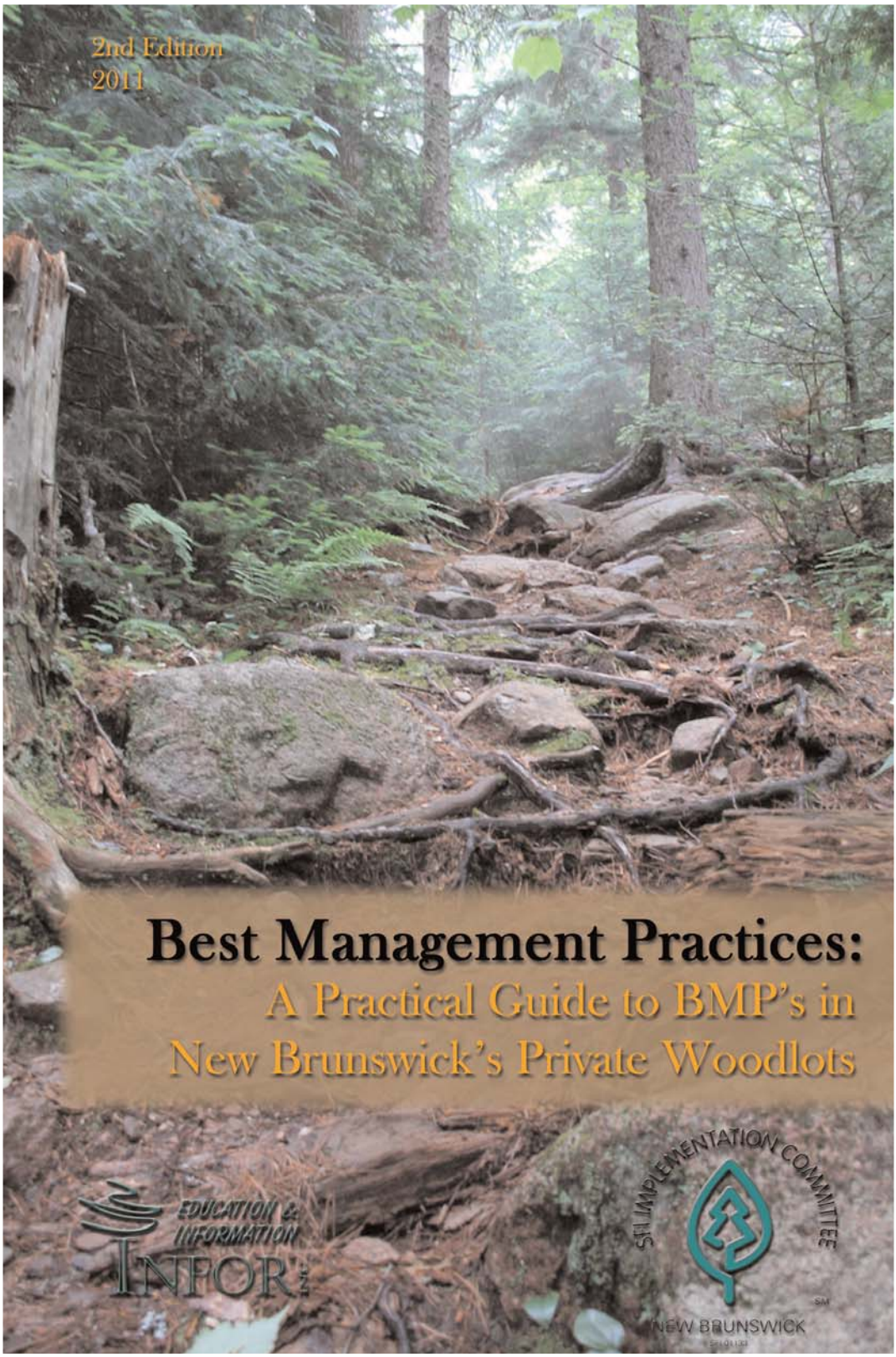
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Best Management Practices:
A Practical Guide to BMP's in
New Brunswick's Private Woodlots
EDUCATION & INFORMATION
INFOR
SFI IMPLEMENTATION COMMITTEE
NEW BRUNSWICK

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The New Brunswick Federation of Woodlot Owners

N.B. Department of Natural Resources

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Natural Resources Canada - The Canadian Forest Service

NB Forest Products Marketing Boards

Department of Fisheries and Oceans

New Brunswick Invasive Species Council

Compiled by INFOR Inc., 2011

SFI IMPLEMENTATION COMMITTEE

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NEW BRUNSWICK

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## What are Best Management Practices (BMP's)?

As our knowledge of the forest has grown, we have come to understand that our actions on our woodlots can have significant impacts upon the environment. Poor forest management frequently results in the degradation of the diverse range of resources found in the woods, such as wildlife habitat and future timber supply. Poor operating practices may result in unnecessary damage to forest soils, water quality and biodiversity and can even translate into threats to worker safety. The term best management practices (BMP's) describes the most current techniques generally agreed upon as reducing the impacts of forestry operations on the environment while minimizing effects upon cost and productivity.

Private woodlot owners in New Brunswick must be aware of and abide by several Federal and Provincial acts which affect activities on private lands. The Clean Water Act, Clean Environment Act, Endangered Species Act, Species at Risk Act (SARA) and the Occupational Health and Safety Act are just some of the legislation that regulates forest management activities on private land in New Brunswick.

Beyond mandated requirements, the private landowner has the responsibility of practicing good stewardship. Some of the best management practices in this guide are not mandated, but are based on responsible practice and strive to, at the very least, leave a site in as good a condition as it was before activities began. Being familiar with the BMPs in this guide will help landowners understand the potential effects of their actions and help them to make informed management decisions on their woodlots.

## Certification

Today, there are several certification programs employed in Canadian forests, each designed to ensure a minimum standard of quality in forestry operations. The Sustainable Forestry Initiative® is a program of forestry and conservation practices designed to help ensure that future generations will have the same abundant forests that we enjoy today. The framework of the SFI Program revolves around the idea that sound environmental practices coupled with strategic business plans can benefit all stakeholders involved. SFI Inc., a fully independent registered non-profit organization has a governance structure with equal representation from social, economic and environmental sectors.

The SFI Standard is made up of a combination of principles. Participants have an important stewardship responsibility and commitment to society in following and supporting these principles. Independent stakeholder groups having broad experience in forest sustainability helped develop this Standard. SFI Objectives are intended to provide measures for evaluating member conformance with the SFI Principles. This gives forest managers the direction needed to expand the practice of sustainable forestry and to visibly improve performance.

**Complying with the SFI standard involves incorporating sustainable actions such as:**

Broadening the practice of sustainable forestry.

Ensuring long-term forest productivity and conservation.

Protecting water quality in streams, lakes and other waterbodies.

Managing the quality and distribution of wildlife habitats and contributing to the conservation of biological

diversity.

Managing the visual impact of harvesting and other forest operations.

Managing special sites.

Promoting the efficient use of forest resources.

Broadening the practice of sustainable forestry through procurement programs.

Improving forestry research, science and technology.

Improving the practice of sustainable forest management through appropriate training and education programs.

Committing to comply with applicable federal, provincial, state, or local laws and regulations.

Broadening the practice of sustainable forestry by encour aging the public and forestry community to participate in the commitment to sustainable forestry and publicly report progress.

Promoting continual improvement in the practice of sus tainable forestry and monitor, measure, and report performance in achieving the commitment to sustainable forestry.

Education and outreach are components of the SFI Standard which enable participants to convey information about Best Management Practices across all forestlands and provide results to ensure adherence to the Standard.

SFI also addresses other issues and values that are very important to the public, such as aesthetics and public recreation. SFI fully recognizes that the forest is more than trees and that care for other resources must be integrated into plans for growing and harvesting forest products.

To learn more about the Sustainable Forestry Initiative please go to **www.sfiprogram.org** or visit the New Brunswick SFI Implementation Committee website at **www.nbsfi.ca**.

## Forest Management Planning: A Good Place to Start

Whether you are an experienced woodlot owner or just starting out, there is no substitute for the guidance and direction provided by a forest management plan. The seven forest products marketing boards located throughout the province offer private woodlot owners the opportunity to have a management plan drafted for their woodlot for a reasonable price. Such a plan will give you a detailed description of your woodlot, including stand mapping, timber quality and quantity, an assessment of wildlife habitat and general notes concerning various issues of interest. The author of the plan will work with you to develop management activities designed to meet your objectives and make recommendations as to how these goals can best be achieved. Having a management plan prepared for your woodlot may also qualify you for the Inter-generational Transfer Program. This program allows the transfer of managed woodlands between generations (i.e. father to son) without requiring the payment of capital gains tax.

### Key elements of a Forest Management Plan for a woodlot are:

- **Description of the woodlot.**
- **Access options for the woodlot and road planning.**
- **Stand mapping.**
- **Timber quality and quantity.**
- **Conservation values and recreation opportunities.**
- **Wildlife habitat assessment.**
- **Visual quality objectives.**
- **Opportunities for Non Timber Forest Products (NTFP).**
- **Objectives, work plan and general notes.**

For more information, contact your local forest products marketing board, forestry consulting firm or Professional Forester (see Contact Info).

## Pre-harvest Planning

Planning should be the first step in any forestry operation. Proper planning will help to improve efficiency and limit time delays reducing overall cost and avoiding potential environmental damage resulting from inadequate forethought. Planning your operation in advance also allows you to identify regulations pertaining to your operation and gives you time to apply for necessary permits.

## Boundary Lines

It is imperative that you confirm the location of your property boundaries **BEFORE** beginning any activities. Involve/inform your neighbours of your management activities to maintain good relations. Ensuring that all of your boundaries are well marked will reduce the potential for trespassing onto adjacent properties. Conduct reconnaissance to try and find any evidence of the old line (blazed trees, pins, an old fence etc). In some cases, lines may be remarked without a new survey from pre-existing lines. If a line is entirely absent and there is no evidence of its former placement, a new survey is required. Only a surveyor can legally establish a boundary line.

***A freshly painted boundary line -*** *photo courtesy of INFOR Inc.*

The following are guidelines to help you update and maintain proper boundary lines:

Underbrush may be cleared up to approximately 1 metre (3 feet) on each side of the centre line, depend ing on the forest density.

Large, healthy, un-blazed trees on the line should not be cut, and leave some smaller trees as well. These will serve as future line markers.

Trees within approximately 1 metre (3 feet) of the centre line can be blazed to indicate the location of the centre line. Blazing should be done so that the blazes are pinched, pointing towards the centre of the line.

Old blazes or other physical evidence must not be dis turbed, because this is evidence of the age of the original survey work.

If you are blazing a tree which has existing blazes, then blaze above or below those existing blazes, so original evidence is not destroyed.

Blaze only live trees, preferably the largest. Un-blazed trees or deadfalls that must be cleared should be laid flat on the ground to the side of the line.

Mark corners well and replace posts with durable, easily visible materials and paint.

It is a criminal offense to alter a surveyed boundary line. This includes cutting down a blazed tree, pulling a pin or stake, mov- ing a cairn or otherwise altering a line.

