

Prince Edward Island
FOREST
Wildlife
Manual

Text and Concept by Dan McAskill

Illustrations by
Kate Poole and Dan McAskill

*Prince
Edward
Island*

CANADA

Agriculture, Fisheries,
Aquaculture and Forestry





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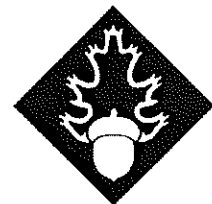
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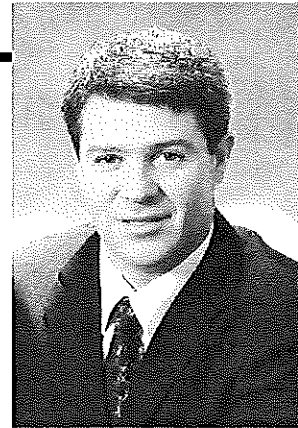
Agriculture, Fisheries,
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Message From the Minister



Forests cover nearly 46 per cent of Prince Edward Island's surface. These forests provide timber for local sawmills, heat energy for Island homes and work for over 1,000 Island families. They also contribute to the beauty of our Island's landscape, protect our soil from erosion, purify the air we breathe and water we drink, and offer habitat to thousands of wildlife (animal and plant) species.

Because Island forests have many values, it is important that everyone recognizes the need to manage our natural resources in a sustainable fashion for the benefit of present and future generations. As Minister of Agriculture, Fisheries, Aquaculture and Forestry, I have encouraged my staff to develop guidelines and techniques which address the needs of all forest values, including wildlife. Over the years, forestry staff have carried out basic research to determine the impact of forest operations on certain wildlife species and populations and conducted interactive workshops with wildlife specialists from across Canada. The results of these efforts have reinforced our understanding of and commitment to the environmental, social and economic values of managed forests.

Woodlot owners have also come to appreciate the non-timber values of Island forests and many have expressed a keen desire to manage their properties for both wildlife and timber. In response to their requests, members of my department have prepared the Prince Edward Island Forest Wildlife Manual. This manual contains a wide variety of wildlife management techniques which can easily be implemented at little cost or sacrifice to timber objectives. Many of these can also be applied in backyards. All of these suggestions are practical, effective and educational.

I strongly encourage Islanders to try the techniques offered in this manual. Our forest wildlife depend on the actions and choices of each and every Islander.

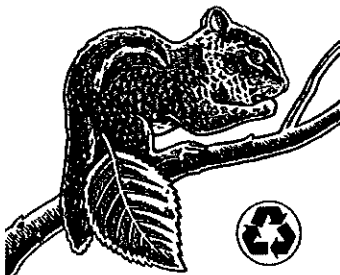
A handwritten signature in black ink, reading "Kevin J. MacAdam". The signature is written in a cursive style with a large initial 'K' and 'M'.

Honourable Kevin J. MacAdam
Minister
Agriculture, Fisheries
Aquaculture and Forestry

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• ACKNOWLEDGEMENTS •

Few efforts of this size evolve from the work of any one individual. The *Prince Edward Island Forest Wildlife Manual* is the direct result of interest expressed by landowners, students, naturalists, forest technicians, foresters and wildlife biologists during dozens of forestry wildlife, wildlife and forest management lectures and workshops presented over the past two decades. I extend my thanks to all those who raised questions on various issues during those sessions since the exchanges that followed led to many of the illustrations used for clarification within this manual. Thanks also to the many forest wildlife researchers whose ongoing efforts allow publications such as this to occur.

The vast majority of illustrations throughout this manual are the work of Ms. Kate Poole. I extend my sincere thanks to her for the patience displayed in creating the many versions required to clarify the concepts being presented. Her artistic skills and vision contributed greatly. Illustrations were refined and prepared for publication by TRI•AD Design. TRI•AD was responsible for design, layout and production of this publication.

The first version of this manual was reviewed during a P.E.I. Department of Agriculture, Fisheries and Forestry "Integrating Wildlife Management into Forestry Prescriptions Workshop" held in May, 1989. Since that time many additional illustrations were reviewed by Sid Watts, William Glen, Gerald MacDougall, Wade MacKinnon, Jean Ouellette, Bruce Smith, Debbie Hearn and Ken Mayhew. The editorial comments provided by all these individuals led to significant improvements. My thanks to all who contributed their time and expertise.

In addition to those named above, I would like to extend a special thanks to the following individuals: Sid Watts, P.E.I. Department of Agriculture, Fisheries and Forestry, for many years of promoting and testing forest wildlife improvement techniques; J.-P. Arsenault and Jerry Gavin, P.E.I. Department of Agriculture, Fisheries and Forestry for providing a work environment that challenges individuals to take on efforts such as this; Darlene Ching, Hellen Wellman and Iva Stewart, P.E.I. Department of Agriculture, Fisheries and Forestry for converting my hand-written notes, first to word processing files and then to text; Wade MacKinnon, Bob Thompson, Alan McLennan and Geraldine Fitzgerald of the Montague Watershed Project, P.E.I. Fish and Wildlife Division and Wildlife Habitat Canada for the testing of techniques, participation in our workshops and monitoring of wildlife responses; Dwayne Sabine and Scott Makepeace whose bird studies under Forestry Canada, National Research Council and P.E.I. Department of Agriculture, Fisheries and Forestry contracts contributed significantly to our knowledge of bird response to forest management on P.E.I.; Bruce Smith, P.E.I. Conservation Strategy, Daryl Guignon, U.P.E.I. Biology Department and Bob Bancroft, N.S. Department of Lands and Forests for critiques and discussions of ideas and encouragement to proceed; and Randy Milton, Julie Towers and Anne Cammozi of the St. Mary's River Project, N.S. Department of Lands and Forests for their assistance in the workshops and tours as well as their contributions to our knowledge of wildlife population responses to various forest management practices.



