

# NATIVE PLANTS AND WATERSHEDS

## A NATURAL COMBINATION



Environment and  
Climate Change Canada  
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**PEI FORESTED LANDSCAPE PRIORITY PLACE FOR SPECIES AT RISK**

# Great Plants for Wildlife



Here is just a partial list of some of the plants we use and how they can impact wildlife:


## WHITE SPRUCE (*Picea glauca*)

An excellent plant to make an open area bird friendly, providing protection, then nesting habitat, and finally a great winter food sources for white-winged and red crossbills, purple finches, and red squirrels.

## EASTERN HEMLOCK (*Tsuga canadensis*)

A preferred food source for American goldfinch, boreal chickadee, ruffed grouse, pine siskin and red-winged and white-winged crossbills. Many other species of birds and mammals also eat the seeds, and snowshoe hare browse young shoots. Hemlocks will also offer great cover and protection for both small and large birds. Large, old hemlock are used by raccoons for dens and provide cavities, nesting sites, and denning sites for a wide variety of birds.

# Great Plants for Wildlife




## EASTERN WHITE PINE (*Picea strobus*)

Pine seeds are a prime winter food for the squirrel family due to their high protein content. The crossbills, purple finches, and pine siskins also make good use of this tree as a food source and eventually it will become one of our more important nesting trees, especially for large birds such as bald eagles.



## EASTERN WHITE CEDAR (*Thuja occidentalis*)


The seeds are a preferred food for pine siskins and are eaten by a grosbeaks, redpolls, crossbills, and other species of birds and small mammals. But it is as protection and cover that cedar excels, since smaller birds can find solace from both winter winds and predators within the dense branches.



## NORTHERN RED OAK (*Quercus rubra*)

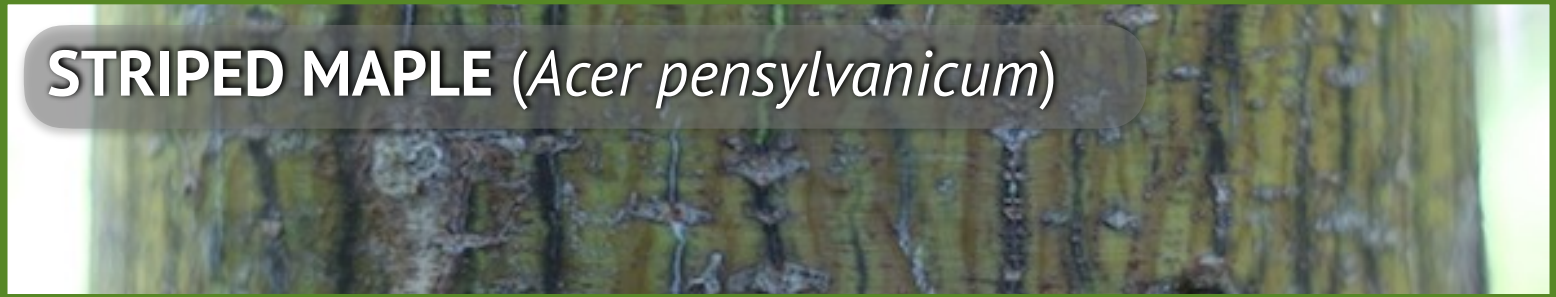
Snowshoe hare love to browse oak and all members of the squirrel family feast on the acorns. As well, blue jays, grackles, woodpeckers, ruffed grouse and many other birds and small mammals favour acorns, making red oak one of our most important wildlife trees.

# Great Plants for Wildlife



## YELLOW BIRCH (*Betula alleghaniensis*)

Birch seed is an important food source for many winter birds, including American goldfinch, pine siskin, northern junco, blue jay, and the chickadees and sparrows. Birches regularly produce heavy crops of seed and larger trees can be quite important to local populations. While the seed is important for wildlife (including small mammals), the trees are used in many other ways. Ruffed grouse can often be found in birch trees during the winter eating the buds, and snowshoe hares browse the twigs. In spring, birch flowers attract many insects, which in turn attract large numbers of migrating warblers.



## STRIPED MAPLE (*Acer pensylvanicum*)

The young twigs are browsed by snowshoe hare, while red squirrels, chipmunks and ruffed grouse eat the seeds. Striped maple are also very useful to wildlife in that they help diversify the vertical profile of a forest, adding to the dense layers in a woodland that are attractive to many wildlife species for nesting, feeding and perching.



## AMERICAN WHITE ASH (*Fraxinus Americana*)


The seeds are an important food source for red-winged blackbird, evening grosbeak, pine grosbeak, purple finch, and other birds. Cedar Waxwing love to browse the flowers.

# Great Plants for Wildlife



## CHOKE CHERRY (*Prunus virginiana*)

Fruits are a preferred food for ruffed grouse, pileated woodpecker, yellow-bellied sapsucker, eastern kingbird, common crow, gray catbird, American robin, wood thrush, Swainson's thrush, gray-cheeked thrush, eastern bluebird, cedar waxwing, rose-breasted grosbeak and evening grosbeak. Dozens of other bird species utilize the fruit to a lesser degree, as do many small mammals. In winter and spring, red fox, skunk, chipmunk and snowshoe hare browse twigs and buds.



## SERVICEBERRY (*Amelanchier* spp.)

One of the most important food sources for birds, especially those fattening up for fall migration. Berries are a preferred food of northern flicker, blue jay, American crow, gray catbird, American robin, hermit thrush, Swainson's thrush, veery, Bohemian waxwing, cedar waxwing, American redstart, northern oriole and evening grosbeak and eaten by over 30 other species. Red squirrel, chipmunk, flying squirrel and red fox are also fond of the fruit, while in winter the twigs and buds are browsed by snowshoe hare and red fox. Ruffed grouse also eat the buds in winter. Serviceberry's early flowering in spring makes it an important initial source of pollen and nectar for bees and other insects.



## BEAKED HAZELNUT (*Corylus cornuta*)


An excellent source of protein highly attractive to all members of the squirrel family, as well as crows and jays. An important source of winter food for squirrels and chipmunks, as it stores well.

# Great Plants for Wildlife



## **BAYBERRY** (*Myrica pensylvanica*)

A critical food source for yellow-rumped warblers on both their spring and fall migrations, but are berries are also extensively used by evening grosbeaks, crows, grackles and starlings.



## **RED-BERRIED ELDER** (*Sambucus pubens*)

This elder flowers and fruits weeks before the common elder, making the two species great combination to plant in close proximity to each other. The berries are a primary food source for cedar waxwing, American robin, Swainson's thrush, rose-breasted grosbeak, ruffed grouse, white-throated sparrow, and veery, as well as fox, raccoon, red squirrel, and chipmunk.



## **COMMON ELDER** (*Sambucus Canadensis*)

Once the red berries of the previous species are all eaten, the purple berries of the common elder berries are available for a variety of wildlife. They are a preferred food of blue jay, northern mockingbird, gray catbird, American robin, wood thrush, Swainson's thrush, gray-cheeked thrush, veery, cedar waxwing, rose-breasted grosbeak and white-throated sparrow, and are eaten by dozens of other species. The shrub provides good cover, and is used as a nesting site by alder flycatcher, yellow warbler and American goldfinch. In winter, snowshoe hare and other mammals browse the twigs and buds.