## Preliminary Site Visit - Walk your Woodlot

A preliminary site visit will give you the chance to locate and identify any wet areas, unmapped watercourses, wetlands, or areas of critical wildlife habitat that should be preserved or avoided while harvesting. Walk proposed roadway and look for any unmapped watercourses, wetlands, sensitive areas or critical wildlife habitat. Seasonal watercourses and certain wetlands may appear dry at certain times of the year. GeoNB is a free internet-based mapping application that is useful for locating regulated wetlands (www.geonb.snb.ca/geonb). Any wetlands appearing on the Regulated Wetlands Map or Provincially Significant Wetland layer require specific management practices that are addressed in the Watercourse Protection section of the manual. If you are unsure if you are looking at a wetland or not, contact your local Department of Natural Resources (DNR) or Department of Environment (DENV) office for help.

## Road Building: Doing it Right the First Time

Proper planning of roads and landings is critical. Roads are often one of the largest expenditures made by a private landowner, so their proper location and construction is vital. Minimizing the number of watercourse and wetland crossings will reduce your risk of environmental damage, lessen the number of necessary permits and save you money. Remember, if you alter a watercourse, even unintentionally, you are liable for the consequences of your actions by law.

Well-built roads will provide access for harvesting, silviculture, fire suppression and recreation for years to come and serve as a framework for future forest management activities. Roads have a major impact upon forest soils, water and ecology, and must be properly constructed to minimize potential site degradation.

The timing of road construction should be determined with significant thought given to the weather. Avoiding construction activities during wet weather events and periods of high soil moisture (spring) will make construction easier and more cost effective while reducing the risk of erosion and watercourse contamination. Layout roads with future activities in mind. By considering all the stands to be harvested in the foreseeable future when laying out your road network, locations can be optimized building the shortest length possible while allowing the greatest access and future expansion.

Harvesting activities will require trucking. It is important to identify turning and decking areas during the layout phase. Consider the equipment you will be using and design your roads accordingly. Roads should also be constructed with the expected trucking season in mind. All season roads are typically built to a higher standard, with a higher quality subgrade, deeper ditches and more surfacing. Identifying borrow pits and locating roads across ground where suitable building materials are readily available (sand and gravel for spring and fall roads) will help reduce

construction and maintenance costs. When dry, solid ground is not available it may be necessary to build road over wet, soft soils by importing suitable material and building up the sub-grade. If this construction technique is used, consider leaving the forest floor intact and adding a layer of logs laid perpendicular to the road prior to adding fill to provide additional bearing capacity. Make full use of off-take ditches, cross drains and catch basins to deal with runoff. Effective drainage will minimize erosion and siltation. Make sure that roads are graded, well ditched and crowned. Avoid hauling or operating in wet conditions as this will cause excessive damage to the roadbed. Clean up slash, fill ruts and install erosion control devices (water bars, silt fences, hay bales) where required. Properly built and maintained roads promote good drainage and help to minimize runoff and siltation problems . Do not run ditches into a watercourse. Off-take ditches must run out into vegetated areas at least 30 metres from a watercourse or wetland to trap sediments so they do not enter watercourse or wetland.

## Watercourse Crossings

Watercourse crossings range from streams calling for a small corrugated plastic pipe to large rivers requiring complex multi-span structures. Remember, if you alter a watercourse, even unintentionally, you are liable for the consequences of your actions by law. Even if you contract out all forestry activities to a certified forest worker, ultimately you as the landowner are liable for any resulting damage to a watercourse. Consequently, you must be aware of all applicable regulations pertaining to activities occurring on your property. A summary of New Brunswick's Watercourse and Wetlands Alteration (WAWA) Regulation is given in the Watercourse Protection section of this document. A complete version of this and all other provincial regulations is available at www.gnb.ca. A copy of watercourse alteration technical guidelines can be obtained from the Department of Environment (DENV) .

## Crossing Locations

A properly constructed watercourse crossing should be located on solid, level ground, perpendicular to the banks of the watercourse. Crossings aligned at right angles to the waterway minimize the necessary span length and reduce the probability of structure being compromised due to erosion. Avoid areas of easily eroded, unstable materials such as sand or silt if possible. If these materials are unavoidable, additional armouring around the crossing may be necessary. Choose a portion of the waterway that is straight and un-winding with a stable bank. Limit grubbing to the footprint of the subgrade as disturbed soils within close proximity of watercourses will likely introduce sediment under wet conditions.

## Proper Sizing

In New Brunswick, proper culvert, arch and bridge size is calculated based on the drainage area and the corresponding design flow. Sizing should be undertaken by an individual certified in watercourse alteration. The procedure involves delineating the watershed boundary, determining the area of the watershed, calculating the design flow for the 1 in 100 year event and then using a nomograph to size the culvert. When an application is made to install a watercourse crossing, DOE will evaluate the design flow calculation and proposed crossing structure to ensure that they are correct. Contact your local forest products marketing board for help determining proper crossing structure design and sizing.

## Culverts and Bridges

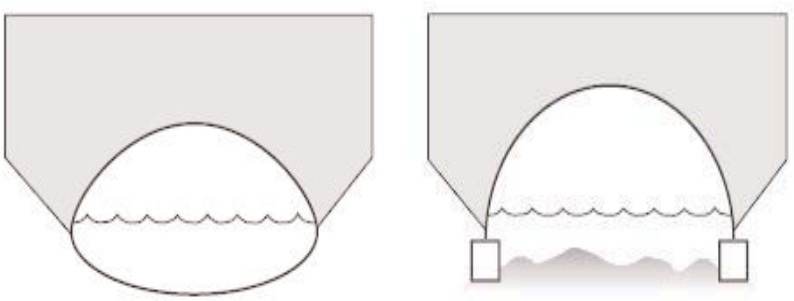
In a forestry setting, culverts are generally used for crossing small to medium watercourses and to control ditch water. Culverts help direct the flow of water, preventing erosion of ditches and roadbeds. Several different types of culverts are used in road construction, including conventional round culverts,

open bottom culverts and pipe arch culverts. Bridges may be used for any size crossing but are generally reserved for larger watercourses because of cost. Open bottom culverts and bridges

***Top - Steel stringer bridge with bolt-a-bin abutments.*** *(Photo courtesy of Fornebu Lumber)* ***Bottom - Multi-plate open bottom arch.*** *(Photo courtesy of AV group)*

***Stream Diversion with a cofferdam*** *(Photo courtesy of AV Group)*

span a watercourse and do not alter the streambed. Depending on the size and morphology of the watercourse, these structures may require less effort to install because their footings are installed outside of the streambed requiring only partial diversion of the watercourse.



Illustrated by Pete Stafford

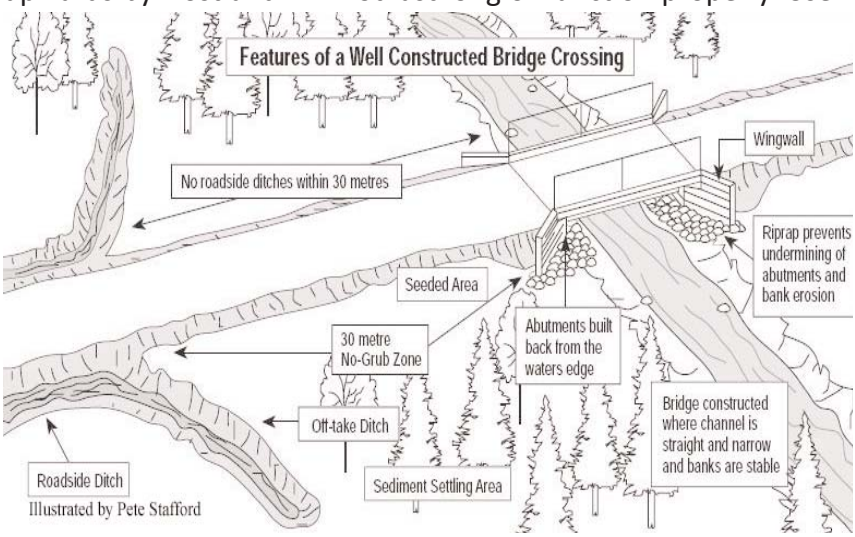
***Left - Pipe arch culvert; Right - Open bottom culvert***

## Installation

All structures crossing a watercourse should be installed "in the dry", preferably during periods of low flow to facilitate stream diversion, avoid disturbing fish migrations and reduce siltation. "In the dry" means that the water should be diverted or pumped around the crossing location to allow for proper installation of the structure and avoid introducing excessive amounts of sediment into the watercourse. WAWA regulations specify that all watercourse alterations involving in-channel works are to take place between June 1st and September 30th.

In general, pipe culverts should be embedded to 20% of the pipe diameter, to a maximum depth of 0.45m (18 in.) At minimum, they should be buried at least 6 inches into the streambed and have a downstream slope of no more than 0.5% to promote proper fish passage.

Backfill all structures using 6inch compacted lifts and in the case of culverts ensure a depth of fill over top of the structure equivalent to one half of its diameter. All structures must be well supported along their length by stable material (crushed gravel, etc.). Improperly seated, shallow structures will be pushed upwards by frost and will not last long or function properly. Use



***Properly installed cross-drain culvert*** *(Photo courtesy of AV group)*

sediment control measures where there is a risk of sediment entering a watercourse or wetland. Seed exposed soils to stabilize them and reduce erosion.

Culverts are also used as runoff control devices for roads. Culverts help direct the flow of water, preventing erosion of ditches and roadbeds. Cross drains are simply culverts crossing a road, connecting the ditches on either side to manage heavy runoff. As a general rule of thumb cross drains should be installed at set intervals based upon the slope of the roadbed. he accepted method for determining cross drain spacing is:

$$\text{Spacing} = \frac{500\text{m}}{\%\ \text{grade}} \quad \text{or} \quad \frac{1640\text{ft}}{\%\ \text{grade}}$$

It should be noted that the spacing formula is meant to be used as a guideline. The final decision should take into account local conditions and may result in a deviation from the calculated number.

The minimum acceptable diameter for cross drains is 300mm. Cross drains should be installed at a 30 degree angle oriented down-slope, with a 4% slope in grade to facilitate flow (i.e. bury the culvert 4cm for every 1m of length). Do not run ditches into a watercourse. Off-take ditches must run out into vegetated areas at least 30m from a watercourse or wetland to trap sediments before they reach the riparian features.

## Silviculture

Deciding on a management regime for your woodlot can be challenging. At minimum, stand and site characteristics must be taken into account when deciding on a course of action in your woodlot. Your personal goals will also give you a starting point in terms of the type of operation you ultimately choose (commercial thinning vs. clear cutting, etc.). It then becomes a matter of custom-tailoring the selected prescription to suit the character of your stand.

The following are questions you should consider when prescribing forestry activities:

**Stand Age**

Is the stand young and ready for pre-commercial thinning?
Is the stand still growing vigorously?
Is volume declining?
Has the stand reached its desired product potential?

**Regeneration Habits/Species Characteristics**

What are the natural characteristics of the tree species present?
Are they short or long lived?
Are they susceptible to wind or pests?
Which harvest method will promote the regeneration of the present or desired species?
Is planting required?

**Drainage**

Is there potential for soil/watercourse damage?
Can the site be worked with minimal damage or impacts to water quality?
Can all regulations be followed?
Will low soil strength make the trees susceptible to wind throw after harvesting?

**Habitat Quality**

Is the stand significant to wildlife?
Can habitat be improved? For which species?
Are species at risk or other unique species present?
Are provisions for habitat maintenance required to com ply with relevant regulations? (i.e. federal species at risk act.)