• INTRODUCTION •

For each individual, the term "wildlife" elicits specific images. Some people may envision an eagle soaring slowly over a river's edge. For others, the sound of spring peepers heralding the end of winter, or the serenity of a lady's slipper growing in a sunlight-dappled forest glade epitomize the concept of wildlife. Whatever image is brought to mind, people tend to associate particular values with wildlife. The values they attribute, and these values may be either positive or negative, can affect the decisions people make in planning management of their properties.

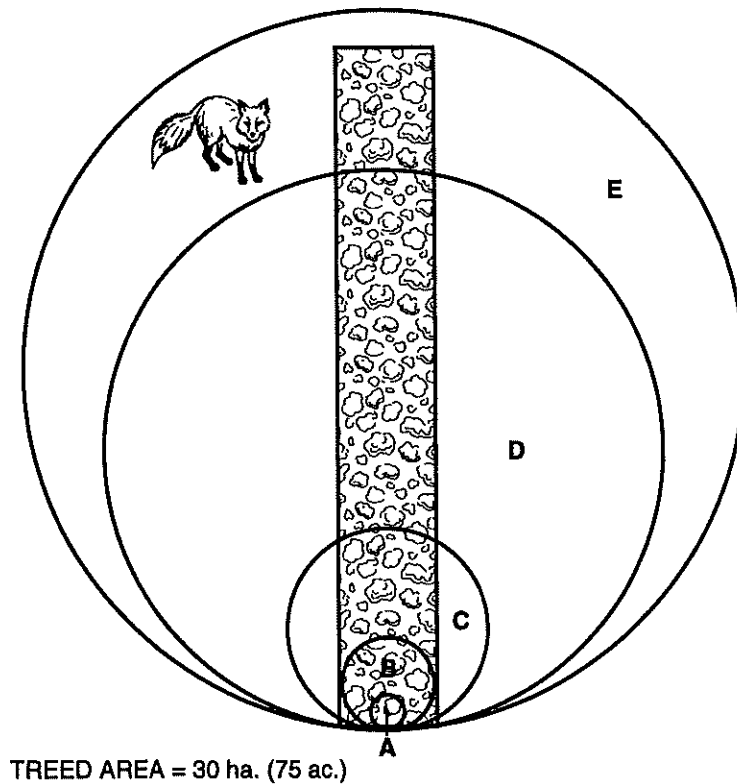
Virtually all decisions reached regarding a property's management will affect some form of wildlife. If you decide to leave your woodlands untouched, the natural changes in the woodland over time (called succession) will affect both the numbers and kinds of wildlife using different parts of your woodland. If you decide to harvest or plant part of your woodlands, or even individual scattered trees, certain types of animals will increase in number, others will decrease and still others will maintain the same population level. It is important to understand the potential consequences of your management choices.

Many forest landowners have expressed an interest in managing wildlife in their woodlands. Since the Private Woodlot Management Plan Program started, landowners have been asked to identify their management objectives. Over 20% of participating landowners selected wildlife enhancement. Since the start of its forest management programs, the P.E.I. Department of Agriculture, Fisheries and Forestry has tried to address this concern for wildlife by setting environmental standards for all work and by making forestry programs available to those wishing to implement forest wildlife enhancement.

This manual is designed to explain easily-applied wildlife improvement techniques for forest land. Some of the techniques can also be used to improve backyards for wildlife. The concept of "how-to illustrations" with a minimum of text is the direct result of requests from forest wildlife management course participants. Where possible, animals and plants are identified by the name commonly used by Island landowners. For those who wish to explore additional information on forest or backyard wildlife management, a bibliography is provided at the conclusion of this manual. If you have any suggestions for improvements in, or additions to, the *Prince Edward Island Forest Wildlife Manual*, please contact the author at the P.E.I. Department of Agriculture, Fisheries and Forestry. Your comments and suggestions will be appreciated.



