetuate shade intolerant species, such as yellow poplar, birch, cedar, or cherry. Modifications of this technique can also successfully regenerate oak or pine under special circumstances.

Selective Cutting - An intermediate treatment aimed at improving the growth and vigor of an existing stand of trees by reducing competition and maintaining an uneven-aged forest.

Shelterwood harvest: This method leaves a partial overstory of mature trees to protect and provide a source of seed for the new stand. About 40-60% of the mature trees are removed allowing partial sunlight to reach the understory. When seedlings become well established in 10-20 years, the remaining mature trees can be removed and the young trees form the new stand.

Glossary of Forestry Terms

Silviculture: Forest harvest systems used to control the establishment, composition, and growth of forest stands to meet the owners objectives. They can be broadly classified as regeneration treatments, which are aimed at creating a new stand, or intermediate treatments, which are used to manage an existing stand.

Site: The description of a specific location or area based upon the type and quality of vegetation it can support.

Site Index: A measure of site productivity used to relate site quality, which is based upon the height of the dominant trees at a specific age (usually 50 years and different for each species of trees).

Slash: Limbs, branches and tops left after a cutting operation or fire.

Snag: A standing dead tree, or portion of, which provides valuable feeding, roosting, and nest-hole habitat for birds and small mammals.

Stand: see Forest Type/Forest Stand

Stocking level: A term used to describe a relative measurement of the number of trees per acre and the basal area, stating how completely the stand occupies its area and utilizes growing space. A stand can be understocked, well stocked, or over-stocked.

Timber Stand Improvement (TSI): This is a general statement which refers to various cultural treatments conducted in immature stands aimed at influencing their composition and growth. This is typically a non-commercial operation requiring labor costs.

Understory: The smaller, usually younger trees in a forest under the main crowns.

Uneven-aged: An area of trees of different ages and sizes.

Vernal Pool: A small temporary body of water often found in woodlands. They provide a valuable and critical habitat to many species of wildlife, mostly amphibians.

Weeding: This is a harvest done early in the life of the stand, seedling or sapling size, to favor the most desirable trees by removing competing stems.

Wildlife Border: A strip 15 to 20 feet wide along the edge of a field where the forest growth has been cut back and allowed to grow back to sprouts, creating vertical edge.

Wolf Tree: A large tree with a spreading crown which takes up more space than its economical value, preventing the development of smaller trees.

This Glossary of Forestry Terms fact sheet is part of the RI Conservation Management Practices Guidebook produced by the RI Forest Conservator's Organization (RIFCO). For your complete binder set of the Guidebook, contact RIFCO at (401) 568-3421, PO Box 53, No. Scituate, RI 02857, or visit www.rifco.org.

Urban/Wildland Interface

INTRODUCTION

The suburbanization of our woodlands has led to several emerging issues with regard to the interaction of urban and rural land uses.

We're all familiar with the images of how forest fires can impact residential areas that have been built in the woods. So far, these images have a western U.S. source, and Rhode Island is considered a Low Risk Area, but your home may be susceptible here in Southern New England's suburbanized woodlands.

Along with forest fire dangers, the interaction of residential land uses with the forest results in clashes with wildlife and the conduct of traditional forestry and farming practices.

ISSUES

FIRE

Fire risks in Rhode Island include homes, but it's the secondary structures that are typically affected by the brush and forest fires we experience. The additional risk of these burning barns and sheds is that they often involve stored fuel and chemicals, which pose a hazard to the firefighters.

Risk management includes activities that can help reduce the exposure of your property and its improvements to fire. Here are some recommendations:

- Maintain good access roads into and throughout your property;
- Check your insurance policy to make sure you've got coverage;
- Install a fuel break within 30 feet of your structures;
- Avoid stacking your firewood against the house;
- Develop an emergency water supply accessible by firefighters

Creating a Survivable Space For Your Home

from *"A Homeowner's Guide to Wildfire Retrofit"*, IBHS

A survivable space is an area of reduced fuels between your home and the woodlands. One of the easiest ways to establish a survivable space is to use the zone concept. Zone 1 is the closest to your home and Zones 2 and 3 move progressively further away.

ZONE 1: Establish a well-irrigated or vegetation-free area around your home. This should extend a minimum of 30 feet from your home on all sides. As your hazard risk increases, a clearance of between 50 and 100 feet or more may be necessary, especially on any downhill sides of the lot. Plantings should be limited to carefully spaced native species.

ZONE 2: Place low-growing plants, shrubs and carefully spaced trees in this area. Maintain a reduced amount of vegetation. Trees should be at least 10 feet apart, and all dead or dying limbs should be pruned. For trees taller than 18 feet, prune lower branches within six feet of the ground. No tree limbs should come within 10 feet of your home.