**Marketability**

What is the state of current market for the products you will produce?
What are the expected merchantable quantities?
Does the quality of timber to be extracted improve its marketability?
Do markets allow full utilization of your resource?
Do markets provide full value potential for your products?

**Non Timber Forest Products (NTFP) opportunities**

Are there other potential sources of income from non-timber or unconventional forest products?

## Other Points to Consider

The harvest method / silviculture system selected should reflect the species present, their age, size and disturbance regime. As an example, clear cutting a 100 hectare patch of mature tolerant hardwood (sugar maple, yellow birch, etc.) would not be recommended as a best management practice. Tolerant hardwoods are not usually subject to large scale, stand replacing events. Selectively harvesting 30% of the total volume (and not just the best trees) to promote regeneration and develop the remaining trees is closer to the normal pattern of stand development. Choosing the right time of year to enter any given stand will help to minimize the potential for site damage. Sensitive areas, areas

with high soil moisture and those prone to rutting and excessive soil disturbance are best entered after freeze-up or when dry in late summer.

## Possible treatments

Silviculture refers to the means of controlling the establishment, composition, character and growth of forest stands to satisfy specific objectives. This covers the full range of forest management activities, including planting, pre-commercial and commercial thinning, pruning and harvesting. There are numerous options for woodlot owners considering silvicultural activities. Each activity should be tailored in its approach to suit local conditions and individual goals.

While silviculture describes the management activities within forest stands, afforestation describes the establishment of a forest or stand in an area where the preceding vegetation or land use was not forest. Although New Brunswick is Canada's most forested province (by percent cover), as agriculture declines afforestation is becoming more relevant to private landowners. What was previously open land can now be returned to a forested condition, developing a wide range of environmental, economic and social values that were previously non-existent.

## Planting

The need for planting is highly dependent upon your personal objectives, the current state of your woodlot and its recent history. Planting is a means of speeding up stand regeneration while providing the opportunity to determine the species that will be present. In many cases, planting after harvesting is not necessary as abundant natural regeneration will quickly establish itself. Plantations can be established in a number of ways ranging from planting only one species to mixing several together and varying the way they are arranged (in rows or random) and the number planted per hectare (density).

## Things to Consider When Planting

Species selection is the most important aspect of establishing a crop of trees. Selecting native species suitable for the site gives the landowner the best possible chance of a successful plantation. This is because each species has a specific set of requirements for soil, water and climatic conditions and most do very poorly if they are not all met. Planting season generally begins in the month of May after the snow has melted and the weather has warmed sufficiently such that extreme frost events have passed.

Planting prescriptions vary by site, but certain principles are applicable to all circumstances. Proper spacing is key to achieving desirable form. Planting seedlings too close together will result in wasted investment due to some of the stems succumbing to competition. Planting seedlings too far apart results in excessive branching and poor form. Two metres between trees generally promotes rapid growth while maintaining good form. Store seedlings in a cool, shaded place, monitor them regularly and water them if necessary. This is critical for bare root seedlings.

When planting trees, it is important to keep the following BMP's in mind to get the most for your money. First and foremost, plant seedlings to the proper depth, ensuring the roots are seated in mineral soil up to the root collar. Depending on the state of the site and level of disturbance, it may be necessary to kick off the duff layer (forest floor) to expose suitable mineral soil. With your foot, firmly compact the ground in front of and behind seedlings to ensure the tree is held firmly in place. Air spaces around the roots can dry them out and lead to root rot. Both bare root stock and seedling plugs must be planted with roots straight down, not curled back up or "J" rooted. Flag planted trees every so often so that you can see the line where you have planted. This will make it easier to achieve the desired spacing.

Check your work to make sure you are meeting your target density (number of trees planted per hectare). An example would be to measure out a 10 metre by 10 metre square, counting the number of trees inside and ultiplying by 100.

## Pre-Commercial Thinning (PCT)

Pre-commercial thinning reduces the number of trees in a stand using a thinning saw, allowing those remaining to maximize their growth potential by freeing up additional resources necessary for growth.  It also provides a means of changing the species composition of the stand and the overall quality of the remaining trees. The resulting stand will determined by the "pecking order" employed to select trees for removal, based upon your goals for the stand. Consideration should be given to maintaining the balance of species found naturally in the stand as well as any species of special concern that may be encountered. As an example of a pre-commercial thinning strategy, you may want to develop high quality hardwood sawlogs. To do this, you would

***Pre-commercial thinning*** *(Photo courtesy of JD Irving)*

develop a list or "pecking order" that describes which species will be kept, in order of importance. In this case, you would want to keep high value species such as sugar maple, yellow birch, black cherry and white birch while removing grey birch and other short lived species such as balsam fir and other softwoods. Tailor your pecking order to achieve your particular strategy.

## Things to Consider when Pre-Commercially Thinning

Timing is critical when planning to pre-commercially thin your woodlot. Begin too soon in a stand's development, and the efficiency of the activity (how much thinned per day, response of the trees) will be compromised. Wait too long, and you may be losing volume that could be captured by commercially thinning, and your stand will not develop volume as rapidly as it could. Do not leave cut trees leaning against uncut ones as this can damage or deform the uncut stems. Stumps should be no taller than your boot. There should be no green shoots left on cut stems. Crop trees (those left uncut) must be selected according to the pre-determined pecking order and should not be damaged in any way. This includes accidental cuts and scuffed bark. Leave clear trails free of debris for easy access as a safety precaution should an emergency occur.

A general rule of thumb for timing of PCT operations in Hardwood stands is an average height of 4m or greater. Start considering PCT in softwood stands once they have reached an average height of 2m or greater.

## Commercial Thinning

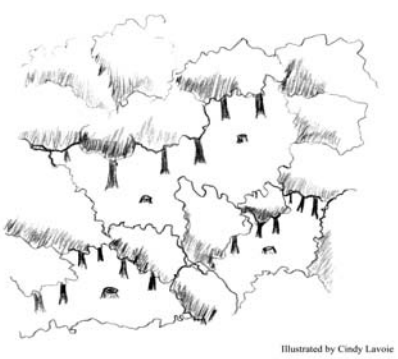
Partial harvesting, also known as commercial thinning, is designed to capture marketable timber while helping to improve growing conditions and quality within the stand. As trees increase in size, their numbers are reduced through natural competition. Commercial thinning harvests this volume that would otherwise be lost to the landowner.

## Silviculture systems and Harvesting Strategies

Harvesting is the removal of merchantable timber from a forest stand. It may be done in any number of ways to suit individual goals, stand and market conditions. Removing all of the timber from a stand in one pass results in an even-aged stand; all trees in the new stand will be the same age. Partial harvesting removes a few trees at a time at regular intervals, creating an uneven-aged stand; the remaining stand will consist of a variety of ages. Both systems have their advantages and disadvantages, depending upon your personal goals and the nature of your woodlot. Consider your long-term goals before deciding on your harvest method and consult your local forest products marketing board or a qualified forestry professional (Forester or Technician) for site specific advice. To find a Registered Professional Forester (RPF) or Certified Forest Technician (CFT) near you, contact the Association of Registered Professional Foresters of NB (ARPFNB) or the NB Forest Technician's Association (NBFTA).

## Single-Tree and Group Selection

This method of harvesting removes individual trees or small groups of trees from the stand based on a set of criteria to achieve a desired stand condition. It provides a means of improving the overall quality of the timber in the stand by removing less fit individuals and improving the growing conditions for the remaining stems by creating space in the canopy. The best way to achieve the desired stand composition with this method is to mark stems for removal prior to starting harvesting operations. Single-tree and group selection result in uneven-aged stands. These methods also




***Pattern of tree removal in single-tree selection system***

generate income on a regular, sustained basis. This harvest strategy may be used in any stand type where stand improvement is an objective. Single-tree and group selection allows for the maintenance of tolerant species (species that can grow in shade) such as sugar maple, beech, yellow birch, oak, red spruce and balsam fir by providing an opportunity for regeneration under shaded conditions.

***Natural regeneration*** *(Photo courtesy of JD Irving)*

## Shelterwood and Seed-Tree Harvesting

Shelterwood and seed-tree harvesting involves the total removal of all merchantable timber in two to three cuts. These systems leave widely spaced, good quality mature trees to produce seed after the first cut, establishing the next generation. The distribution of the retained stems varies depending on the system. Mature trees are left to create the proper growing conditions for the species to be regenerated. Protect regeneration when making the first cut and removing the remaining overstory. The vigour and resilience of the retained stems should be assessed prior to harvesting to ensure they are capable of providing seed and persisting until their scheduled removal. Shallow rooted species may not be suitable for this type of system as they are susceptible to windthrow and may blow down following the first removal. Once the new regeneration is established, the remaining overstory is removed. Harvesting the overstory soon after the regeneration is

established will help minimize damage to the new trees. Regeneration can be further protected by carefully spacing and flagging trails and limiting machine movement outside of designated areas.

Seed tree harvesting is similar to the shelter-wood system but with fewer, widely-spaced seed-trees left. These are in-turn removed when regeneration has been established. Both systems create even-aged stands. Both systems can be used to manage for a variety of hardwood and softwood species.

## Clearcutting

Clearcutting is the least complex harvest method, removing all merchantable timber from a site in one cut. Although widespread, clearcutting in many New Brunswick stand types is not the preferred method for stand management. Clearcutting generally results in the regrowth of an even-aged stand of pioneer species that are generally short lived. The regenerating forest depends upon the type and amount of regeneration in the original stand, the surrounding forest type and size of the opening. In some cases, clearcutting is the appropriate tool to compliment stand type, disturbance regime and landowner objectives. Consider your long-term goals before deciding to clearcut and consult your local forest products marketing board or a qualified forestry professional.

## Employing a Contractor

Many landowners do not have the time or equipment to perform large-scale operations in their woodlot and choose to employ contractors to carry out the work for them. Before choosing a contractor, ask for references and follow up on them. Are previous clients and marketing boards happy with their work? Were there any issues? Ask for a tour of some recent operations similar to those you are considering for your own land. This is a great way to get a feel for the quality of job you can expect. Use a for-

mal contract to clearly outline the details of the work to be done and the responsibilities of both parties. Contact your local forest products marketing board for more information concerning drafting a contract. Constant monitoring of progress, residual damage, adherence to your cutting plan and legal regulations will ensure the success of your operation. Keep an eye on the weather and avoid working during periods of heavy rain and elevated soil moisture as this can lead to heavy rutting and erosion.

The New Brunswick SFI Implementation Committee promotes the use of Qualified Logging Professionals. Qualified Logging Professionals are those with specialized skills in timber harvesting gained through experience and/or formal training who have successfully completed a training program recognized by the New Brunswick SFI Implementation Committee. A list of qualified logging professionals can be found at www.nbsfi.ca.

## Work Permits

Work permits are required to allow most forestry activities during fire season (3rd Monday in April until the end of October). Work permits can be obtained at any Ranger office in the province at no cost and are required before work can begin. Watercourse and wetland alteration permits are required for any works carried out within the buffer of a regulated watercourse or wetland and are covered in the watercourse protection section of this document.