• FOREST WILDLIFE PLANNING •



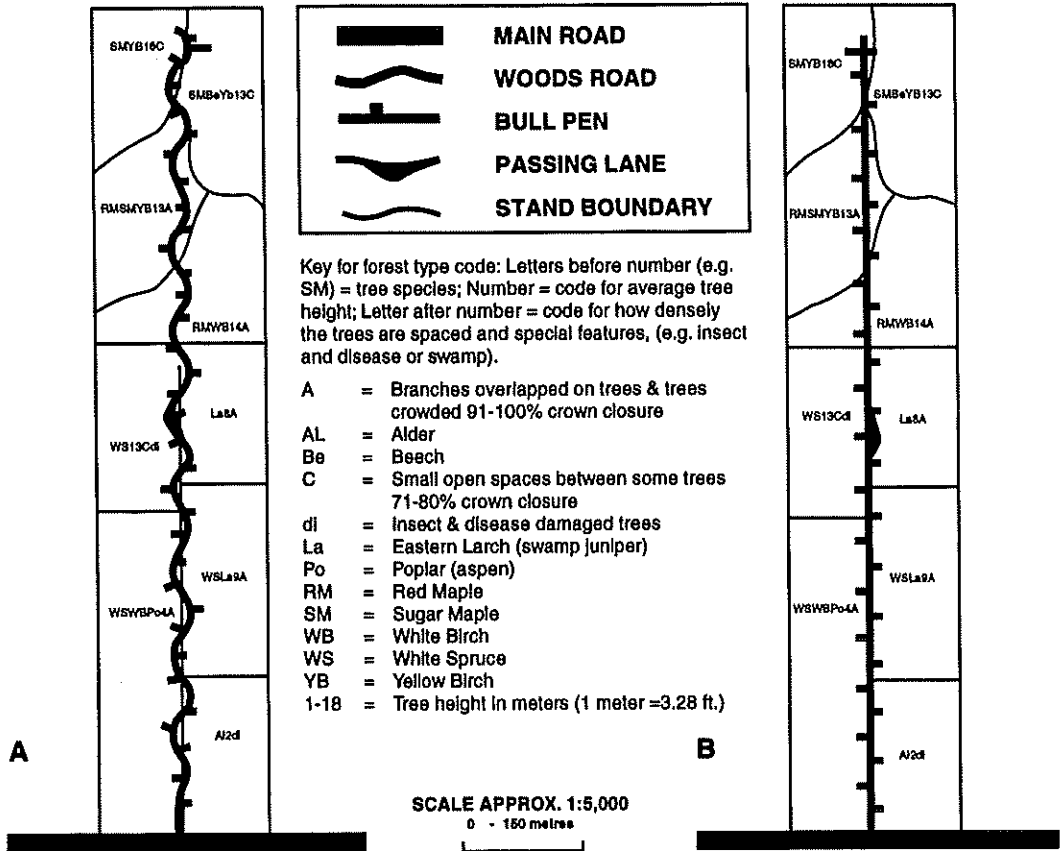
Home Range

Animals require a certain amount of habitat (home range) in which to find all the food, shelter and special requirements they need to survive. The shape of this area tends to be irregular depending upon the types of habitat present. The illustration above, showing average home range sizes for selected animals, will assist you in planning which species you wish to manage. As you can see, some animals range over the properties of many landowners while others can exist in a tiny corner of the property managed by one landowner.

- A. Meadow Vole (mouse), White-throated Sparrow, Yellow Warbler (0.2 ha. or 0.5 ac.)
- B. Snowshoe Hare (rabbit), Yellow-bellied Sapsucker (Woodpecker) (3 ha. or 7.5 ac.)
- C. Northern Flicker (Woodpecker) (15 ha. or 37.5 ac.)
- D. Sharp-shinned Hawk (1.2 km² or 300 ac.)
- E. Red Fox (2.0 km² or 500 ac.)



**Sample
Forest
Management
Maps**



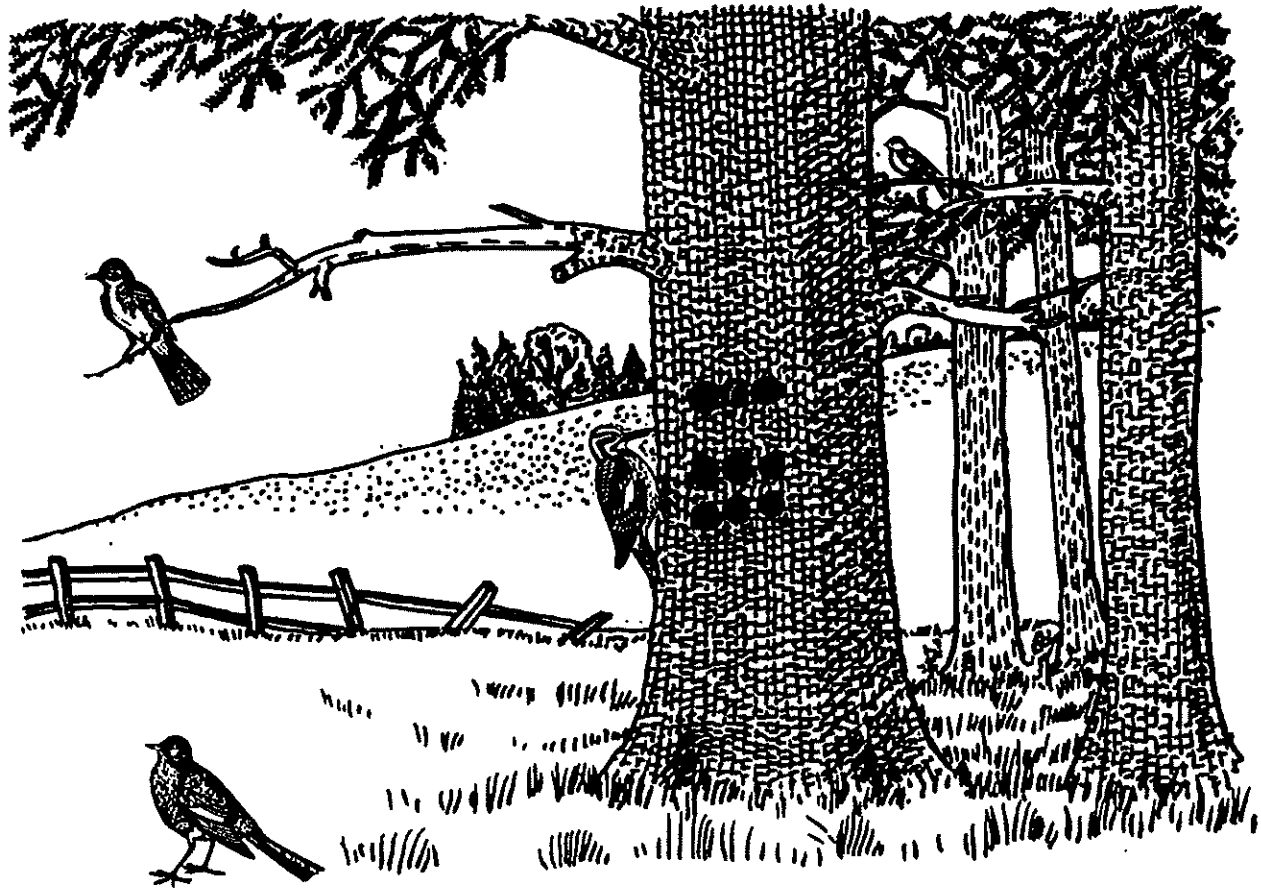
Assessing Your Forest Wildlife Habitat Resource and Access