ZONE 3: This furthest zone from your home is a slightly modified natural area. Thin selected trees and remove highly flammable vegetation such as dead or dying trees and shrubs.



The Ideal Fire-Resistant Home

The next step in protecting your home and property from wildfire is to consider using fire-resistant materials and construction techniques.

Roof: The roof is the most vulnerable part of your home to wildfires. Roofing materials fall under three levels of fire-resistance: A, B, and C, with A being the most fire resistant. Some treated wood shake shingle products have ratings of Class C or better. If your roof needs to be re-covered, consider installing a Class A roof covering.

Exterior Walls: Your home's exterior walls are susceptible to the radiant and convective heat of a wildfire. The fire can 'bridge' to more vulnerable areas such as eaves, soffits, vents and windows. Eaves and soffits should be 'boxed'

or enclosed with noncombustible materials to reduce the size of the vents, and non-combustible screening should be used in the vents.

Chimneys: Embers can either be sucked into your chimney from a wildfire, or embers from your own fire can fly out the chimney and start a wildfire. The best way to avoid this situation is to install a spark arrestor made from welded or woven wire mesh with openings less than 1/4" wide.

Seek Advice

For further assistance in assessing your home's risk to wildfire, seek the advice of professionals. Check with your local fire department, building official, and your insurance agent. They may be able to help with a fire safety audit.

SUBURBAN SPRAWL: Impacts on Water Quality and Wildlife Habitat

In our pursuit of the American Dream, which to some means having a house in the country, we have, over the past 50 years, altered the landscape. As the forest on abandoned farmland matures, we have created small openings in that canopy, we have built wide subdivision streets with storm drain systems, we have increased vehicle traffic on our rural roads, and we have installed septic systems to discharge our wastes.

These activities have resulted in impacts on the quality of the water that flows in our streams and ends up in our ponds and reservoirs, and creates conflicts between people and wildlife.

WATER QUALITY

Non-point source pollution is an issue that has become a hot topic lately, and it refers to the water pollution that is washed into our streams and ponds every time it rains. Stormwater flows off every surface, and is either absorbed into the ground to be filtered, or runs directly into streams and ponds.

Carried with stormwater are all the various pollutants from vehicles, animals, garden chemicals, and soil itself that, along with septic system nitrates, collects in our water bodies. Fertilized water grows weeds, and lower water quality affects fish and wildlife populations, and can contaminate our drinking water supplies.

Protecting our water resources requires some effort from every individual; every well drawing groundwater is susceptible to the pollution you generate. For more information on what you can do to protect water quality, go to a well-water workshop sponsored by the RI Home*A*Syst Program, based at the University of RI's Cooperative Extension Service, or check out their website (www.uri.edu/ce/wq).

WILDLIFE

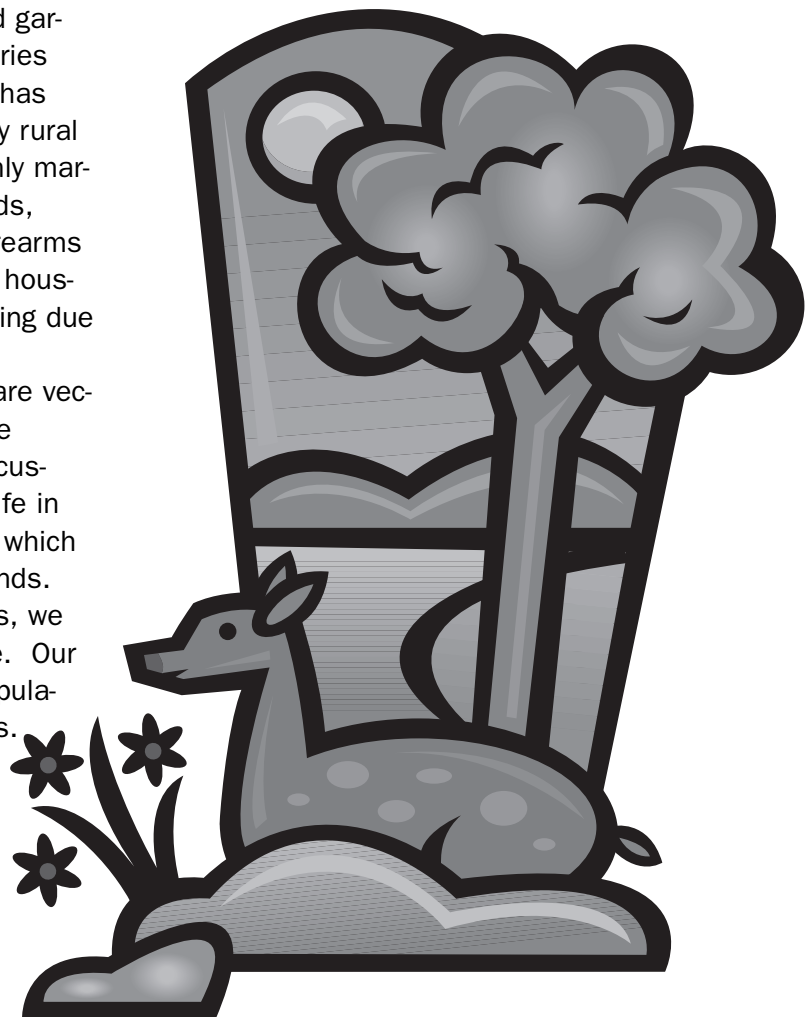
Suburban wildlife problems occur when human populations occupy animal habitats, and when natural habitats are altered, favoring certain animal species. Increasing populations of some species may be desirable, but the problems occur when certain species are over-abundant, impacting gardens, landscape materials, and creating hazards on our roadways. Exactly who the hazard is may be a matter of perspective.