## Operational Planning

### Trails

Unlike roads, trails are the undeveloped paths through the forest by which timber is removed. They are not grubbed, ditched or crowned, but are simply created as machines move through the forest. As with roads, proper trail layout will improve harvesting efficiency while reducing potential negative site impacts. Trails should access timber designated for harvest by the most direct route, yet avoid sensitive areas, watercourses and areas that are not scheduled for harvest. When formulating your cutting plan, walk all proposed main trails to identify any un-mapped wet areas or areas of special concern. Avoid these areas by delineating them with flagging and restricting machine traffic. Orient trails to avoid steep slopes where possible to limit soil disturbance and erosion as well as reduce the risk of personal injury. Intersecting trails should be laid out at angles less than 30 degrees with respect to the main trail. This will help to limit damage to trailside trees you intend to leave. Plan out trails with designated bumper trees around which loads can be turned, protecting leave trees and regeneration to be left. These trees should be harvested just prior to completing operations.

### Soil Disturbance

Selecting the right machinery for the job and time of year will yield the highest efficiency while minimizing soil disturbance. Although exposing mineral soil can help to stimulate certain types of regeneration, poor operating practices will lead to rutting and sedimentation. Rutting displaces and damages soil structure which can impede root development and alter drainage patterns.  Saturated fine textured and organic soils are most vulnerable to rutting. If ruts begin to form, cease operating until the soil dries or use an alternate trail. Leaving slash on the trail is also useful to minimize rutting as it creates a larger foot print, spreading the weight of wheels or tracks over more

ground. If rutting continues, consider waiting until the ground becomes frozen. Do not fill ruts on trails with soil pushed in from another location as this will add to sediment flow. Fill ruts with slash to trap sediments and break up water flow. As the slash decomposes, new soil will form helping to fill them in.

Know your machine and its limitations. Do not overload equipment as this will lead to unnecessary rutting and machine wear. Use a winch to access timber on steep slopes or valley bottoms. This will keep you out of danger while preventing excessive rutting and soil disturbance. When using a winch try and use the full length of your main line. Doing so will limit the amount of driving required in the stand, minimizing damage to root systems and soil compaction.

## Timber Selection

When selectively harvesting your woodlot, choosing the right trees to remove is crucial. The tendency to "take the best and leave the rest" degrades the quality of the stand and may limit future product mix. By taking only the top quality growing stock the most genetically desirable traits are removed, diminishing the quality of future trees. For improvement cuts, trees should be selected for removal based upon the following, in order of importance:

Trees showing signs of disease or decline.
Trees with poor form or mechanical damage likely to degenerate or detract from quality.
Stunted trees that will not respond to better growing conditions.
Trees that are the most likely to blow down or suffer wind damage between now and the next harvest.
Trees whose value will not improve between now and the next harvest.

Remaining selection should focus upon creating optimum

spacing for the remaining trees. Species left should be windfirm, meaning they are unlikely to blow down or suffer wind damage.

## Product Utilization

It is in your best interests as a landowner to make the most of the resource. Eliminating wood waste means more money in your pocket. Consider full tree and treelength markets where they exist as they generally involve reduced harvest cost and time. Know your markets and fully utilize all trees. Be aware of product specs and strive to process your logs to produce the highest value products possible i.e. sawlogs, veneer, and studwood. Keep stumps low and cut trees to full potential length to get maximize utilization. Keep an eye on market trends and time your harvest accordingly. Always check with your local forest products marketing board for market conditions before harvesting.

***Logs being sorted by product -*** *(Photo courtesy of JD Irving)*

## Debris Management

Although there are several approaches to the management of harvesting debris (slash), it is now generally agreed that at least a portion of the slash should remain on site, evenly distributed across the cut. As slash breaks down it returns nutrients to the soil helping to maintain site productivity. With the increased interest in forest biomass as a source of energy, debris management is becoming an ever more important consideration in forest management. As debris gains value, the impact of its removal from a forest stand must be considered. Many of the critical nutrients that cycle between growing trees and the soil after they die and decay are found in the fine branches of the canopy. Removing the crown and these fine branches can disrupt this nutrient cycle potentially leading to a degradation of soil quality and a site's overall ability to grow trees and support healthy ecosystems. In addition, coarse woody debris (fallen dead wood) is a critical habitat component for many species - plant, animal and invertebrate. Removing or reducing the amount of coarse woody debris could have a significant negative impact on the health of these populations.

## Watercourse Protection

Watercourses, wetlands and wet areas are heavily influenced by forestry activities, with the deposition of silt being accounted among the greatest threats to aquatic ecosystem health. To protect the health and function of watercourses and wetlands at risk from forestry activities the government of New Brunswick has created provincial watercourse and wetland regulations. These regulations spell out how operations are to be conducted within close proximity to regulated riparian features as well as the permits required.

As part of the Clean Water Act, the Province of New Brunswick has enacted the Watercourse and Wetland Alteration (WAWA) Regulation which seeks to minimize the impacts of forestry, agri-

cultural, development and recreational activities on watercourse and wetland quality and functioning. This regulation requires landowners to obtain a permit for any activities within 30 metres of a designated watercourse or wetland. Applications for permits and inquiries for additional information may be made at your local Department of the Environment office or at any Service New Brunswick office.

You as a landowner are responsible for ensuring that no alteration to water quality or quantity occurs as a result of your actions, whether a permit is required or not and you are legally liable for damage to any watercourse, regardless of size. In 2003, the Province amended the existing Watercourse Alteration Regulation to include wetlands. Since the inclusion of wetlands into the legislation, any activity within 30 metres of a wetland depicted on the Regulated Wetlands Map or Provincially Significant Wetland layer as viewed on GeoNB or any wetland greater than 1 hectare (2.5 acres) in size requires a permit. If the activity occurs within 30 metres of a wetland smaller than 1 hectare (2.5 acres) that is part of a watercourse, then the activity requires a permit regardless of the wetland size.

Watercourse and wetland regulations are complicated and subject to interpretation, so it is highly advisable that you contact your local Department of Environment office before beginning any activities that may affect wet areas on your property.

## Why do we Need Buffers?

The reasoning behind the creation of mandatory watercourse and wetland buffers stems from the importance they play in several landscape functions. Buffer strips along watercourses are treed areas left to help preserve the many functions of the riparian area.  Buffers trap sediments before they have a chance to enter watercourses. This is extremely important when the potential for erosion from logging roads, skid trails and landings is considered. Buffer strips shade watercourses, regulating water tem-

perature for cold water loving species (e.g. speckled trout) and provide habitat for terrestrial species. Buffers act as corridors for the movement of wildlife across the landscape. They serve as temporary and permanent habitat for a multitude of plants, animals and birds. There are countless reasons why it is important to respect the need for buffers.

## Guidelines for Operating in Buffers

Watercourse and Wetland Alteration (WAWA) permits allow certain low impact operations inside of watercourse buffers. Current regulations permit limited harvesting (up to 30% basal area removal) in approved buffers. Permits are required for pre-commercial thinning operations within the 30 metre buffer of a watercourse or wetland as well. When pre-commercially thinning inside the buffer, all trees and brush must be left in place, and no debris may enter the watercourse. Contact DOE for further details before you begin.

No machinery is permitted within 15 metres of a watercourse. Machines operating inside the 30 metre buffer may cause significant soil disturbance so plan your trails carefully. If you are permitted to operate within the outside 15 metres of a watercourse or wetland buffer, be sure to count your skid trails when calculating 30% volume removal. DO NOT allow slash or debris to enter the watercourse. Do not pile wood within 15 metres of a watercourse or anywhere that debris may flow into a watercourse

## Workplace Safety

As a landowner employing a contractor, you are obligated to make all reasonable efforts to ensure safe practices are followed. You have the legal obligations of an "employer" under the Occupational Health and Safety Act as outlined by the Workplace Health and Safety Compensation Commission (WHSCC) and therefore you must be aware of all employer and

employee obligations. Under this legislation, it is your responsibility to ensure all necessary safety equipment is available on site and all staff is well trained and aware of hazards and safety procedures. Basic safety clothing when harvesting should include:

- Hardhat, undamaged with proper fit
- Hearing protection i.e. earmuffs or plugs
- Vision protection - Hardhat screen, safety glasses
- Kevlar cutting pants in good condition
- CSA approved cutting boots - specifically intended for chainsaw use
- Chainsaw gloves
- Personal fire extinguisher
- A radio or phone on site in case of emergency

Always park vehicles facing out of the woods to facilitate a smooth, efficient exit in the event of an emergency.
Where chemicals are to be used, using the Workplace Hazardous Materials Information System (labels and training) will ensure that all reasonable precautions have been taken to assure their proper use and handling. It is also highly recommended that all forestry workers have current First Aid certification. At least one person on site must be a designated first aid provider.

Do not work alone. Make sure that somebody knows your whereabouts at all times. Keep a fully stocked first aid kit on site able to handle any likely emergency including broken limbs, serious bleeding and allergic reactions.

## Petroleum Products

You are likely aware of the environmental damage caused by petroleum spills. Even minor spills that might not seem to be significant can cause serious contamination. The Federal Transportation of Dangerous Goods Act requires all petroleum products to be properly transported and stored in approved containers to minimize the potential for spills. Storing fuel in unap-

proved containers can pose a serious risk to the environment and the community while in transport. Slip tanks, portable fuel tanks with a capacity between 450 and 5000 litres **must** meet the national standard for a federally approved slip tank and are


***Example of an approved slip tank -****(Photo courtesy of INFOR Inc.)*

subject to yearly inspections and testing. All tanks used to carry flammable liquids with a capacity greater than 450L must be manufactured after January 1, 2003 and must conform to one of two standards. Tanks holding between 450 and 3000 litres have to meet one of the following specifications: UN standard mobile IBC to CGSB 43.146. Tanks with greater than 3000 litre capacity must conform to: TC 306/406 to CSA B620. If your tank has a capacity of more than 2000 litres, you will need a transportation of dangerous goods certificate to transport or dispense fuel. Contact Transport Canada for a list of certified inspection stations or for more help. Be sure to check that tanks meet these requirements when selecting a new tank. Remove all used containers, contaminated materials and garbage from the site.

Deposit them in designated disposal facilities. Collect used oil, including engine oil, hydraulic fluid, lubricating oils and transmission fluid, in clean containers and dispose of at designated return facilities. This is the only acceptable method of dealing with used oil. Empty oil containers are to be disposed of in the same way as household hazardous waste. Regularly inspect machinery to check for leaks or mechanical problems that could lead to spillage. FIX PROBLEMS IMMEDIATELY. In the case of a broken line or active leak, shut down and repair in place when possible to limit spillage. Consider using alternate, biodegradable lubricants when possible. Use care when filling cans, tanks, saws, etc. not to overflow and spill. Consider using anti-spill nozzles, funnels etc. Do not perform maintenance within 30 metres of a watercourse or on a slope next to a watercourse.

### Spills and Cleanup

Spill kits are available from safety supply dealers, auto and truck parts stores and equipment dealers. They must be on site during any mechanical operation where spills are possible. Have spill kits handy and ensure that all workers are familiar with their use. Place contaminated earth in in sealed containers and dispose of at an approved facility. All spills greater than 25 litres MUST be reported to the Department of the Environment. Call 1-800-565-1633 for advice on how to handle clean-up after hours, or contact your local DOE office during regular business hours. All spills must be addressed. You are responsible for their immediate and thorough clean-up.