In attempting to improve your woodlot for wildlife, it is important to know the type and age of your trees and the tree groups (stands) you have on your property, how the plants are arranged within these stands, and where features such as streams, bogs, hills, roads and property boundaries are located. If you already have a forest management plan, a map similar to the one above should be attached. If you do not have a plan, visit your District Forestry Office and a forest stand map for your property will be provided.

A good road system is needed for all managed woodland. A properly designed road will: allow efficient wood extraction by reducing the distance wood has to be moved in off-road conditions; provide the access needed for underplanting, thinning, reforestation, or maintenance; and help prevent erosion. Roads can be designed with many curves to improve wildlife viewing opportunities, recreation and aesthetics, while allowing good access for small log trucks (A above); or they can be designed for wood extraction efficiency with tractor trailers (B above). Landowners can also choose a road design somewhere between these two extremes by adding a small number of curves.

The freshly disturbed edges of new forestry roads serve as good nursery areas for hardwood and shrub seedlings. These seedlings can be transplanted to other areas of the woodlot or can be used to provide a dense growth of saplings for wildlife cover and/or food. The addition of curves (as in A above) increases road length and cost by 10% or more depending on number and type of curve included. Where aesthetics and wildlife viewing opportunities are important, the road cut width should be as close to the desired standards as possible, (i.e. 6 to 8 m [20 to 26 ft] cut width with a 4 m [13 ft] travel surface).





Bird Feeding Habits (Foraging Guilds)

Understanding how animals utilize their habitat for feeding, raising young, resting and other activities will help you improve the habitat for these animals. The illustration above shows four birds which find their food by different means. Biologists group birds with similar feeding methods into feeding "guilds". This helps biologists plan habitat improvements since members of these guilds tend to respond in a similar manner to specific habitat treatments. For example; the bird on the end of the branch is an Eastern Kingbird and it flies off exposed branches and tree tops to capture insects on the wing (the flycatcher guild); the Robin in the field is a ground feeder (the ground forager guild); the Black-capped Chickadee on the branch to the right of the largest tree searches for food along leaves, branches and tree stems (foliage and bark foraging guilds); and the Yellow-bellied Sapsucker creates holes to catch sap and insects (woodpecker guild).

Animal or plant life histories will help you to understand the various requirements for the wildlife in your woodlot. Some animals prefer thick cover, others require very low, or even no vegetation, for courtship dances, etc. For further information, please refer to pages 36-38.



Animal Use of Softwood and Hardwood Forest Habitat

All habitat types, including softwood plantations and clearcuts, are important for certain kinds of plants and animals. Even the surface of forestry roads has value to species such as the woodcock which requires extremely low vegetation or open areas for courtship dances. Some species, e.g. robin, use all stages of forest growth to some extent. To understand the impact of your management decisions, whether you decide to leave forest stands untouched to naturally follow their cycles (succeed), or to manage them, it is important to keep notes on how various animals and plants respond. The chart below provides information on the response of birds (Sabine, 1989; Makepeace, 1989; Sabine and Makepeace, 1990; McAskill, personal observations) and other animals to various methods of forest management. It will illustrate the variety of habitats an animal uses within your woodlot. This information is based primarily on breeding season usage. Keep in mind that some resident animals vary their employment of forest habitat depending on time of year.