# Great Plants for Wildlife

## OTHER GREAT SHRUBS

**AMERICAN MOUNTAIN ASH** (*Sorbus Americana*)

**WILD ROSE** (*Rosa Spp.*)

**HIGHBUSH CRANBERRY** (*Viburnum trilobum*)

**WINTERBERRY HOLLY** (*Ilex verticillata*)

All great plants to attract winter birds that eat fruit, such as cedar and bohemian waxwings, American robins and pine grosbeaks.

## SWAMP MILKWEED (*Asclepias incarnata*)



This rare native wildflower is the sole food source of the beautiful Monarch butterfly, and is worthy of planting just for this reason. Generally, the year after planting some milkweed you start getting Monarchs laying eggs and then the caterpillars eating the leaves. The nectar is also attractive to other types of butterflies and moths, as well as bees, wasps, flies, and beetles.

## CUTLEAF CONEFLOWER (*Rudbeckia incarnata*)



One of our most beautiful native ornamentals, it is a valued food source for bees, wasps, butterflies, and moths. In addition, American goldfinch and other smaller birds feast on the seeds in the fall.

## SPOTTED JOE-PYE WEED (*Eutrochium maculatum*)



A quite common wildflower that nonetheless is an important plant for a wide variety of pollinators. This includes butterflies, moths, bees, wasps, flies and beetles. A must for any pollinator garden.

# Propagating Native Plants



This is a partial list of native trees and shrubs and how they can be grown.

Please contact landowners for permission before collecting seeds, cutting material and especially transplant material. Some trees and shrubs are best grown from seed while others are especially well-suited to propagate from stem cuttings or root cuttings. Still others can be found in great abundance and easily transplanted, though generally this is done with very small plants – white spruce under 1' growing in a field, or red maple under 4" growing thickly on a new woods road.

## CONIFEROUS TREES

Coniferous Species	Seed	Transplant	Root Cutting	Stem Cutting
White Spruce ( <i>Picea glauca</i> )	X	X		
Black Spruce ( <i>Picea mariana</i> )	X	X		
Red Spruce ( <i>Picea reubens</i> )	X			
Eastern White Pine ( <i>Pinus strobus</i> )	X	X		
Red Pine ( <i>Pinus resinosa</i> )	X			
Jack Pine ( <i>Pinus banksiana</i> )	X	X		
Eastern Larch or Tamarack ( <i>Larix laricina</i> )	X	X		
Eastern White Cedar ( <i>Thuja occidentalis</i> )	X			
Eastern Hemlock ( <i>Tsuga canadensis</i> )	X	X		
Balsam Fir ( <i>Abies balsamea</i> )	X	X		



# Propagating Native Plants

## DECIDUOUS TREES

Deciduous Species	Seed	Transplant	Root Cutting	Stem Cutting
Sugar maple ( <i>Acer saccharum</i> )	X	X		
Red maple ( <i>Acer rubrum</i> )	X	X		
Striped maple ( <i>Acer pensylvanicum</i> )	X	X		
Mountain maple ( <i>Acer spicatum</i> )	X	X		
Red oak ( <i>Quercus rubra</i> )	X			
Yellow birch ( <i>Betula lutea</i> )	X	X		
White birch ( <i>Betula papyrifera</i> )	X	X		
Grey birch ( <i>Betula populifolia</i> )	X	X		
American beech ( <i>Fagus grandifolia</i> )	X			
White ash ( <i>Fraxinus americana</i> )	X			
Black ash ( <i>Fraxinus nigra</i> )	X			
Large-tooth aspen ( <i>Populus grandidentata</i> )	X	X	X	
Trembling aspen ( <i>Populus tremuloides</i> )	X	X	X	
Balsam poplar ( <i>Populus balsamifera</i> )		X	X	
American elm ( <i>Ulmus americana</i> )	X			
Butternut ( <i>Juglans cinerea</i> )	X			
Ironwood ( <i>Ostrya virginiana</i> )	X			
Apple ( <i>Malus</i> spp.) *introduced species*	X	X		

# Propagating Native Plants

Shrub Species	Seed	Transplant	Root Cutting	Stem Cutting
Bog birch ( <i>Betula pumilla</i> )	X			
Serviceberry ( <i>Amelanchier spp.</i> )	X			
Willow ( <i>Salix spp.</i> )		X		X
Wild raisin ( <i>Viburnum cassinoides</i> )	X	X		
Highbush cranberry ( <i>Viburnum trilobum</i> )	X			X
Hobblebush ( <i>Viburnum alnifolium</i> )	X			
Common elder ( <i>Sambucus canadensis</i> )	X		X	X
Red-berried elder ( <i>Sambucus pubens</i> )	X	X		
Red-osier dogwood ( <i>Cornus stolonifera</i> )	X	X		X
Alternate-leaf dogwood ( <i>Cornus alternifolia</i> )	X	X		
Round-leaved dogwood ( <i>Cornus rugosa</i> )	X			
Speckled alder ( <i>Alnus rugosa</i> )	X	X		
Mountain (downy) alder ( <i>Alnus crispa</i> )	X	X		
Beaked hazelnut ( <i>Corylus cornuta</i> )	X	X		
Witch hazel ( <i>Hamamelis virginiana</i> )	X			
Winterberry holly ( <i>Ilex verticillata</i> )	X			
Sweetfern ( <i>Comptonia peregrina</i> )		X	X	
Northern bayberry ( <i>Myrica pensylvanica</i> )	X	X	X	
Mountain holly ( <i>Nemopanthus mucronata</i> )	X	X		
American mountain ash ( <i>Sorbus americana</i> )	X	X		
Hawthorn ( <i>Crataegus spp.</i> )	X			
Wild rose ( <i>Rosa spp</i> )	X	X	X	X
Pin cherry ( <i>Prunus pensylvanica</i> )	X	X		
Choke cherry ( <i>Prunus virginiana</i> )	X	X		
Staghorn sumac ( <i>Rhus typhina</i> )		X	X	
Canada yew ( <i>Taxus canadensis</i> )	X			X
American fly honeysuckle ( <i>Lonicera canadensis</i> )	X			X
Mountain fly honeysuckle ( <i>Lonicera villosa</i> )	X	X		
Alder buckthorn ( <i>Rhamnus alnifolia</i> )	X			
Common juniper ( <i>Juniperus communis</i> )	X	X		
Ground juniper ( <i>Juniperus horizontalis</i> )	X	X		

# Areas to be Planted and Appropriate Species



Please note that even within the following fairly narrow categories, such as "Wet areas in full sunlight", there will always be a range of conditions - some drier spots, areas with lots of competing low vegetation, etc. Know your planting conditions well, and try to plant the correct species. When in doubt, look around for similar conditions and see what plants are thriving there, and which ones are doing poorly.