Keep the site clean. Show respect for the environment by picking up and properly disposing of all waste, including food and beverage wrappers/containers, broken parts, used filters etc. Garbage contaminated with petroleum or chemical products should be disposed of according to regulations. See the Petroleum Products section for more details.

# Wildlife

## Habitat and Biodiversity

Wildlife is the blanket term given to all organisms living independent of mankind. This includes mammals, birds, reptiles, insects, plants and any other non-domesticated living creature you might encounter. Consideration must be given to wildlife habitat when planning and conducting activities in your woodlot. Although private woodlands are generally fairly small (on the order of 100 acres/40.5 hectares), individual parcels of land can have regional ecological significance. For instance, your woodlot may contain the only productive deer wintering habitat in the region. Activities that degrade the quality of this habitat could have serious impacts upon the regional deer population. When designing a management strategy, consider all of your goals and try to integrate wildlife into your long-term plans. There are a number of project orientated activities that woodlot owners can undertake to create or improve wildlife habitat on their property. Brush shelters, release and care of wild apple trees, putting up nest boxes, etc. will all help to improve habitat quality and encourage wildlife.

## Forests with Exceptional Conservation Value (FECV)

Woodlot owners are stewards of the land. Their management decisions directly impact the landscape, influencing the arrangement and abundance of species by modifying forest stand composition. As we learn more about forest ecology, maintaining biodiversity is becoming an increasingly important consideration in management planning. Biodiversity may be defined as the variety and abundance of life forms, processes, functions, and structures of plants, animals and other living organisms, including the relative complexity of species, communities, gene pools and ecosystems at spatial scales that range from local to regional to global. In the face of a changing climate and the influence of invasive species the maintenance of biodiversity is becoming

increasingly important as a means of ensuring that New Brunswick's forests are able to buffer the types of changes expected over the next 100 years.

**Forests with Exceptional Conservation Value** are broadly defined in the SFI standard as 'those containing critically imperilled (G1) and imperilled (G2) species and ecological communities'.

**Critically imperilled:** A plant or animal or community, often referred to as G1, that is globally extremely rare or, because of some factor(s), especially vulnerable to extinction. Typically, five or fewer occurrences or populations remain, or very few individuals **(<1,000)**, acres **(<2,000 acres or 809 hectares)**, or linear miles **(<10 miles or 16 kilometers)** exist (Further information can be found under Descriptions of Biodiversity Hotspots and High-Biodiversity Wilderness Areas in Section 6 of the SFI requirements document).

**Imperilled:** A plant or animal or community, often referred to as G2, that is globally rare or, because of some factor(s), is very vulnerable to extinction or elimination. Typically, six to 20 occurrences, or few remaining individuals **(1,000 to 3,000)**, or acres **(2,000 to 10,000 acres or 809 to 4047 hectares)**, or linear miles **(10 to 50 miles or 16 to 80.5 kilometers)** exist (Further information can be found under descriptions of Biodiversity Hotspots and High-Biodiversity Wilderness Areas in Section 6 of the SFI requirements document).

Forests with Exceptional Conservation Value should be taken into consideration when planning any activities on your woodlot. A current list of G1 and G2 species occurring in New Brunswick can be generated through NatureServe (www.natureserve.org) for free or through local conservation data centres for a fee (www.accdc.com). As of March 2011, there are 26 species and 1 forest community that are listed with NatureServe as G1 or G2 in New Brunswick. Reasonable Measures should be taken to locate and protect these occurrences on your woodlot. Assistance in

determining whether you have any of these species or community on your woodlot can be provided by your local forest products marketing board or by a qualified forestry professional.

## Endangered Species Act

Beyond the principles of good stewardship, there are provincial and federal regulations which may affect your choice of management activities. These regulations apply to species listed under the NB Endangered Species Act and the Federal Species at Risk Act (**see Appendix**). Species protected by these regulations can be referenced by accessing the province of New Brunswick web site at: http://www2.gnb.ca/content/gnb/en/departments/natural_resources.html and the Federal government site at: http://www.sararegistry.gc.ca/default_e.cfm. If any of these species are present in your woodlot, you must abide by all pertinent regulations. As of April 2011 there are 27 species listed as endangered and 15 as threatened in New Brunswick. Since the arrival of Europeans over 400 years ago, New Brunswick has lost 4 native species.

### Deer Wintering Areas (DWA's)

Whitetail deer are at the northern extreme of their range here in New Brunswick and as such are susceptible to winter kill, most notably caused by deep snow and extreme cold. Unlike native moose and caribou, whitetails have comparatively short legs and small hooves which limits their ability to travel and forage in deep snow. To help sustain deer populations, biologists have identified the habitat types that provide the best chance of success for winter survival. Winter deer habitat includes stands that meet the following criteria:

- Conifer and conifer-hardwood stands (excluding tamarack, pine, poor-site spruce and most pure black spruce types).

Conifer Crown closure >=50% composed of trees greater than 10 metres tall. Usually requires more than 20m2/ha basal area.
Average conifer diameter of 18cm.
>10% ground cover of available browse species.
Minimum 150 metre stand width.

***Whitetail deer - (****photo courtesy of JD Irving.)*

Many stands will fit this description, not all of which will be active deer habitat. There will also be stands that don't fit this description that do shelter deer. Look for signs of deer use including tracks, scat and browsing.

As far as food and shelter quality are concerned, white cedar and hemlock are valuable components of deer wintering areas. These trees provide shelter, forage and are long-lived. Where possible, these species should be left to help preserve the quality of deer wintering areas.

## Snags-Dead and Dying Trees

Standing dead and dying trees (snags) provide critical habitat to a number of species. Cavity nesters, including woodpeckers and wood ducks use snags to rear their young, forage for food and roost. A variety of mammals use snags for shelter and forage as well. It is important to consider snags and their function, and to include them in your management plan. Snags are generally unmerchantable, so cutting them is of little economic value. Snags should be left when possible, so long as they pose no hazard to forest workers or recreational users.

***Pileated woodpecker feeding on a softwood snag*** *- (Photo courtesy of Fornebu Lumber.)*

## Wildlife Trees

Before you begin harvesting, take a walk through your woodlot and try to identify any trees that are being actively used by wildlife. Wildlife trees can be alive or dead and may often be hard to spot. These trees might include:

**Escape trees** - hollow trees with a hole at the butt used by mammals to escape predators.

**Cavity trees** - hollow trees used by birds and mammals for nesting, roosting or feeding.

**Nesting/roosting trees** - Trees that have active nests in them. Raptor (birds of prey) nests can be hard to see as they are generally located in the top of the crown. Woodchips around the base may indicate that woodpeckers are using the tree.

***Stick nest in a spruce tree -*** *(Photo courtesy of Fornebu Lumber)*

**Fruit/Seed Bearing Trees (mast trees)-** Trees and shrubs that provide seasonal food sources such as beech, white and yellow birch, red oak, cherry, wild apple trees and butternut should be left to continue providing forage for local wildlife.

If you find any active trees, clearly flag them and make sure that all people involved with the operation are aware of their location. Avoid active nests by leaving an un-cut buffer around them. Each species generally has its own management strategies therefore proper identification is key.

## Trees of Special Concern

Make yourself aware of uncommon trees or trees with management concerns when planning and implementing your harvest. For example, butternut is declining in the province due to butternut canker, a fatal pathogen and as a result has been listed as an endangered species under the federal species at risk act (SARA). Under SARA, it is an offense to kill an endangered species, this includes harvesting live butternut. Leaving any and all live butternut to serve as a seed source will increase the odds of this species rebounding.

***Mature White Pine -*** *Photo courtesy of INFOR Inc.*

Due to the widespread nature of beech bark disease in Eastern Canada, American Beech has experienced a significant reduction in numbers. It is advisable to leave healthy beech as a source of seed. Beech is also a valuable mast tree.

Leave species uncommon or rare to your area as a source of seed (i.e. black cherry in the north, black ash across the province). Leave white pine seed trees (not just poor quality trees) for quality seed source.

## Special Sites

Special Sites are areas that include ecologically or geologically unique or culturally important features. Landowners should consider locating and protecting such sites on their woodlots at the management plan stage. Examples of special sites are as follows:

**Graveyard sites;**
**Historical settlements;**
**Waterfalls or springs; or**
**Large bird nesting sites.**

# Invasive Species

## Control of invasive exotic plants and animals

There are nearly as many definitions of the term invasive species as there are invasive species themselves. In general however, invasive species may be defined as 'species introduced from another country or geographic region outside its natural range that may have fewer natural population controls in the new environment, becoming a pest or nuisance species'. Currently around the world, invasive species cause hundreds of billions of dollars a year in losses while doing an incalculable amount of environmental damage. According to the United Nations, invasive species are counted as the second greatest threat to global biodiversity (total number of species found in any given place) behind habitat loss. In Canada, invasive species have been doing significant damage since the arrival of Europeans. All habitat types, from forests, to prairies to arctic tundra and both marine and freshwater ecosystems have been significantly impacted through the action of invasive species. As our climate changes and native species become even more stressed by environmental factors, known invasive species will likely have an increasing impact while new invasives begin causing unforeseen issues. The general public have a huge impact upon the spread and control of invasive species. The most damaging invasive forest insect pests are being spread faster than they could on their own due to routine human activities like moving infested firewood or transporting infested growing stock or soils.

The following list details some of the most invasive and potentially damaging species both currently established in and threatening to invade New Brunswick ecosystems. Woodlot owners, forest workers and the general public should make themselves aware of these species, their identification and primary methods of spread.

## Invasive Insects

### Asian Longhorned Beetle (*Anoplophora glabripennis*)

As the name implies, the Asian longhorned beetle is of Asian origin and is a species of extreme concern in the hardwood forests of Eastern North America as well as urban and suburban landscapes. It is believed that the insect was introduced into North America in solid wood packaging material. The Asian longhorned beetle attacks all species of maple trees, and has been shown to affect a very wide range of host species including horse chestnut, willow, poplar, elm, birch and 15 other species, most of which occur in New Brunswick.

***Left- Asian Longhorned Beetle; Right - native white-spotted sawyer beetle -*** *(Photos courtesy of Natural Resources Canada)*

It is a very large insect measuring from 2.5 to 4 cm in length with antennae up to 10cm long. It resembles the native white spotted sawyer beetle which leads to regular misidentifications.

Adult female beetles deposit eggs in depressions chewed into the bark of the host tree. After hatching, larvae burrow into the tree and begin excavating feeding galleries in the cambium. As they grow, the larvae create oval shaped galleries in the sapwood

and heartwood. Frass (sawdust) is expelled from these galleries near where the eggs were deposited. It is the cumulative impact of these galleries that cause tree breakage and the eventual death of the tree.

Larvae may take up to two years to reach the minimum weight required to initiate pupation. Larvae pupate in late spring or early summer and emerge from the tree through pencil-sized holes in the trunk or large branches.

At present, sanitation is the only option for controlling this insect. Infested trees must be removed and chipped into pieces small enough to ensure there in no potential for the survival of larvae.

The movement of firewood and roundwood are generally viewed as being responsible for the spread of this insect. The potential damage of this insect runs into the billions of dollars as it threatens a huge section of the hardwood lumber industry, the future of maple syrup production, as well as recreation and ecological function of forests.

### Brown Spruce Longhorned Beetle (*Tetropium fuscum*)

Introduced to Halifax from Europe in the late 1980's, the brown spruce longhorned beetle was first found to be established in Point Pleasant Park, Halifax, Nova Scotia and has been expanding its range ever since.