FOREST STAND AND AGE (YEAR)

Forest Type	Clearcut 0 - 1	Plantation 2 - 10	Branch Closure 12 - 25	Pole Stage 25 - 35	Mature 35 + varies with spec.	Overmature
White Spruce 75% +					_____ Northern Goshawk _____	
	_____ Marsh Hawk _____				_____ Sharp-shinned Hawk _____	
	-?-?-?-?-?-?-?-?-?-?				_____ Sparrow Hawk** _____	
	_____ Killdeer _____					
	_____ Woodcock _____		-?-?- depends on ground moisture conditions		-?-?-?-?-?-?-?	
					_____ Northern Flicker _____	
	-?-?-?-?-?-?-?-?-?-?				_____ Hairy Woodpecker _____	
	_____ Alder Flycatcher _____		-?-?-?-?-?-?-?-?-?-?			
					_____ Blue Jay _____	
					_____ American Robin _____	
	-?-?-?-?-?-?				_____ Hermit Thrush _____	
					_____ Swainson's Thrush _____	
					_____ Cedar Waxwing & Red-eyed Vireo _____	
	-?-?-?-?-?-?-?-?-?				_____ Yellow-rumped Warbler _____	
					_____ Redstart _____	
				-?-?-?-?-?	_____ Rose-breasted Grosbeak _____	
					_____ Northern Junco, White-throated Sparrow, & Chipping Sparrow _____	
					_____ Song Sparrow _____	
					_____ Snowshoe Hare (rabbit) _____	
				-?-?-?-?-?-?	_____ Red Squirrel _____	
Sugar Maple Yellow Birch/ Beech					_____ Sharp-shinned Hawk _____	
	_____ Sharp-shinned Hawk _____				_____ Sparrow Hawk** _____	
					_____ Ruby-throated Hummingbird _____	
					_____ Northern Flicker (woodpecker) _____	
					_____ Hairy & Downy Woodpecker _____	
	_____ Alder Flycatcher _____					
					_____ Blue Jay _____	
					_____ American Robin & Swainson's Thrush _____	
					_____ Hermit Thrush _____	
					_____ Black-capped Chickadee _____	
	_____ Cedar Waxwing _____				_____ Cedar Waxwing _____	
					_____ Red-eyed Vireo _____	
	-?-?-?-?-?-?-?				_____ Northern Parula _____	
					_____ Ovenbird _____	
					_____ Rose-breasted Grosbeak _____	
	- American Goldfinch		-?			
	- Northern Junco		-?			
	_____ Chipping Sparrow _____					
				_____ White-throated Sparrow _____		
				_____ Snowshoe Hare (rabbit) _____		
				_____ Flying Squirrel _____		

* Marsh Hawk = Northern Harrier

** Sparrow Hawk = American Kestrel

-?-?-?-? - depends on the species of trees, number of layers in the stand, or other features



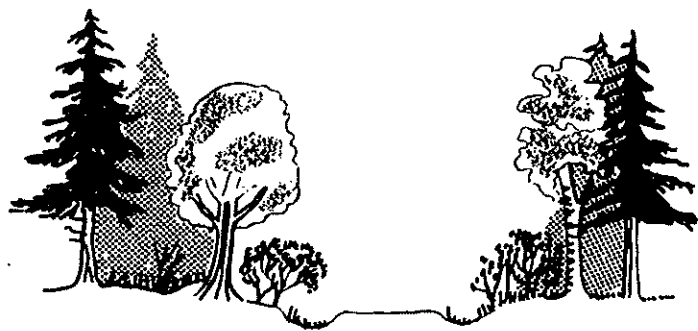


Forest Changes Over Time

Forest stands change at various rates during different parts of their cycle of growth. On Prince Edward Island, most forest openings and clearcuts quickly grow back in plants. The species of plants that grow back depend on various factors including: the amount of light present, the types of seed that are already mixed in the soil or that fall on the newly exposed soil, the amount of bare soil exposed for this seed and the amount and types of plants that are already present. Some age categories and areas will have many layers of vegetation while others will have only one or two. This variation (diversity) of plant structure allows different animals to locate the optimal conditions for their survival.

Management of Edges

This illustration shows one type of edge, that is, an area where two habitat types meet. Some edges are relatively permanent, such as an agriculture field along a forest, while others are quite temporary, such as a regenerating patch cut. For many years, wildlife managers improved wildlife habitat by increasing the amount of edge because counts of animals in edge habitat are usually higher than in the uniform habitat next to it. As with most wildlife improvement techniques, some animals respond to edge by increasing their numbers (edge responsive species), others decrease in number (edge sensitive), and others stay at the same population (refer to *Animals Sensitive to Edge Management* on page 8).



Animals Sensitive to Edge Management

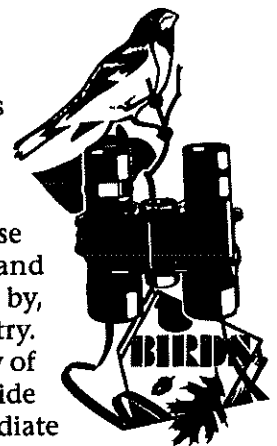
The following bird species that occur on Prince Edward Island were considered to be area (edge) sensitive in the Middle Atlantic States by Robbins *et al* (1989). This table shows whether Robbins *et al* found the birds to increase or decrease in population in response to changes in stand size. (Adapted from Makepeace, S. 1991. Forest Fragmentation and Edge Effects on Forest Breeding Birds of Prince Edward Island.)