## Wet areas in fullsunlight (swamps, floodplains, etc.):

### Trees

- Black spruce
- Eastern larch (tamarack)
- Eastern white cedar
- Red maple
- Black ash
- White ash
- American elm
- Large-tooth aspen

### Shrubs

- Willow
- Wild raisin (witherod)
- Common elder
- Red-osier dogwood
- Round-leaved dogwood
- Speckled alder
- Winterberry holly
- Mountain holly
- Alder buckthorn
- American or showy mountain ash
- Red or black chokeberry

# Areas to be Planted and Appropriate Species



## Wet areas with partial shade

(wooded streambanks, high areas in swamps and the upper edges of floodplains):

### Trees

- Eastern hemlock
- Eastern white cedar (light shade)
- Striped maple
- Red maple (will tolerate standing water)
- Yellow birch
- Ironwood

### Shrubs

- Mountain maple
- Winterberry holly
- Mountain holly
- Wild raisin (will tolerate standing water)
- Common elder (will tolerate some flooding)
- Alternate-leaf dogwood

# Areas to be Planted and Appropriate Species



**Dry areas receiving full sun**  
(old fields, open riparian zones above floodplain):

## Trees

- White spruce
- Balsam fir
- Red Pine (in sandy soils)
- Jack pine (generally grows poorly)
- Eastern larch
- White birch
- Grey birch
- Red oak
- Trembling aspen
- Balsam poplar
- White ash
- Butternut
- Pin cherry

## Shrubs

- Chokecherry
- Hawthorn
- Red-berried elder
- Common elder
- American mountain ash
- Showy mountain ash
- Serviceberry
- Downy alder
- Speckled alder
- Northern bayberry
- Staghorn sumac
- Wild rose
- Wild Raisin

# Areas to be Planted and Appropriate Species



**Dry areas with partial shade  
(woodlands needing additional diversity):**

## Trees

- Eastern hemlock
- Red spruce
- White pine
- Balsam fir
- Sugar maple
- Striped maple
- Yellow birch
- American beech
- White ash (light shade)
- Red oak (light shade)

## Shrubs

- Canada yew
- Beaked hazelnut
- Wild raisin
- Hobblebush
- Highbush cranberry
- Witch hazel
- American fly honeysuckle
- Alternate-leaf dogwood

# Areas to be Planted and Appropriate Species



## Around homes and buildings (for wildlife enhancement and beautification):

### Trees

- White pine
- Red pine
- Eastern white cedar
- White birch
- Red oak
- White ash
- Sugar maple
- Red maple
- Striped maple

### Shrubs

- Winterberry holly
- Mountain holly
- Serviceberry
- Highbush cranberry
- Wild raisin
- Red-osier dogwood
- Alternate-leaf dogwood
- Round-leaved dogwood
- Hawthorn
- Staghorn sumac
- Witch hazel
- Common elder
- Red-berried elder
- Beaked hazelnut
- Willow
- American mountain ash
- Northern bayberry
- Hobblebush (with some shade)

# Areas to be Planted and Appropriate Species



## Windbreaks and hedgerows

(or controlling wind and erosion, as well as reducing heating costs and increasing privacy):

### Trees

- White spruce (preferred)
- Black spruce
- Eastern larch
- Eastern hemlock  
(for screening a protected area)
- Eastern white cedar  
(for screening a protected area)
- Red maple
- White birch
- Grey birch
- Pin cherry

### Shrubs

- Service berry
- Hawthorn
- Red-osier dogwood
- Red-berried elder
- Chokecherry
- Red or black chokeberry
- Speckled alder
- Downy alder
- Wild raisin
- Willow
- American mountain ash
- Staghorn sumac
- Northern bayberry
- Wild rose



# Areas to be Planted and Appropriate Species



## Shore Plantings

(generally must tolerate salt spray, wind, and dry sandy soils):

### Trees

- White spruce
- White Pine (mixed results if too windy)
- Eastern larch
- White birch
- Grey birch
- Red oak
- Trembling aspen
- Red maple
- Pin cherry

### Shrubs

- Wild rose
- Northern bayberry
- Staghorn sumac
- Hawthorn
- Willow
- Chokecherry
- Mountain alder
- Downy alder
- Red-osier dogwood
- Creeping juniper
- Common juniper
- Red or black chokeberry
- Spirea
- Wild raisin

# LIVE STAKING



**The practice of live staking is not a new technique, but it has found a welcome audience with conservation groups and anyone interesting in using bioengineering techniques to control erosion.**

Bioengineering sounds scary, but it is defined as “the practice of utilizing plant materials alone in such a way as to perform a structural function of stabilization”. It means working with plant material to solve erosion problems, instead of using gabions full of rocks. These methods can be cheaper and more environmentally friendly, providing habitat for a broad range of wildlife species, everything from ground-nesting birds to pollinators. With certain species of woody plants, you can cut stem pieces and stick them into the ground, and at least some of them will produce roots. They start to hold the bank together, and eventually trap nutrients, provide shade, and offer food and nesting habitat. It almost sounds too good to be true.

This technique works with many shrub species native to Prince Edward Island. Shrubs such as red osier dogwood, willow, common elder, and highbush cranberry can all be propagated from cuttings. We have never live-staked wild roses, but have grown them from cuttings in a nursery bed, so these species might also be suitable. There is also a lot of literature around using balsam poplar for live staking, though it is hard to think of where you’d find enough plant material in the province.

One reason to use live staking, besides the low cost, is that you can do large plantings with a very small amount of soil disruption. Even if you’re looking to plant one-gallon (3.8 l) pots, that is a fairly large hole to dig, and will result in quite a bit of soil disturbance. That is generally okay on flat areas, but on the banks of a stream, or if there is much slope, you can live stake the slopes and even some flat areas and then plant trees in pots above the sloped area.

There has been work done in the US on live staking red-berried elder and black chokeberry, with fair success, so clearly there is potential to successfully use other species. It would be interesting to trial different native shrub species and see what kind of success rates we can achieve. Two potential targets would be mountain fly honeysuckle (a prolific spreader) and the rare round-leaf dogwood (a close relative of red osier dogwood).

Until then, it makes sense to make use of any of the shrub willows, as well as red osier dogwood, common elder, and highbush cranberry when planning to do live staking.

# LIVE STAKING

## SOME POINTS TO REMEMBER:



1. These are all full sun (or mostly full sun) loving plants. If you put them in shaded areas, you won't get the success you are looking for. Instead of thriving, they will grow quite slowly and not be able to do their job.

2. As when you are collecting seed, don't degrade one area to restore another. Make sure there are enough plants of that species to maintain its population. In some places you might be able to take hundreds of stakes. In others, you'll have to be a lot more careful. In addition, try not to leave long stubs at the base that might injure someone walking through the area.

3. Cut stakes when the plant is dormant – late winter is ideal. In our climate, you won't be able to get them into the ground right away, but you can store bundles of stakes in a cool, moist area. A bucket of moist sawdust or compost (you should feel that it is damp but not be able to squeeze water from a fistful) will keep them quite well.