As the name suggests, this beetle favours spruce as its preferred host and causes significant damage and mortality to mature trees.

A smallish beetle no more than 1 inch (2.5 cm) in length with reddish brown antennae and wing cases.

Mature beetles deposit eggs (oviposit) on mature spruce. Eggs

***Brown Spruce Longhorned Beetle -*** *(Photos courtesy of Natural Resources Canada)*

hatch and larvae burrow through the bark and into the cambiumwhere they begin to feed. They eventually girdle the tree, cutting off the flow of essential nutrients, ultimately resulting in the trees death.

As the larvae feed, frass from their galleries may be visible on the trunk along with white streaks of pitch (see photo).

The movement of firewood and roundwood is suspected to be the main vector for movement of this pest. Wood with the bark on should not be moved from zones in or near infested areas to help slow the movement of this pest.

### Emerald Ash Borer (*Agrilus planipennis*)

A small emerald green beetle of Asian origin that attacks and kills all species of ash (Fraxinus spp).

The emerald ash borer (EAB) has already killed millions of ash trees in south-western Ontario,throughOntario, through Michigan as well as Illinois, Indiana, Ohio, Pennsylvania, and New York states and continues to spread rapidly.

Human activities are contributing to the speed of its spread through the movement of infested firewood, logs and untreated lumber.

The emerald ash borer spends the winter underneath the bark, either as a mature larva, or pre-pupa.  From June through August, the adult beetle emerges through 'D'-shaped exit holes.

The adult beetles feed on the edges of ash leaves briefly to gain the nutrients required to reach sexual maturity. They mate and the female lays a small (1mm) egg in bark crevices around branch collars or in scaly bark. The larva hatch and burrow into the cambium of the ash tree to feed in serpentine shaped galleries. When populations are high, these galleries coalesce and restrict the nutrient flow of the tree leading to tree decline and mortality.


***Left - Emerald ash borer; Right - Relative size of 'D' shaped exit hole*** *(Photos courtesy of Natural Resources Canada)*

At this time, the tree responds through branch and crown dieback and often produces adventitious growth from latent buds along the larger branches and main stem. EAB poses a serious economic, environmental and cultural threat to all areas with native ash species.

First nations risk losing both white and black ash, two species with very important cultural implications.

It is not a question if EAB will reach New Brunswick but a matter of when. All woodlot owners, woods workers and the general public need to be aware of this insect and be able to identify it. Restricting the movement of hardwood logs and firewood is critical in preventing the movement of this pest.

## Balsam Woolly Adelgid (*Adelges piceae*)

***Left - Swollen node on balsam fir caused by BWA; Right - classic crown deformation on balsam fir -*** *(Photos courtesy of INFOR Inc.)*

Introduced to North America roughly 100 years ago, Balsam Woolly Adelgid or BWA (formerly balsam woolly aphid) attacks balsam fir causing gouting, crown dieback, the formation of resinous compression wood and the eventual death of infested trees. Even if trees survive the infestation, the damage is permanent and stem quality and tree vigour will likely not recover. The spread of balsam woolly adelgid has been shown to be closely related to minimum winter temperatures. Sustained temperatures of -30 C naturally limit the spread of BWA. As weather patterns have changed and our winters have become less severe balsam woolly adelgid has been able to spread across much of New Brunswick.

Pre-commercial thinning (spacing) has also been shown to have an influence on the susceptibility of stands to infestation by BWA. Spaced stands provide better habitat for BWA than non-spaced or tighter stands. This may offer a means of helping to prevent the establishment of BWA in regenerating forests when modifying density.

## Gypsy Moth (*Lymantria dispar*)

The gypsy moth is of Eurasian origin and was introduced to North America in the 1860's. Imported as a means of developing a North American silk industry, it has become a very damaging defoliator of hardwood trees in Eastern North America.

Gypsy moth caterpillars will feed on nearly every hardwood species found in New Brunswick but oak, poplars, birch, alders, beech, apple and sugar maple are preferred. Gypsy moth will also feed on some softwood species if suitable hardwoods are not available with a preference for eastern white pine and spruce.

***Left - Mature gypsy moth; Right - Gypsy moth egg masses and size relative to human hand. -*** *(Photos courtesy Natural Resources Canada)*

Adult gypsy moths lay egg masses containing up to 1000 eggs from July through September. Egg masses are usually located on bark but may also be found on nearly any surface including vehicles, boats, canoes, outdoor equipment and firewood helping to facilitate their spread.

Gypsy moths over-winter as eggs which hatch in the spring. The larvae climb into the canopy to begin feeding, resulting in damage to the infested tree.

Feeding continues until July when the larvae reach the critical

weight required to initiate pupation. The full-grown larvae, 35 to 60 mm long, are dusky or sooty coloured and hairy, and have a double row of five pairs of blue spots, followed by a double row of six pairs of red spots down the back. Larvae seek out sheltered places in which to pupate. Pupation takes 10 to 14 days to complete.

The adult female moth cannot fly, so mating and egg deposition takes place near the site of pupation. Because females do not fly, the movement of this species across the landscape occurs either in the egg or caterpillar stage. Small larvae may be carried by the wind long distances and egg masses hitch rides on firewood, logs or any type of vehicle. As such, the movement of materials and equipment from infested areas to non-infested areas should be done with great caution. Check for hitchhikers before transporting goods or equipment.

Once an infestation has begun, options for control include spraying registered pesticides and destroying egg masses. Check all applicable provincial and federal regulations before applying any chemical pesticides.

## Invasive plants

### Garlic Mustard (*Alliaria petiolata*)

Brought to Canada in the 1800's as a medicinal plant, it is generally found on moist upland sites - tolerant hardwood stands. This bi-annual plant is a prolific seeder, with seeds remaining viable up to 5 years. It outcompetes native plants for space, water, soil nutrients eliminating forage and habitat for numerous species that rely on spring flowers.

***Garlic Mustard*** *- (Photo courtesy of Natural Resources Canada)*

Eliminating the spread of Garlic Mustard is the best policy. Sanitize equipment by power washing machinery as it leaves the site to prevent the spread of dormant seeds in contaminated soil.

Established garlic mustard may be eliminated before seed set through the application of glyphosate herbicides such as roundup, cutting, digging or burning. After seed set, plants should be removed from the site and destroyed to break the seeding cycle.

### Purple Loosestrife (*Lythrum salicaria*)

***Purple Loosestrife*** *- (Photo courtesy of INFOR Inc.)*

Brought to Canada in the 1800's in ship's ballast and in the soil of potted plants.

Is commonly found in areas where you would expect to find cattails and reeds.

Purple loosestrife outcompetes native aquatic plants causing the degradation of habitat quality, alters the cycling of nutrients and inhibits the filtering capacity of wet lands to clean surface water. Purple loosestrife has a significant impact upon the quality and functioning of wetlands. It is a prolific seeder, each plant producing up to 3 million seeds per season. Seeds are light and easily transported by wind, water and animals. Seeds germinate after overwintering. Plants will also reproduce vegetatively from fragments left in the soil after site disturbance or manual/mechanical removal.
Due to its preference for wetlands, chemical control of loosestrife is limited as the potential for environmental damage is high.

Manual removal can be effective but eradication is impossible as plants will re-shoot from plant parts or seeds left in the soil.

Following a significant amount of research biological control has been developed and proven to be extremely effective in controlling loosestrife. Two species of leaf beetle and two species of weevil are routinely used as bio control for this plant.

### Woodland Angelica (*Angelica sylvestris*)

European Invader that began its North American invasion in the Saint John River Valley.

Occurs on moist interval/bottom lands along rivers and lakes.

A member of the celery family, it has a robust stalk with a large head of white flowers, and is a very prolific seeder.

As with many invasives, Angelica out-competes native plants degrading habitat quality for numerous native species. Control is best achieved by removing adult plants before seed is set. If plants cannot be dug out, mowing or cutting before seeds are set must be repeated annually until the plant is eradicated. Care should be taken when removing angelica as there have been reports that its sap can cause rashes and burns.

***Woodland Angelica*** *- (Photo courtesy of INFOR Inc.)*

### Common Reed (*Phragmites australis*) (Cav.) Trin. ex Streud

Common reed is another wetland invader. Similar in appearance to a closely related native reed, European fragmites may be distinguished by 'its great height, its stiffly erect, unbranched stems, its large, soft panicles that are purplish when first headed-out but become feathery and turn brownish with age, and by the very dense patches that it forms wherever it grows.

***Common Reed*** *- (Photo courtesy of Natural Resources Canada)*

It is found in fresh to alkaline marshes, lake-shores, pond margins, ditches, roadsides and fields throughout most of Eastern Canada. The rhizomes are easily spread from place to place by farm and road machinery, and once established, the plant spreads rapidly by these rhizomes.

### Glossy Buckthorn (*Frangula alnus*)

Is a small tree or large shrub (up to 20 feet tall) that is native to Europe and parts of Asia and Northern Africa.

The bark is dark blackish-brown, with bright lemon-yellow inner bark. The leaves are alternately arranged and oval in shape with some white down on the veins and a smooth leaf margin.

The fruit is a small black berry that ripens from green through red in late summer to dark purple or black in early autumn, containing two or three pale brown seeds. Birds feed on these fruit and their droppings can be problematic as it can discolor painted

***Glossy Buckthorn*** *- (Photo courtesy of Natural Resources Canada)*

surfaces such as cars and houses. Glossy buckthorn is a major problem as it outcompetes and replaces native forest plants, shrubs and tree species degrading habitat quality and reducing biodiversity.

### Norway Maple (*Acer Platanoides*)

European species of maple which includes acer platanoides and several variants bred for aesthetic landscaping purposes.

This species was extensively planted in urban areas as shade and boulevard trees. Norway maple is a prolific seeder and is causing problems through the invasion of forest stands around urban areas and extending into increasing rural settings. It is extremely shade tolerant and will out-compete native tree species such as sugar maple.

Advanced regeneration should be eliminated where found. Norway maple may be distinguished from sugar maple by its rel-

***Left - Norway maple leaves and keys; Right - Sugar maple leaves and keys-*** *(Photo courtesy of INFOR Inc.)*

atively large leaf, large, flat winged seed and the presence of white, milky latex sap.

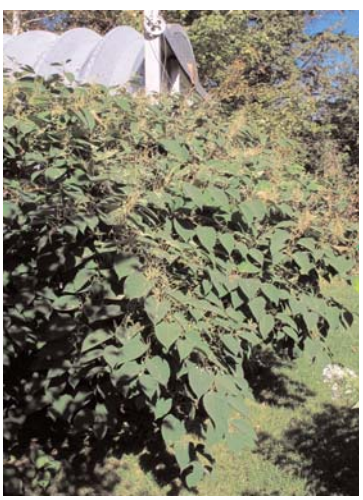
### Japanese Knotweed (*Fallopia Japonica*)

Is an extremely invasive plant native to Eastern Asia, including Japan, China and Korea. It is very fast growing and spreads rhizomes through the soil quickly taking over a site and outcompeting native vegetation.

It grows to a height of 4 metres (13 feet) and has large, heart shaped leaves supported by hollow, bamboo-like stems.