Response to Increasing Forest Block (Island) Size		
Species	Increase	Decrease
Red-eyed Vireo	•	
Ovenbird	•	
Veery	•	
Northern Parula	•	
Black-throated Blue Warbler	•	
Black and White Warbler	•	
Northern Waterthrush	•	
Canada Warbler	•	
Rose-breasted Grosbeak	•	
Gray Catbird		•
Common Yellowthroat		•
European Starling		•
American Robin		•
White-breasted Nuthatch	•	
Hairy Woodpecker	•	
Pileated Woodpecker	•	

The presence of these birds on or near edges during the breeding season suggests that they may not be as area sensitive on Prince Edward Island as they are in the mid-Atlantic States. Since these species may require larger blocks of relatively uniform forest than some other birds, some researchers have suggested that clearcuts be 20 or more hectares (50 + acres) in size so that when the forest regenerates or is planted, the resulting stands will be large enough to meet species requirements. Further research and more nest success studies are needed (see page 35).

Identifying Forest Animals and Plants

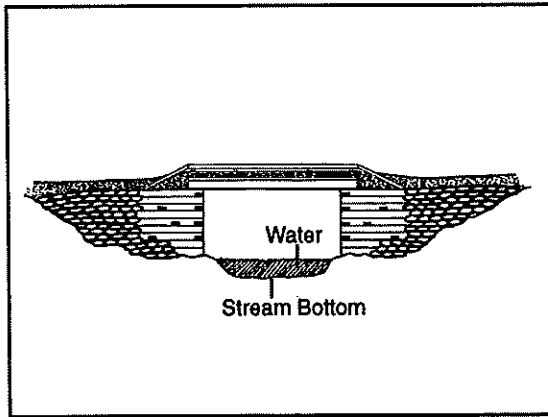
The woodlot owner can learn a great deal about improving his or her woodlands for wildlife by careful observation and record keeping relating to animal and plant response to management treatments. This means that woodlot owners must be able to identify the plants and animals using their woodlands. The reading list at the back of the manual provides the names of some easy-to-use identification books for birds, mammals, fish, amphibians (frogs, toads and salamanders) and woodland plants. Some of these publications are produced by, and available from, the P.E.I. Department of Agriculture, Fisheries and Forestry. Many are available at your local library. In addition, the Natural History Society of Prince Edward Island, the Island Nature Trust, ECOPEI and other groups provide regular meetings, field trips and workshops to assist the beginner or intermediate level naturalist.



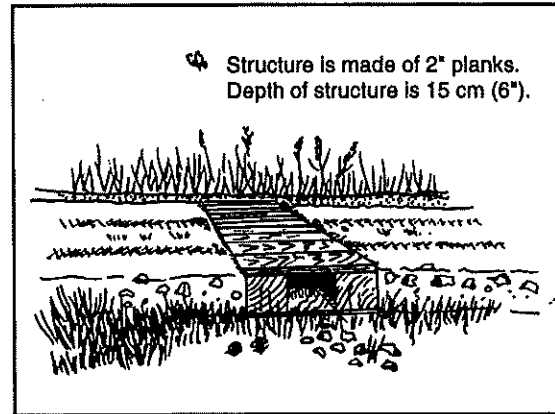
• FOREST ROADS and WETLANDS •

Controlling Erosion

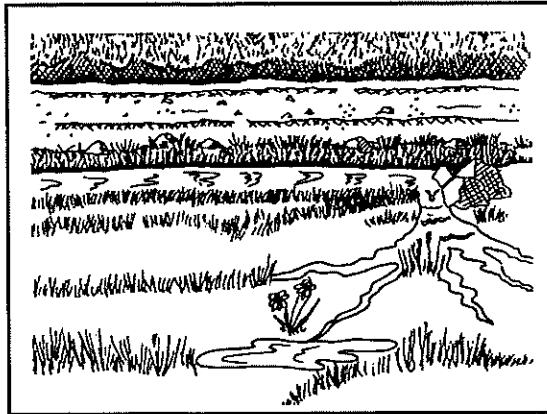
An enduring environmental problem on P.E.I. is soil erosion. As long ago as the 1880s, newspapers ran stories on the problem of Island rivers running red with topsoil. Properly designed stream crossings and woodland roads play a key role in ensuring that operations taking place on your woodland cause minimal soil erosion. Strips of vegetation (buffers) along a stream allow heavier silt particles to settle out into the buffer zone before water enters a stream. On P.E.I., Watercourse Alteration Permits are required for all changes to streams (including stream crossings). The P.E.I. Department of Agriculture, Fisheries and Forestry has designs and standards to help landowners. Some designs are shown below.



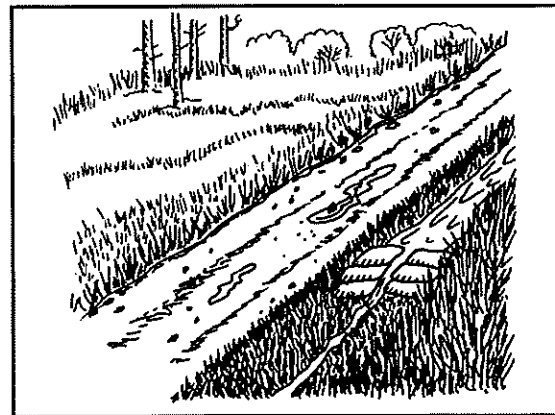
A. A stream crossing with 5:1 sand/cement mix bags arranged in overlapping rows (riprapping) and seeded to prevent erosion around a bridge.