4. Stakes should be as big as you can find – anything from the diameter of a pencil to two inches (5 cm), and about two-three feet (60-90 cm) long. Remove any branches. Often the best places to find them are in ditches, where they've been mowed off by the highways crews a year or more ago. The mowing produces tall, straight stems. Cut the top part of the stake flat across, and just above a bud. Angle the bottom cut at around 45 degrees. This helps you know which end goes up and which end goes down. The flat cut at the top makes it easier to be pounded into the ground, while the angled cut on the bottom helps the stake penetrate the ground. You can dip the tops of the stakes in latex paint to seal the end from moisture loss.

5. If possible, plant on a moist day. Ideally, the stakes can be pushed into the ground without using a rubber mallet, but that's the tool to use you need to drive the stake into damp, uncompacted soil. If the soil is hard, drive a piece of half-inch (1.25 cm) rebar into the ground with a hammer or small metal mallet. Insert the stake as deep as you can. If possible, plant 80% of the stake in the ground. When there will be a lot of competing groundcover, use longer stakes and leave at least one foot (30 cm) out of the ground.

6. Plant the stakes two feet (60 cm) apart in all directions, and try to snug up the soil around the stake to reduce air pockets.

7. As mentioned above, you can combine live-staking with transplanting or planting potted stock. You can also plant acorns throughout a suitable area—above the floodplain or any standing water—by making a two-inch (5 cm) deep hole with the rebar, dropping in an acorn, and filling it up with soil.

# Key to Identifying Deciduous Trees and Shrubs



## LEAVES AND MARGINS

The form of a leaf is going to be either simple or compound. A simple leaf can be a smoothly-edged oval, but it might just as easily be lobed and/or toothed. What it does not have is leaflets, which would make it compound. A compound leaf has leaflets growing off a central leaf stem, such as a rose or a mountain ash.

## BUDS & BRANCHES

The placement of leaves (or buds or branches), is going to be either opposite (across from each other) or alternate (not opposite from each other). There are no tricks, but don't get hung up if everything on a plant isn't one or the other – lots of insects and animals chew on buds, and occasionally things are opposite even on plants with alternate buds. Look for the overall pattern on the plant – if only 90% of the buds are opposite, the plant is still categorized as opposite.

When identifying deciduous trees and shrubs in leaf,  
there are four possibilities:

**SIMPLE & OPPOSITE**

**COMPOUND & OPPOSITE**

**COMPOUND & ALTERNATE**

**SIMPLE & ALTERNATE**

# Key to Identifying Deciduous Trees and Shrubs

## SIMPLE AND OPPOSITE SPECIES:

T  
R  
E  
E  
S

Red maple  
Sugar maple

S  
H  
R  
U  
B  
S

Striped maple  
Mountain maple  
High-bush  
cranberry  
Wild raisin  
Hobblebush

Round-leaf dogwood  
Red osier dogwood  
American fly honeysuckle  
Mountain fly honeysuckle

## SIMPLE AND ALTERNATE SPECIES:

T  
R  
E  
E  
S

Red oak  
American Beech  
White birch  
Grey birch  
Yellow birch  
Ironwood  
American elm  
Large-tooth  
aspen  
Trembling Aspen  
Balsam Poplar  
Pin cherry

S  
H  
R  
U  
B  
S

Bog birch  
Alternate-leaf  
dogwood  
Serviceberry  
Chokecherry  
Red and black  
chokeberry  
Rhodora  
Witch hazel  
Bayberry  
Sweet gale  
Sweet fern

Mountain holly  
Winterberry holly  
Hawthorn  
Willow  
Alders  
Beaked Hazelnut  
Sheep laurel  
Labrador tea

# Key to Identifying Deciduous Trees and Shrubs

## COMPOUND AND OPPOSITE SPECIES:

T  
R  
E  
E  
S

White ash  
Black ash

S  
H  
R  
U  
B  
S

Common elder  
Red-berried elder

## COMPOUND AND ALTERNATE SPECIES:

T  
R  
E  
E  
S

Butternut

S  
H  
R  
U  
B  
S

Staghorn sumac  
Wild Rose  
American mountain ash

# ASSESSING RIPARIAN ZONES

For the best success, each potential planting site should be thoroughly assessed in order to answer the following questions:



1

**Is the area shaded or sunny, or in between?**

*(This helps in selecting species, as well as helping to determine how often you may need to water them)*

2

**Is the soil wet or dry?**

*(Trying to understand how it might look in the spring and summer, especially, this helps in selecting species, as well as helping to determine how often you may need to water them)*

3

**Is the site windy or protected?**

*this helps in selecting species, as well as helping to determine how often you may need to water them)*

4

**What species of trees, shrubs, wildflowers and ferns are growing on the site?**

*(these can paint a fair accurate picture of the site conditions)*

5

**If it is a woodland, what does the future hold for the trees?**

*(is it old field white spruce that will over time start breaking up, or a young mixed hardwood stand that will become shadier as the trees age)*

6

**Are there nearby sources of seed for species that you would like to see growing on the site?**

*(wind, birds, and squirrels can move seed quite a distance)*

7

**Are there enough wildlife trees to support a healthy population of cavity nesting animals?**

*(do you need to girdle some large poplars, or put up nest boxes)*

8

**Are there important food species that are missing?**

*(will there be food in the winter for fruit-eating birds, are there plants for pollinators, and are there high protein mast/nut crops such as oak, beech, and beaked hazelnut)*

# ASSESSING RIPARIAN ZONES



Another thing to remember is that for plants to fruit heavily, they need light. Trees can do fine if they are in the canopy, but for fruit or nut production, deep shade is not a friend of shrubs.

We faced this conundrum on the Selkirk Road property we manage for the provincial government. We're trying to get the forest older and taller, and full of more shade tolerant species. That is a habitat that is in short supply in the province. It is a large block of forest, 220 acres (90 ha), with a lot of conifer plantations. One block of Scots pine (just under an acre - .33 ha) was starting to break up, but also starting to invade the surrounding area. One of our staff came up with the solution of cutting the remaining pine, piling the wood and branches up to create brush piles for wildlife, and then planting wildlife plants.

It is an area that we will not let trees grow back again, as that would defeat the purpose of having a relatively sunny area where wildlife plants can thrive. We put in blocks of pollinator plants, including swamp milkweed, cutleaf coneflower, Joe Pye weed, and blue flag iris for butterflies, moths, bees, and wasps. For fruit-eating winter birds, such as American robin, Bohemian waxwing, cedar waxwing, and pine grosbeak, we added highbush cranberry, wild rose, American mountain ash, winterberry holly, and hawthorn. The latter species also provides great protection from predators for smaller birds. To provide fruit in the summer, we put in red-berried and common elder, red and black chokeberry, chokecherry, and serviceberry. We also added beaked hazelnut for squirrels and chipmunks, and bayberry for birds such as yellow-rumped warbler and evening grosbeak.