Once established, knotweed is very hard to eradicate. Because of its prolific rhizomes (roots), cutting these plants generally leads to a vigorous re-sprouting very quickly. Spraying with glyphosate herbicide has been shown to be very effective, although multiple applications will likely be necessary to ensure all plants have been eradicated. In smaller patches, plants can be cut in Spring and infested soil then covered by black plastic or cardboard and covered by clean soil to hold in place. This will kill any plant material left in the soil. Remove plastic in the fall. Cardboard can be left in place as it will decompose.

Caution should be taken when cutting knotweed as some individuals seems to have severe allergic reactions to the sap. Take precautions including using gloves, eye protection and dust masks to prevent inhalation.



***Japanese knotweed*** *- (Photo courtesy of INFOR Inc.)*

## Invasive Aquatic Plants

### Eurasian Water Milfoil (*Myriophyllum spicatum*)

Eurasian Water Milfoil was introduced to North America as early as the late 1800's and repeatedly from 1950 through the 1980's. It is now extremely widespread.

It has long, narrow leaves arranged in whorls of 4-5 about the stem that have a feathery look to them. Milfoil leaves are comprised of 12-21 leaflets although this is highly variable and can lead to misidentification. It can grow at depths of up to 10 m (33 ft) but is generally found at depths of 0.5 to 3.5 m. (1.6 to 11.5 ft.).

It can tolerate a variety of environmental conditions including a wide range of temperatures, in still and flowing waters, in clear to turbid waters and can survive in a pH range of 5.4 to 11. Milfoil thrives in disturbed areas and is common in areas where human activity has altered the environment.

***Eurasian water milfoil*** *- (Photos courtesy of Natural Resources Canada)*

Milfoil reproduces via seed but asexual reproduction represents the greatest risk of spread. Small pieces of live stem are enough to establish new plants and may be transported on boat propellers or other recreational aquatic gear. Hand pulling is the only proven control for this plant. Hand pulling will not eradicate milfoil however and repeated maintenance is required in infested river and lake systems.

### Didymo (*Didymosphenia geminate*)

Didymo is an invasive aquatic plant that spreads prolifically through freshwater river systems. It robs oxygen out of the water leading to a degradation of fish habitat. Cold water species like trout and salmon are especially at risk.

***Didymo*** *- (Photos courtesy of Natural Resources Canada)*

Didymo can be easily spread from river to river through human activity. Small pieces of dried material transported on the soles of chestwaders, boat hulls, fishnets or any other type of gear can spread Didymo. Forestry equipment tracking through infected watercourses may also spread didymo.

## Invasive Pathogens

### Butternut Canker (*Sirococcus clavigignenti-juglandacearum*)

Is a fungus thought to be of Asian origin first identified in North America in the 1960's.


***Butternut canker*** *- (Photo courtesy of Natural Resources Canada)*

It first began killing butternut (Juglans cineria) in the 1960's and has since reached New Brunswick.

Butternut canker enters the bark through leaf scars, buds or wounds and begins killing the tree's vascular tissue; the cells that transport water and nutrients up and down the tree's trunk.

Large elliptical dead patches appear under the bark and the top

of the crown begins to dry out and die when these patches coalesce. Eventually the entire crown dies back and the tree is killed.

It is very hard to prevent the spread of butternut canker. The best solution is to leave butternut where you find it as a potential seed source. A very small proportion of butternut are resistant to the disease, and it is this natural resistance that is the species only hope for survival. Removing dying trees is not recommended as trees with partial resistance may be removed before they can pass this trait along to the next generation.

### Beech Bark Disease (*Nectria coccinea var. faginata*)

Beech bark disease was first identified in Europe in the 1860's and the first recorded North American case was in Nova Scotia in 1920. This disease involves the initial infestation of beech trees by the beech scale insect (Cryptococcus fagisuga). The scale

***Left - Close-up of beech infected with beech bark disease; Right - Healthy beech bark*** *- (Photos courtesy of INFOR Inc.)*

creates a wound in the bark which allows the subsequent invasion of two different fungi (Nectria coccinea var. faginata and Nectria galligena), both common to North America, causing a canker to form.

These cankers disrupt the normal growth of the tree, deforming the stem and eventually leading to decline and death.

Stands of declining beech can be extremely hazardous as beech trees rot quickly after death leading to fallings limbs (widowmakers) and trees, especially in windy or snowy conditions.

There is little that can be done to control the spread of beech bark disease. As with butternut, the development of natural resistance is this species only chance for survival. Healthy looking beech should be left where they are found.

### White Pine Blister Rust (*Cronartium ribicola*)

Is a rust fungus of Eurasian origin accidentally introduced to North America in the early 1900's that requires two hosts to complete its lifecycle.

It seriously affects all 5 needle species of pine including our native white pine (Pinus strobus).

The rust fungus cycles between white pine and Ribes spp. (wild current).

As the name suggest, this rust fungus results in the formation of blisters on branches and the main stem of the tree, eventually girdling and killing the host.

***White pine blister rust*** *- (Photo courtesy of Natural Resources Canada)*

Once a tree has become infected little can be done to save it. Removing wild current from the stand and surrounding area can help to limit infestations by

breaking the reproductive cycle but is very difficult. Wild current is a prolific seed producer and even small amounts of root left in the soil will lead to the regrowth of the plant.

## Non-Timber Forest Products (NTFPs)

In addition to the numerous conventional timber products derived from private woodlots in New Brunswick, there are a number of opportunities for income from non-timber forest products. These include such things as fiddleheads, blueberries, mushrooms, Christmas trees, ground hemlock and tips for wreaths and greenery. There are best management practices associated with all NTFPs, and you should make yourself familiar with them before harvesting these resources.

### Ground Hemlock

Taxol is a chemical compound found in ground hemlock (Taxus canadensis), a forest shrub native to Eastern Canada. This compound is very effective in the control of certain cancers, and demand for raw materials is increasing. To ensure a sustainable supply of this life-saving drug, it is important that ground hemlock be harvested in a sustainable manner.

***Taxus canadensis (ground hemlock) fruit.*** *- (Photo courtesy of INFOR Inc.)*

### Etiquette and Legal Considerations of Harvesting

Harvesting ground hemlock on private land without permission is illegal. Harvesters need to ask the landowner's permission BEFORE entering private property. Permits for harvesting ground hemlock on Crown Land are available from the Department of Natural Resources.

## When to Harvest

All ground hemlock tip harvesting should be done between August and March/April, since the level of Taxol is higher during this period making for better quality material. Also, harvesters should wait at least 4 years before re-harvesting a shrub.

## How to Harvest

It is very important to only harvest branches from plants that are 1 metre or more in height. This minimum plant size is recommended to help ensure that plants are sufficiently vigorous to withstand harvesting. In order to minimize damage to plants, pruning shears must always be used; tearing or breaking branches should be avoided. The cut should always be made just above side branches since this allows the lateral branches just below the cut to grow and replace the removed shoot. Harvesters should only remove up to three years of growth on each of the harvested branches. The harvestable sections of branches are easily recognizable by the colour of the bark since new shoots typically stay green for up to three years before becoming brown and woody. Your caring for the resource will help ensure a healthy growing ground hemlock tipping industry for years to come.

## Balsam Fir Tipping

The same etiquette described above for harvesting ground hemlock applies to tipping. Do not trespass, and make certain that you obtain permission before harvesting. Permits are required to harvest tips from Crown Lands and may be obtained from the Department of Natural Resources.

## Harvesting Tips

Most experience pickers do not use hand clippers, but snap tips off. Tip only trees taller than 3 metres (10 feet). No tips should be removed from the top 1/3rd of the tree. Doing so may cause damage. No more than 1/3rd of the remaining tips should be harvested. Investigate your market before you begin to harvest - know what your buyer wants. Get tips to market quickly. Balsam tips are perishable and quality begins to decline immediately after harvesting, especially if stored improperly. Wear Blaze Orange - tipping usually coincides with hunting season.

## Fiddleheads

Fiddleheads are the unopened fronds of the ostrich fern (Matteuccia struthiopteris). Fiddleheads are generally found on moist sites along floodplains in the spring, usually before the trees have leaved out.

***Fiddleheads*** *- (Photo courtesy of INFOR Inc.)*

There is a substantial harvest of fiddleheads in New Brunswick every year, with a lot of people making a fair amount of money for a few days' work. Although there are some larger buyers out there, most people sell fiddleheads from their laneway, to fruit stands or friends and family. Although there are no clearly defined guidelines for fiddlehead harvesting, general courtesy should apply. Do not trespass, ask permission before picking on somebody else's land. Make sure you are picking the right ferns, as similar ferns may be poisonous.

## Blueberries

Blueberries come from one of two sources; commercial farms that produce large volumes of cultivated berries for market and small volumes of blueberries picked from wild (un-tended) plants. Blueberries for commercial production are not planted. Berry patches are cultivated in areas where they occur naturally. If you do not have any blue berries in your woodlot, it is unlikely that you will be able to establish a blue berry field. On the other hand, if you do have wild blueberries, you may be able to develop your own blueberry operation. Contact the Department of Agriculture, Fisheries and Aquaculture for more information on blueberry production.

***Blueberries*** *- (Photo courtesy of JD Irving.)*

## Wild Mushrooms

The Acadian forest supports all sorts of different species of mushroom. Some people have turned the collection and cultivation of wild mushrooms into profitable businesses while others enjoy collecting for their own dinner table. There are numerous delicious and edible mushrooms in New Brunswick's woods, but there are also some of the most poisonous species found in North America. Picking mushrooms to eat is not recommended unless you are VERY experienced. Even with experience and the help of field guides and other available literature, it is all too easy to make a fatal mistake.

## Christmas Trees

In New Brunswick, Christmas trees are grown in plantations or are cultivated from naturally occurring "wild" stands. Even though you may have an abundance of fir on your property, or an old field you would like to plant, not all locations are well suited to the production of Christmas trees. Although fir will survive in a wide range of conditions, it only thrives within relatively specific soil and climatic conditions. Before beginning a Christmas tree operation, it is advisable to have a full soil analysis (including soil texture) conducted. Soil analysis will indicate the ability of your woodlot to produce Christmas trees as well as deficiencies inherent in the soils. For more information on soil testing contact INFOR Inc. (see Contact Information section below).

***Christmas tree plantation*** *- (Photo courtesy of INFOR Inc.)*

## Maple Syrup

The production of maple sugar products has a long history in New Brunswick. They are made from the concentrated sap of the sugar maple (Acer saccharum) with red maple (Acer rubrum) making up a smaller proportion of production. Maple sap is collected in the springtime during periods of overnight freezes and daytime thaws. Sugar production can be an enjoyable hobby and a profitable business, but do not underestimate the time and monetary commitments required for either. Much of the equipment used prior to 1994 may contain lead-bearing materials,

either in the form of lead solder, galvanized metal or ternplate, a lead-bearing alloy. If you intend to begin sugaring, make certain that you use only lead-free equipment. Lead poisoning can lead to serious health issues.

***Maple sap collection system -*** *(Photo courtesy of INFOR Inc.)*

Sugar bush management is different from conventional timber management in that producers are concerned with how much sap the tree is producing, not the volume and commercial value of the wood. If you are interested in sugar production, but are unsure if your woodlot is suitable, contact your local forest products marketing board or INFOR Inc. for more information.