B. Water diversion structures come in a variety of types, from several logs arranged in a depression to the structure shown here. The spaces between the top boards in this type of structure drain water from the road surface, especially from tire ruts. This prevents water speed from increasing and causing large washouts. The bottom of the structure, illustrated above, is made from pressure treated plywood.



C. Ditch run outs should be constructed so water in ditches does not build up excessive volume or increase significantly in speed on long hills. To prevent this from occurring ditches must, wherever possible, empty into natural vegetation and not directly into streams.

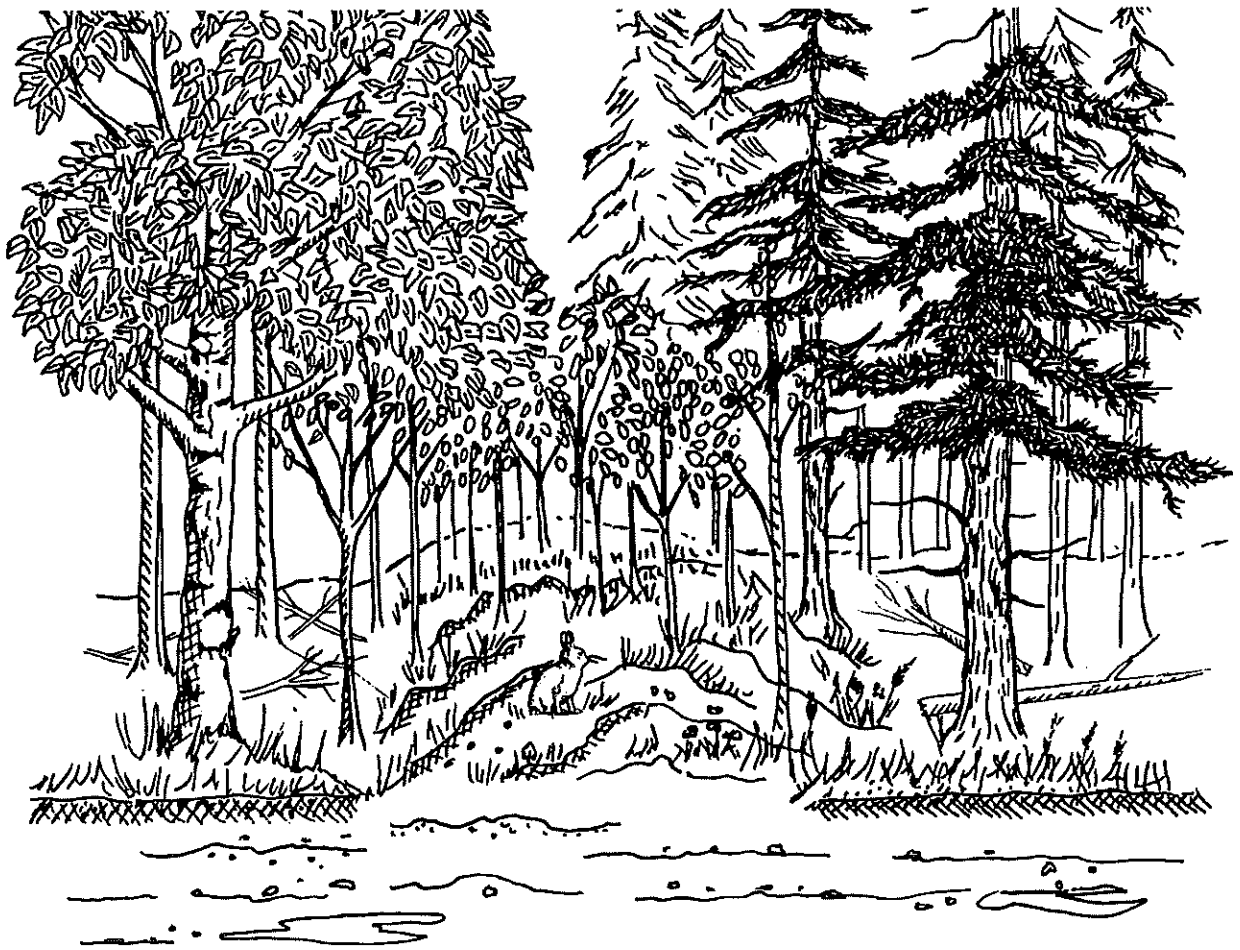


D. Silt traps (holes or dams constructed in ditches) can trap large volumes of silt. They must be cleaned out regularly to be effective. The trap shown in the ditch above is created using bags of 5:1 sand/cement mix.



Bullpens or Push-Off Areas

Organic soils and topsoils are moved off road surfaces to improve the road's capacity to support vehicle traffic. The push-off areas (bullpens) in which the topsoil and tree roots are deposited during forest road bulldozing are very rich in nutrients and are consequently quickly colonized by trees and shrubs. These nutrient-rich bullpens serve as excellent wildlife food production areas. The new shrub and tree seedlings are browsed by snowshoe hare, their berries are eaten by a wide variety of animals including chipmunks, waxwings and robins, and their buds are eaten by grouse and squirrels. Bullpens can also serve as ground nesting or food storage areas for tunneling or cavity-dwelling mammals such as the chipmunk, red squirrel, or red fox. The deep layer of organic material makes these excellent areas for planting food trees such as red oak.