**In the following pages are some common scenarios that will be of some help in determining what treatments would most benefit a riparian zone.**

These are just some examples of the types of problems and opportunity people come across everyday in their efforts to restore fish habitat and forest health. Like many things, a lot of it comes down to understanding the site, looking carefully at what is there, whether big trees or tiny seedlings, and making thoughtful interventions.



# ASSESSING RIPARIAN ZONES



## ALDERS GROWING ON BOTH SIDES OF A STREAM WITH FEW OTHER SPECIES

This will usually be on a flood plain. Speckled alders can choke out a small stream quite quickly, making passage difficult. The beautiful thing about alders is that they fix nitrogen in their nodules on their roots, and their leaves also have high levels of nitrogen. They're actually one of the best soil builders that we have. The problem is two-fold. You can't really plant under them or amongst them, as the shade is too dense.

That's why there are few or no other tree and shrub species growing there – the young ones were all shaded out by the alders. And you can't really mow them down and expect good results, as they seem to come back even stronger from the roots and stem.

What you can do is create openings just as if you were doing a patch cut in any woodland. The general rule is that the diameter of patch cuts is no greater than the height of the surrounding plants, whether that is in a regenerating field or an older forest. If you are making patch cuts in an old field white spruce site with trees that are 60 feet (18 m) tall, that's the largest the diameter of your cut should be. If you are in a thicket of alders that are six feet (1.8 m) tall, then that's the diameter of your cut. In most cases, this means just cutting down one alder plant, and perhaps pruning back some of the neighbouring shrubs. You're trying to create dappled light, and not full sun conditions. In these openings, plant one tree that will benefit from some side shading. Yellow birch is a great choice for these areas, but red maple, white ash, and American elm (on wetter sites) and white pine and red oak (on drier sites) will make good growth as they reach for the sun. You should use well-rooted plants that will quickly start to grow tall as they continue to reach for the sun.

These patches can be roughly 20 feet (6m) apart. Once the trees pop out of the canopy and provide shade, the alders will start to grow more slowly as they are a plant that thrives in full sun. It is a slow process but it allows the alders to continue building soil, feeding wildlife, and providing nesting habitat, while nurturing the trees that you would like to see growing there.

If there are other species growing with the alders - most likely pin cherry, but also chokecherry, trembling aspen, etc. - let them continue growing and providing shade and habitat. They may not be the species you want there in the future, but they are serving a good purpose at present.

If beavers are a problem, the plantings will need serious protection, but that is the beauty of not planting so many trees – you can look after them better.

# ASSESSING RIPARIAN ZONES



**A DRY STREAMBANK WITH LIVE TREES THAT ARE STARTING TO DIE OR BREAK OFF, MOSTLY BALSAM FIR AND RED MAPLE, WITH AN ASSORTMENT OF OTHER TREES AND SHRUBS**

In these areas, the general goal is to make the stands thicker by adding more shade-tolerant plants, and also to create the right growing conditions for other species. After the initial assessment, the first step is to cut the leaning trees so that they are laying relatively flat on the ground. If there are enough of them, make brush piles for wildlife. The piles of wood and brush will not only benefit a wide range of wildlife, but also store water and provide future nutrients. Unless they are a hazard, the standing dead trees, or snags, should be left to provide homes for a wide variety of wildlife, everything from chickadees and nuthatches in the small diameter ones to barred owls and wood ducks in the larger dead wood.

The plantings should focus on yellow birch, sugar maple, eastern hemlock, and red spruce. These will eventually become the future forest. Try to find areas where the seedling can have even a small amount of clear sky above it. If the stand is too dark, these species will grow, but very slowly. You can also add a variety of native shrub species in appropriate locations. Species such as witch hazel, hobblebush, alternate-leaf dogwood, and beaked hazelnut grow well in dappled light and will help diversify the stand in species as well as heights.

If the soil is at all damp in places, that's where you can add Christmas fern, ostrich fern, male fern, and cinnamon fern. They will help diversify the structure of the area, providing dense cover and capturing carbon. Any of the wood ferns and interrupted fern will provide the same benefits in drier areas.

Whenever possible, we always look to add rare species of wildflowers and ferns so that we can continue to improve biodiversity at the same time as creating healthy riparian zones. Plant male fern and Braun's holly fern (if available) and wildflowers such as yellow violet, Dutchman's breeches, and hairy sweet Cicely in groups of three or five. They seem to love company.

# ASSESSING RIPARIAN ZONES



## A STAND OF OLD FIELD WHITE SPRUCE THAT IS STARTING TO BREAK UP

These stands can greatly benefit from some careful silvicultural work. The first thing to consider is that if you do nothing, the spruce trees in the stand will eventually start to die and fall down. As they do, more light will enter the stand, and you will see other species coming up. White spruce does not do well in shade, but you'll see white birch, grey birch, red maple, and trembling aspen coming up, as long as there are nearby seed sources. This is the natural succession of an old field white spruce stand.

A good intervention will help speed up this natural succession and increase the diversity and future value to wildlife of these stands. Think of it as working with nature, enhancing the natural processes that keep forests healthy. If there were appropriate seeds sources nearby, you probably wouldn't have to do much, if any, planting. But that is usually not the case in Prince Edward Island—our fields were large and about 75% of the province was cleared for farming. You want to be able to look into these forests in a few years and start seeing them green up, instead of waiting for the trees to fall down and then watching the same thing happen but with a limited number of species.

The goal should be to make a series of small patches in the forest to create planting sites for native plant species that are not present nearby. Just as with the alder stands, the patches should be no wider than the height of the surrounding trees. In a white spruce stand where the average trees were 60 feet (18 metres), you could create 4-5 patches of that diameter per acre (10-12 per hectare). Select areas that have already started to open up. That will make it easier for you, and you're trying to create planting spaces, not produce wood for lumber or pulp.