## Contact Information

**Sustainable Forestry Initiative (SFI)**
**New Brunswick Implementation Committee**
www.nbsfi.ca
Report inconsistent practices at:
1-888-SFI-4888

**INFOR Inc.**

Mailing address:
1350 Regent Street
Fredericton, N.B.
E3C 2G6

Physical address:
680 Strickland Lane
Hugh John Flemming Forestry Complex
Fredericton, New Brunswick, Canada
1-877-450-8787 (Maritimes only)
(506) 450-8787
infor@infor.ca
www.infor.ca

**New Brunswick Federation of Woodlot Owners**
819 Royal Rd.,
Fredericton, N.B.
E3A 6M2
(506) 459-2990
Fax: (506) 459-3515
nbfwo@nbnet.nb.ca

**Fundy Model Forest**
701 Main St., Suite 2
PO Box 5184
Sussex, NB
E4E 7H7
Phone: 506-432-7575
Fax: 506-432-7562
www.fundymodelforest.net

**Department of Natural Resources (DNR)**
Hugh John Flemming Forestry Centre
1350 Regent Street
Fredericton, New Brunswick
www.gnb.ca/0078/index-e.asp

**Association of Registered Professional Foresters of New Brunswick**
1350 Regent Street
Suite 221
Fredericton, NB
E3C 2G6
Tel: 506-452-6933
fax: 506-450-3128

**Transport Canada**
**Information concerning the transportation and storage of dangerous goods - slip tanks**
National Headquarters (Ottawa)
(613) 990-2309
1-888-675-6863
www.tc.gc.ca

**Transport Canada - Atlantic Region**
PO Box 42, Moncton, New Brunswick
E1C 8K6
Telephone: 1-800-387-4999
www.tc.gc.ca/eng/atlantic/menu.htm

**NB Department of Environment (DENV)**

Surface Water Protection - Central Office
Fredericton
Marysville Place
P. O. Box 6000
Fredericton, N.B.
E3B 5H1
Phone: 457-4850 Fax: 453-6862

## DENV Regional Offices

**Bathurst Office**:
(506) 547-2092 Fax: 547-7655
159 Main St., Suite 202
Bathurst, N.B.
E3A 1A6

**Miramichi Office**:
(506) 778-6032 Fax: 778-6796
316 Dalton Avenue
Miramichi, N.B.
E1V 3N9

**Moncton Office**:
(506) 856-2374 Fax: 856-2370
428 Collishaw Street
Moncton, N.B.
E1C 3C7

**Saint John Office**:
(506) 658-2558 Fax: 658-3046
8 Castle Street
Saint John, N.B.
E2L 3B8

**Fredericton Office (Regional)**:
(506) 444-5149 Fax: 453-2893
565 Priestman Street,
Suite 301 Priestman Centre
Fredericton, N.B.
E3B 5X8

**Grand Falls Office**:
(506) 473-7744 Fax: 475-2510
65 Broadway Blvd.
Grand Falls, N.B.
E3Z 2J6

**Canadian Food Insepction Agency (CFIA) - Invasive Species Information**
1-800-442-2342 - 9am to 7pm Monday to Friday
www.inspection.gc.ca

**New Brunswick Invasive Species Council**
www.nbisc.ca
nb.invasive@gmail.com

## New Brunswick Forest Products Marketing Boards

**YSC Forest Products Marketing Board**
Mailing address:
PO Box 424, Station A
Fredericton, NB
E3B 4Z9

Physical address:
819 Royal Road
Fredericton, NB
E3G 6M1
(506) 444-6644
YSC@nbnet.nb.ca
http://www.ysc.nb.ca

**SNB Forest Products Marketing Board**
PO Box 4473
13 Drury's Lane
Sussex, N.B. E4E 5L6
(506) 433-9860
Fax: (506) 433-3623
snb@nbnet.nb.ca
http://www.snbwc.ca

**SENB Forest Products Marketing Board**
Mailing address:
PO Box 5074
Shediac, NB
E4P 8T8

Physical address:
3384 Rte 132
Scoudouc, NB
E4P 3S7
(506) 532-1150
Fax: (506) 532-6500
senbmb@nbnet.nb.ca
http://senb.ca/

**Northumberland County Forest Products Marketing Board**
PO Box 494
101 McMurdo Street
Miramichi, N.B. E1V 3M6
(506) 622-4010
Fax: (506) 622-6317
nwoodlot@nbnet.nb.ca

**North Shore Forest Products Marketing Board**
PO Box 386
2807 Miramichi Ave.
Bathurst, N.B. E2A 3Z3
(506) 548-8958
Fax: (506) 548-1165
nsfpmb@nbnet.nb.ca
http://www.forestrysyndicate.com

**Carleton-Victoria Forest Products Marketing Board**
151 Perkins Way
Florenceville, N.B. E7L 3P6
(506) 392-8290
Fax: (506) 392-8290
cvwpa@nbnet.nb.ca
http://www.cvwpa.ca

**Madawaska Forest Products Marketing Board**
870 Rue Canada Rd.
Edmunston, N.B. E3V 3X3
(506) 739-9585
Fax: (506) 739-0859
odvdm@nbnet.nb.ca

## NTFPs

**Bleuets NB Blueberries**
Hugh John Flemming Forestery Centre
1350 Regent St.
680 Strickland
Fredericton, N.B.
E3B 2G6
(506) 459-2583

**New Brunswick Department of Agriculture**
**Fisheries and Aquaculture**
P.O. Box 6000
Fredericton, N.B. E3B 5H1
Telephone: (506) 453-2666

**New Brunswick Christmas Tree Industry Association**
(C/O INFOR Inc)
1350 Regent Street
Fredericton, N.B.
E3C 2G6
1-877-450-8787 (Maritimes only)
(506) 450-8787
infor@infor.ca
www.infor.ca

**New Brunswick Maple Syrup Association**
1350 Regent Street
Fredericton, N.B.
E3C 2G6
(506) 458-8889
www.maple.infor.ca

Watertercourse illustrations courtesy of the New Brunswick Department of Environment, Department of Fisheries and Oceans and artist Pete Stafford
Pencil drawings by Cindy Lavoie

# Appendix

## Species At Risk in New Brunswick Forests

| Name | | Taxonomy | Conservation Status | | |
|---|---|---|---|---|---|
| Common Name | Scientific Name | Species Group | NatureServe Global Status | Federal Species At Risk Act | NB Endangered Species Act |
| Canada Warbler | *Wilsonia canadensis* | Birds | G5 | Threatened | - |
| Piping Plover | *Charadrius melodus* | Birds | G3 | Endangered | Endangered |
| Olive-sided Flycatcher | *Contopus cooperi* | Birds | G4 | Threatened | - |
| Least Bittern | *Ixobrychus exilis* | Birds | G5 | Threatened | - |
| Roseate Tern | *Sterna dougallii* | Birds | G4 | Endangered | - |
| Common Nighthawk | *Chordeiles minor* | Birds | G5 | Threatened | - |
| Eskimo Curlew | *Numenius borealis* | Birds | GH | Endangered | - |
| Whip-poor-will | *Caprimulgus vociferus* | Birds | G5 | Threatened | - |
| Chimney Swift | *Chaetura pelagica* | Birds | G5 | Threatened | - |
| Harlequin Duck | *Histrionicus histrionicus* | Birds | G4 | - | Endangered |
| Bald Eagle | *Haliaeetus leucocephalus* | Birds | G5 | - | Regionally Endangered |
| Peregrine Falcon subspecies anatum | *Falco peregrinus anatum* | Birds | G4T4 | Threatened | Endangered |
| Rainbow Smelt - Lake Utopia Small-bodied Population | *Osmerus mordax* | Fishes | G5TNR | Threatened | - |
| Atlantic Salmon - Inner Bay of Fundy Populations | *Salmo salar* | Fishes | G5TNR | Endangered | - |
| Cobblestone Tiger Beetle | *Cicindela marginipennis* | Arthropods | G2 | Endangered | - |
| Brunswick Sallfly | *Alloperla acadiana* | Arthropods | G1 | - | - |
| Salt Marsh Copper | *Lycaena dospassosi* | Arthropods | G2G3 | - | - |
| N/A | *Siphlonurus demaryi* | Arthropods | G2G3 | - | - |
| Maritime Ringlet | *Coenonympha nipisiquit* | Arthropods | G1 | Endangered | Endangered |
| Witch's-hair Lichen | *Alectoria fallacina* | Lichens | G2 | - | - |
| Diverse Porpidia Lichen | *Porpidia diversa* | Lichens | G2G3 | - | - |
| Hertel's Porpidia Lichen | *Porpidia herteliana* | Lichens | G2G3 | - | - |
| Boreal Felt Lichen - Atlantic Population | *Erioderma pedicellatum* | Lichens | G1G2Q | Endangered | - |
| Schuster's Pouchwort | *Metacalypogeia schusterana* | Plants | G1G2 | - | - |
| Spike Quillwort * (Prototype quillwort) | *Isoetes prototypus* | Plants | G2G3 | Special Concern | Endangered |
| Narrowleaf Grapefern | *Botrychium lineare* | Plants | G2 | - | - |
| Furbish's Lousewort | *Pedicularis furbishiae* | Plants | G1G2 | Endangered | Endangered |
| Gulf of St. Lawrence Aster | *Symphyotrichum laurentianum* | Plants | G2 | Threatened | Endangered |
| Connecticut Beggarticks | *Bidens heterodoxa* | Plants | G2Q | - | - |
| Anticosti Aster | *Symphyotrichum anticostense* | Plants | G3 | Threatened | Endangered |

## Species At Risk in New Brunswick Forests

| Name | | Taxonomy | Conservation Status | | |
|---|---|---|---|---|---|
| Common Name | Scientific Name | Species Group | NatureServe Global Status | Federal Species At Risk Act | NB Endangered Species Act |
| Butternut | *Juglans cinerea* | Plants | G4 | Endangered | - |
| Roland's Sea-blite | *Suaeda rolandii* | Plants | G1G2 | - | - |
| Eaton's Beggarticks | *Bidens eatonii* | Plants | G2G3 | - | - |
| Robinson's Hawkweed | *Hieracium robinsonii* | Plants | G2G3 | - | - |
| Van Brunt's Jacob's Ladder | *Polemonium vanbruntiae* | Plants | G3G4 | Threatened | - |
| Short-leaved Bristle Moss | *Seligeria brevifolia* | Plants | G2G3 | - | - |
| Bathurst Aster (Bathurst Population) | *Symphyotrichum subulatum* | Plants | G5T2Q | - | Endangered |
| Pinedrops | *Pterospora andromedea* | Plants | G5 | - | Endangered |
| Parker's Pipewort | *Eriocaulon parkeri* | Plants | G3 | - | Endangered |
| Southern Twayblade | *Listera australis* | Plants | G4 | - | Endangered |
| Pohlia Moss | *Pohlia sphagnicola* | Plants | G2G3 | - | - |
| Canada Lynx | *Lynx canadensis* | Mammals | G5 | - | Regionally Endangered |
| Eastern Cougar | *Felis concolor couguar* | Mammals | G5THQ | - | Endangered |
| Wood Turtle | *Glyptemys insculpta* | Reptiles | G4 | Threatened | - |
| Leatherback | *Dermochelys coriacea* | Reptiles | G2 | Endangered | Endangered |

*Table created May 5, 2011*

** This list is subject to change.*

SFI IMPLEMENTATION COMMITTEE

SM

NEW BRUNSWICK

SFI-01133