The deer population in RI is the most visible effect of the rural/urban interface. The population of deer has steadily increased after its re-introduction during the days of farm abandonment. A suburban habitat, with lots of edge created by residential openings in the forest, tends to support higher amounts of deer. The resulting damages to crops, Christmas trees, shrubbery, and gardens, along with the damages and injuries caused by collisions on our roadways, has made the deer a vilified enemy of many rural and suburban residents. Hunting is only marginally effective at controlling deer herds, especially in a suburban area where firearms can't be discharged within 500 feet of houses. Fewer areas are available for hunting due to the sprawl of development.

Fox, raccoons, and skunks, which are vectors for rabies, raise a concern with the spread of this disease. People not accustomed to seeing and dealing with wildlife in their backyards fear coyotes and bear, which are relatively new returns to RI woodlands. As we continue to alter natural habitats, we displace and interact with more wildlife. Our pets also have an effect on wildlife populations, especially cats that prey on birds.

There are some things we can do to live with wildlife.

- Use landscape plants that do not attract munching deer;
- Install fencing around gardens;
- Plant onions and certain flowers on the perimeter of gardens as a repellent;
- Install deer rub sticks on the perimeter of your Christmas trees;
- Use trash cans with secure lids;
- Secure chicken coops to prevent access by coyotes;
- Use chimney caps and screening to keep squirrels out of your home;
- Keep your cat indoors, to prevent it from preying on your favorite birds, and to prevent it from becoming preyed upon by coyote



LOGGING & FARMING

Working farms and woodlands are an important component of our local economies, and the state's economy. The residential development of our rural towns has brought about a number of problems between traditional rural activities and the expectations of suburban residents. Having purchased a home in the tranquil countryside, some of these residents now find it offensive to smell the seasonal operations of farms and to see the effect of logging activity. Affronted by these activities, efforts are undertaken to halt or change the way these things are done.

Rhode Island's Right to Farm Act (RIGL Ch. 2-23) prevents towns from passing ordinances that restrict a farmer's ability to operate beyond existing state measures. Forest landowners are included in the definition of farmers under this law. Despite this law, there continue to be efforts to undermine the farmer's ability to operate.

Education of incoming residents is an important step in protecting our right to farm and harvest timber. Participation on local Boards and Commissions are also important to maintain balanced views on these issues. Organizations such as the RI Farm Bureau and the RI Forest Conservator's Organization (RIFCO) are involved in the state policy arena, and your support of these organizations helps provide a balanced view towards natural resource use and management.

RESOURCES & PUBLICATIONS

National Fire Protection Association,
Quincy, MA (800)735-0100

Firewise Landscaping Videotapes and
Checklist, 1993

Firewise Construction Videotapes and
Checklist, 1997

Standard for Protection of Life and
Property from Wildfire, 1997

Protecting Your Home from Wildfire, 1987

Water Quality Topics: RI Home*A*Syst
Program: www.uri.edu/ce/wq

WEBSITES

Firewise Communities 1 Batterymarch Park,
Quincy, MA 02269
(617)984-7486 • www.firewise.org

National Fire Protection Association
www.nfpa.org

National Interagency Fire Center (NIFC)
www.nifc.gov

USDA Forest Service
www.fs.fed.us/fire/

Wildfire News
www.wildfirenews.com

WILDLIFE INFORMATION FOR FARMERS

RI DEM, Division of Agriculture
401.222.2781

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