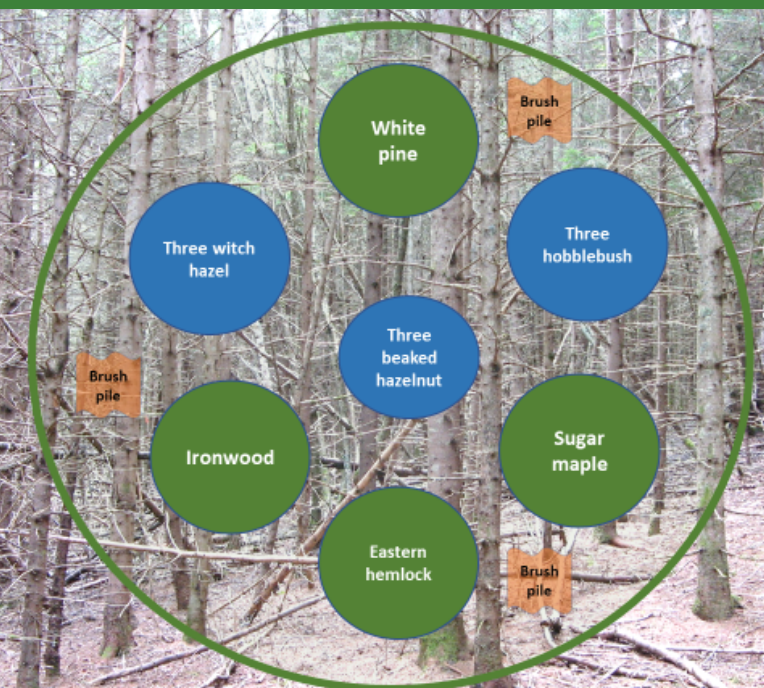
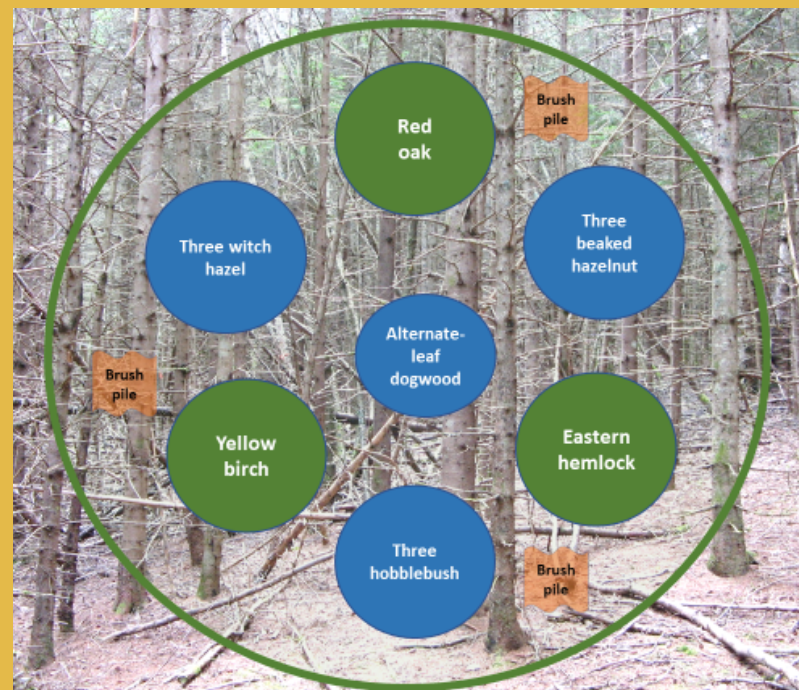
Cutting in white spruce stands always results in a lot of brush. The wood and brush can be positioned into piles that provide excellent habitat for wildlife. Because the old field white spruce stands grew up on ploughed land, the forest floor tends to be flat, with little coarse woody debris. The brush piles provide multiple benefits: diversifying the forest floor, capturing and storing more water, providing excellent wildlife habitat for everything from toads and salamanders to garter snakes and chipmunks.

These stands generally lack organic matter, and are often low in nitrogen. We rarely fertilize plants we put in the forest, except the potted plants that contain relatively fertile soil. But one thing we have found useful is to add organic matter to the site. If there are any trees down on the ground that have started to decay, we add a chunk of this material (or several handfuls) into the planting hole. This helps store water, ensuring that the plant doesn't go through severe cycles of lots of being very wet and then very dry. It provides a bit of a balance to the water regime. Species such as hemlock and yellow birch—which you'll often find growing in large numbers on rotting stumps and logs—seem to especially benefit from this treatment.

# ASSESSING RIPARIAN ZONES

FOR EACH OF THESE PATCHES YOU CAN ADD THE SAME MIX, OR A DIFFERENT ONE. HERE ARE A COUPLE OF EXAMPLES:

Old field white spruce patch cut example 1: To this 50-60' (15-18 m) diameter patch cut, add one red oak, one eastern hemlock, one yellow birch, three beaked hazelnut, three hobblebush, three witch hazel, and one alternate-leaf dogwood. After assessing what wildflowers and ferns are there, any gaps can be filled with species such as yellow violet, false Solomon's seal, starry false Solomon's seal, painted trillium, nodding trillium, bluebead lily, baneberry (poisonous), hairy sweet Cicely, interrupted fern, wood ferns, and Christmas ferns. You don't have to overdue these plantings, just think of them as opportunities to restore diversity. Remember that you are trying to put future seed (or spore) sources in place that will find their way to



Old field white spruce patch cut example 2: To this 50-60' (15-18 m) diameter patch cut, add one white pine, one sugar maple, one eastern hemlock, one ironwood, three hobblebush, three beaked hazelnut, and three witch hazel. After assessing what wildflowers and ferns are there, any gaps can be filled with species such as yellow violet, false Solomon's seal, starry false Solomon's seal, painted trillium, nodding trillium, bluebead lily, baneberry (poisonous), hairy sweet Cicely, interrupted fern, wood ferns, and Christmas ferns.

# ASSESSING RIPARIAN ZONES



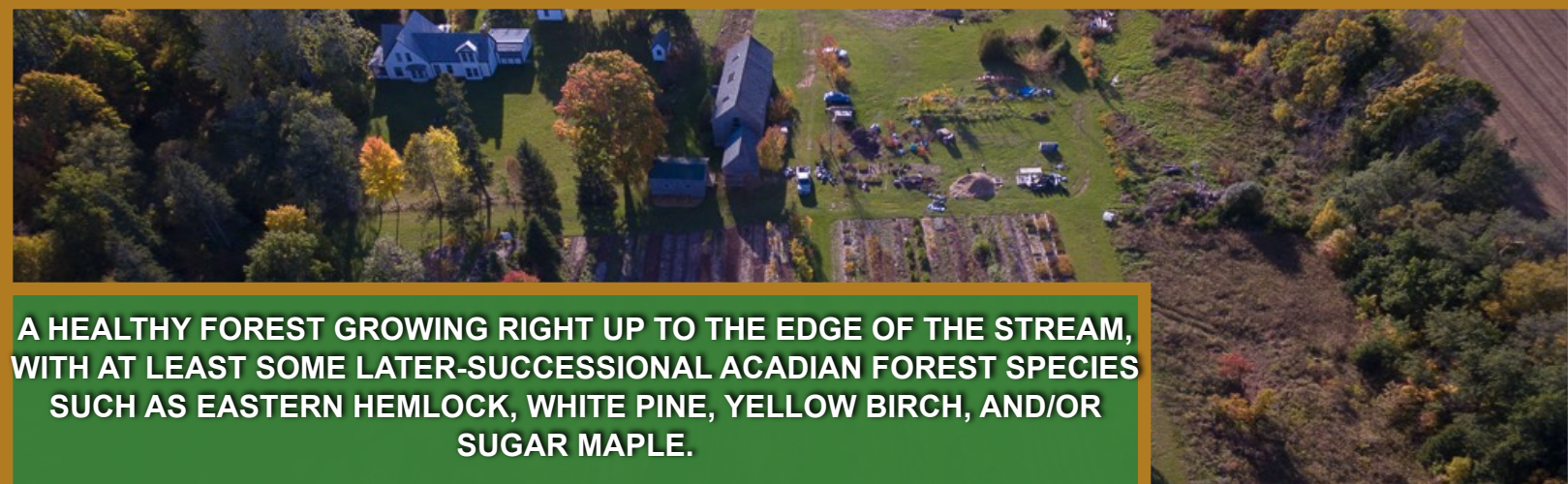
## FIELDS RUNNING RIGHT DOWN TO A GRASSED HEADLAND

These types of areas can be very challenging, depending on the severity of the slope, whether there is still large amounts of water running off the fields, and whether there have been cattle packing down the bank in the past.

These streamsides also present great opportunities, as successful plantings can change the area from a liability into excellent habitat for a wide range of wildlife. They will also keep soil where it should be, help clean the water, and eventually provide shade that will cool the stream.

This type of area is a good place to try out live-staking, in combination with some direct seeding, and more conventional planting. Plant live stakes (see the "Live staking" chapter in this package) every two feet (.6 m) along the stream bank, concentrating on willows and red osier dogwood, with small amounts of common elder and highbush cranberry. Further up the bank, plant trees such as white ash, red maple, American elm, eastern larch and black spruce, along with shrubs such as mountain maple, chokecherry, common elder, black and red chokeberry, highbush cranberry, and wild rose. Where the flooding ends, you can add red oak, white birch, grey birch, white spruce and eastern larch, as well as serviceberry, hawthorn, red-berried elder, and staghorn sumac. This would be also a good area to try direct seeding red oak acorns. Use a stick or a piece of rebar to poke a 2 inch (5 cm) deep hole, drop in an acorn and gently pack the soil around it. You will almost certainly get less than 10% germination, but acorns take little effort to collect and not much more to plant, so it is worth the effort.

# ASSESSING RIPARIAN ZONES



**A HEALTHY FOREST GROWING RIGHT UP TO THE EDGE OF THE STREAM, WITH AT LEAST SOME LATER-SUCCESSIONAL ACADIAN FOREST SPECIES SUCH AS EASTERN HEMLOCK, WHITE PINE, YELLOW BIRCH, AND/OR SUGAR MAPLE.**

While these types of forests along streams are not nearly as common as they once were in the province, they still exist. Unfortunately, even the ones we come across can have some serious problems with a lack of diversity and the existence of invasive species. It is great to have large trees of long-lived species, but often these areas are dominated by eastern hemlock, balsam fir, and red maple, with little of the diversity found in older forests such as the Townsend Woodlot near Souris.

It is as useful to know what is growing on the ground as it is to know what species the trees are. Both are important, and help you know what to plant and what not to plant. Generally, in these areas you are looking to improve biodiversity. There should already be lots of standing dead trees, or at least large trees with cavities. In addition, there should be lots of coarse woody debris (trees and parts of trees that have fallen to the ground over a long period of time).

After becoming aware of what species were growing in the forest, you would generally look at what is missing that you can assume might naturally grow there. Are there many ferns on the forest floor? If not, add some that are appropriate to the light conditions. And if possible, choose some rare ones that might not otherwise find their way there. What types of food are there for wildlife? If it is low on fruit, consider adding some hobblebush or wild raisin. If there are no mast-producing plants (red oak, American beech, beaked hazelnut), consider adding some of these species. What species of wildflowers could be growing in patches? Look to species such as trilliums, yellow violet, bluebead lily, hairy sweet Cicely, and many others. Again, if you can add in rare species that are appropriate to the site, including ferns, that is a win-win situation.

One thing to be careful of when working in these stands is to be cautious – you don't want to damage the stand you are trying to fix. Roots will be everywhere. Try to minimize the damage that you do when transplanting. We most use small plants so that you don't have to dig large holes, minimizing your negative impact on the forest.

# ASSESSING RIPARIAN ZONES

An aerial photograph showing a rural property. On the left, there is a large house with a blue roof and a barn. In the center, there is a field of young trees, some with autumn-colored leaves. To the right, there is a larger field with a mix of trees and shrubs. The overall scene depicts a regenerating riparian zone.

## AN OLD FIELD THAT IS REGENERATING IN A MIX OF SPECIES, ABOUT 10-15 YEARS OLD

In these young regenerating stands, early intervention really pays off. If left on their own, they often turn into typical old field white spruce stands with little diversity. The mix of sun-tolerant pioneer deciduous trees (pin cherry, trembling aspen, grey birch) and shrubs (willow, wild rose, bayberry) will eventually be overtopped by the white spruce and the shading stunts their growth. The stand actually becomes less and less diverse as it ages.

The key to making improvements is to act quickly. Survey what is growing there and take steps to maintain what diversity is there. I rarely plant balsam fir, but in a stand like this, I will cut out white spruce to rescue a few fir. You may have some white birch mixed in. If it is growing too tightly with other trees, remove some of the competition. Rescue the red maple, save the serviceberry, free up any other species you want to keep healthy.

Any trees that you would like to keep should be pruned as needed (please see our videos on this subject). Pruning young trees is so much more beneficial (and less work) than waiting until they get older with larger branches. Sometimes it is just pruning up a young birch that has been chewing by snowshoe hare, getting it back to a single stem. Other times, it is a matter of removing the second leader on a young white spruce, another quick fix. Again, you're not trying to prune every tree, just the ones that you will have as longer-lived specimens in the future forest.

Every patch in the stand that doesn't have a tree growing is ripe for planting. Think about putting in appropriate species that are missing from the mix. White pine, red oak, yellow birch, sugar maple, and American elm. All of these species grow quite quickly in the right setting, which will help them get ahead of the competition. If they do become crowded, you may have to cut back some of the surrounding vegetation. And remember that you're not trying to plant tons of trees, just one high-quality, long-lived species every 15-25 feet (4.5-7.5 m). When deciding on shrubs to add, think about how the stand will have more shade as it goes older. Even though it is an early successional stand, it is still an appropriate time to plant later successional species such as witch hazel, hobblebush, beaked hazelnut, and alternate-leaf dogwood.

# ASSESSING RIPARIAN ZONES



**A YOUNG MIXED HARDWOOD STAND, 30-40 YEARS OLD, AFTER A CLEARCUT. MOSTLY RED MAPLE FROM STUMP SPROUTS WITH SMALL AMOUNTS OF SUGAR MAPLE AND YELLOW BIRCH**

These young stands can be very rewarding. You can usually plant them throughout the growing season, as the shade cuts down on the need for watering. We'll often plant open areas in the spring, and wooded areas throughout the summer. In these stands, the trees are all the same age, springing up mainly from stump sprouts. If you do have to do some thinning to allow more light for the plantings, select the trees for removal by assessing the species (all things being equal, take red maple and leave sugar maple); quality of tree (can you see rot anywhere, or are there visible cracks?); and the placement (is it casting too much shade on another tree you value more highly). In these stands, you always attempt to maintain the tallest trees, as that's what keeps the shorter trees stretching to reach for the sun. And the largest trees—even if they are starting to die—should be left, as though will be your future wildlife trees for cavity nesting birds and mammals.

Any thinning should be carried out from mid-August to early May. Cutting during the prime bird nesting season will lead to the destruction of nests. Some of these may be of migratory birds. Though rarely enforced, there is actually federal legislation in place to protect migratory birds. But legal or not, this is just a good practice to adopt.

These stands often have good light conditions for underplanting. You don't need to look for blue sky above you, as there is usually lots of light coming in from the sides. But select plants that are appropriate to the sites. Species such as eastern hemlock, white pine, red spruce, sugar maple, yellow birch and ironwood all do well in these types of stands. If there are lots of any of those species present, then leave them out of the mix. Shrubs such as hobblebush, witch hazel, alternate-leaf dogwood and beaked hazelnut also help to diversify the forest, providing both food and nesting habitat. For the most part, these types of stands often have lots of ferns and wildflowers growing. See what is missing, and use the opportunity to plant rarities such as Braun's holly fern, male fern, Christmas fern, yellow violet, Dutchman's breeches, hairy sweet Cicely, and others.

Also, think about the needs of wildlife and see what is abundant or uncommon, when considering food and habitat. In the photo above, the stand is missing a lot of ground cover and larger wildlife trees, but it is also missing winter protection. A brisk winter wind would leave many birds looking for a place to hide, and there really isn't one. Getting some clumps of hemlock growing can really provide a great source of protection for winter birds, as well as eventually providing food.



# ASSESSING RIPARIAN ZONES



## STANDS WITH OBVIOUS HEALTH PROBLEMS

Too often, we come across stands where the trees themselves are clearly having health problems. The photo above is an American beech stand that resulted from a clearcut for fuelwood. Beech tends to root sucker when it becomes stressed, and there is nothing more stressful to a beech than being cut! This leads to forests that are for the most part clones of one or more parent trees, depending on how long this pattern has been taking place. In these woods, the beech are all infected with beech bark disease. A European beech scale insect feeds on the bark and creates cracks. These openings allow a native canker fungi to enter the tree. Sometimes the trees can live for years, though some research shows that 50-85% of infected trees die within ten years.

Problems can be found in all kinds of forests, but when you look at a young stand and see that it is getting less and less healthy, that is the time to take action. It could be a conifer plantation that had shoot moth damage, or a trembling aspen stand that is full of a yellow fungus called hypoxylon canker, it is good to start making patch cuts in the stand and getting some other species started. As we've already talked about, the patch cuts should be no greater in diameter than the height of the surrounding trees. Try to make the patches in naturally occurring openings, and look to take out the least healthy trees. In effect, treat it as if it was old field white spruce that you were trying to help become a healthy forest.

In the stand pictured above, while sugar maple and yellow birch would be two species to add, concentrate on the late-succession conifers that are missing—white pine, red spruce, and eastern hemlock. In the red pine stand mentioned, you can put more emphasis on deciduous trees such as red oak, yellow birch and sugar maple, with smaller amounts of hemlock and white pine. You can also start adding some shrubs for fruit-eating birds and pollinators, such as serviceberry, hobblebush, alternate-leaf dogwood, round-leaf dogwood, American fly honeysuckle, and red-berried elder. You can also plant a mix of ferns and wildflowers, from interrupted fern and Christmas fern to hairy sweet Cicely and trilliums. These will start to give you more layers in the forest, and more diversity when it comes to flowering and fruiting times, and the type of food it will provide.

# INVASIVE SPECIES IN A WOODLAND



## STANDS WITH OBVIOUS HEALTH PROBLEMS

Part of the assessment process is looking at what species are occupying the site. In some cases, these will be non-native species which can cause problems if left unchecked. The eradication (or at least a reduction in the prevalence) of invasives is a key part of keeping a forest healthy, and the earlier you start, the more successful you will be. Remember that young plants don't produce much seed, but at they age they will produce a lot more. It is much easier to pull small English oak or dig out young glossy buckthorn than it is once they've gotten larger.

Most of our truly aggressive invasives (e.g., Japanese knotweed, purple loosestrife, and wild cucumber) thrive in the sun but seem to wither in the shade. Unfortunately, some non-natives do just fine in dappled light. Norway maple, English oak, and glossy buckthorn are three of our worst. In cases where you have invasive species looking to get a foothold in a relatively healthy forest, their identification and removal should be one of the first things to do.

At the Macphail Homestead, the nearby woods are absolutely full of Norway maple, English oak, European linden, and European mountain ash, with smaller amounts of glossy buckthorn. They seeded in from parent plants at the homestead. Initially, when I saw seedlings and saplings sporting what looked like sugar maple leaves, I thought I had hit the jackpot. But as I got better at plant identification, I noticed that the leaves were wider than they were tall—the exact opposite of sugar maple. And the keys didn't droop like those of sugar maple.

Norway maple can be quite problematic in woodlands. So many of these trees were planted around the Island—at schools, around homes, in cities and towns—that the seed sources are virtually everywhere. I try not to go to war with plants, but recognize that early removal is the key to success. That said, there have been times when I chose not to cut down or pull or dig out all of certain non-native plants. The first is European mountain ash. It is everywhere, at least in the eastern part of the province. It is a good source of food for winter birds, so I leave it until there are replacements available. And Norway maple makes up a big part of the disturbed woodland at Macphail Woods. We do cut it down at the slightest provocation, but more to create the dappled light conditions that we want for planting other species. If we removed them all at once, we'd be facing almost full-sun conditions and would still have to deal with the young ones and the seed load in the ground. Getting rid of any young ones is a great way to start, then removing the oldest ones that are growing most of the seeds, and then eventually get rid of the rest of them.

# INVASIVE SPECIES IN A WOODLAND

An aerial photograph showing a residential property with a large house, a garden, and a wooded area. The trees in the woodland appear sparse and unhealthy, with many bare branches and some yellowing leaves, indicating a problem with the forest's health.

## STANDS WITH OBVIOUS HEALTH PROBLEMS

Glossy buckthorn has become a real problem in some of our woodlands, especially in more urban parkland. It produces large amounts of fruit which are eaten by birds who then spread the seed throughout the area. Buckthorn can form such a dense understory that our native vegetation gets shaded out.

Buckthorn can be pulled (young) and dug out (older), but an even more effective way of dealing with them is to girdle the trunk, much like you would do with a large poplar you're trying to kill to remove shade and create a wildlife tree. With a sharp knife, slice the bark and cambium layer off an entire section of the trunk. The plant basically becomes starved and dead and is less likely to throw up large numbers of sprouts.

The eradication of invasives is a key part of keeping a forest healthy, and the earlier you start, the more successful you will be. Remember that young plants don't produce much seed, but as they age they produce a lot more. And it is much easier to pull young English oak or dig out young glossy buckthorn than it will be if you let them grow larger.

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## NATIVE PLANTS

J. Frank Gaudet Provincial Tree Nursery: 183 Upton Road, Box 2000, Charlottetown, PE, C1A 7N8, Phone: 902-368-6450.

*They're growing a lot of great native trees and shrubs, which in the past have included rare species such as witch hazel, black ash and ironwood.*

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