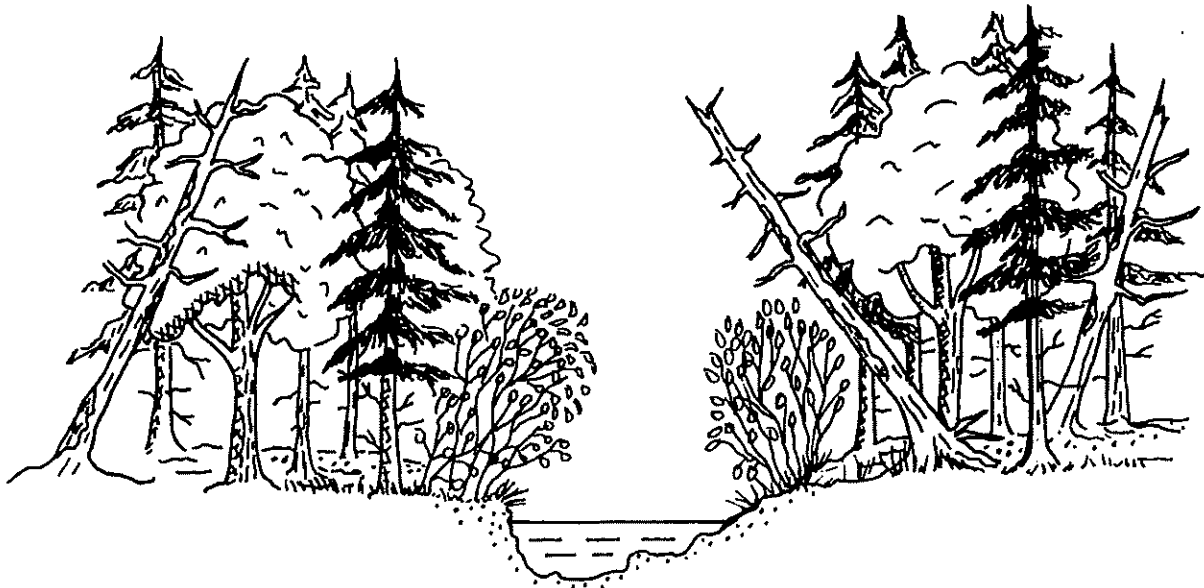


Stream Edge Management

The area along a stream (riparian zone) requires special care because it is normally quite rich in a variety of animal species which live in the water, on the land, and/or on the vegetation of either. Such a buffer: provides shade for the stream which cools the water for trout and salmon and helps to control the plant growth which can trap silt; allows heavier silt particles from water run-off to settle out before run-off enters the stream; serves as wildlife cover and travel corridors; and allows plant material or land and tree dwelling animals such as insects to fall into the stream or be harvested as food by water dwelling animals.

Areas along ponds and streams need more cavity trees because of the presence of Tree Swallows. This species usually feeds on the mosquitoes, blackflies and other flying insects which inhabit this environment. Twenty to thirty cavity trees per hectare (eight to twelve per acre) should be maintained. For example, if the buffer is ten meters wide, two to three cavity trees should exist within each 100 meters of buffer on each side of the stream. Select trees that lean away from the stream or those that are far enough from the banks that they will not enter the water should they fall.

The Department of Agriculture, Fisheries and Forestry has set a buffer width guideline of ten meters (33 feet) plus an adjustment that increases the width as the slope gets steeper (1.5 times the angle of the slope). Log moving equipment used in this area should be restricted to prevent erosion. The Department has developed a number of small scale machines including winches which cause virtually no ground disturbance and allow the harvesting of individual trees from these types of areas. Contact your District Forestry Office or the Forest Extension Section at (902) 368-4700 for information on this equipment.



Seeding or Mulching to Prevent Erosion

Where exposed soil represents an erosion threat to a stream, the area should be sown with a mixture of seeds (e.g. highways road mix) to promote rapid plant development. A rain droplet can hit the soil at speeds in excess of 50 km/hr (30 mph). Thus the spreading of a hay or straw mulch is helpful in preventing rain drops from disturbing the soil. In addition, the mulch will shelter the seeds and even promote germination and seed growth.



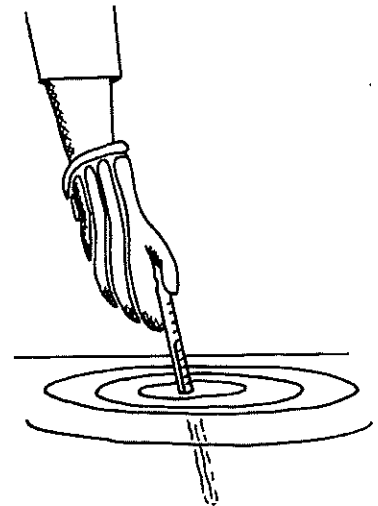
A. Seeding exposed soils



B. Laying a straw or hay mulch

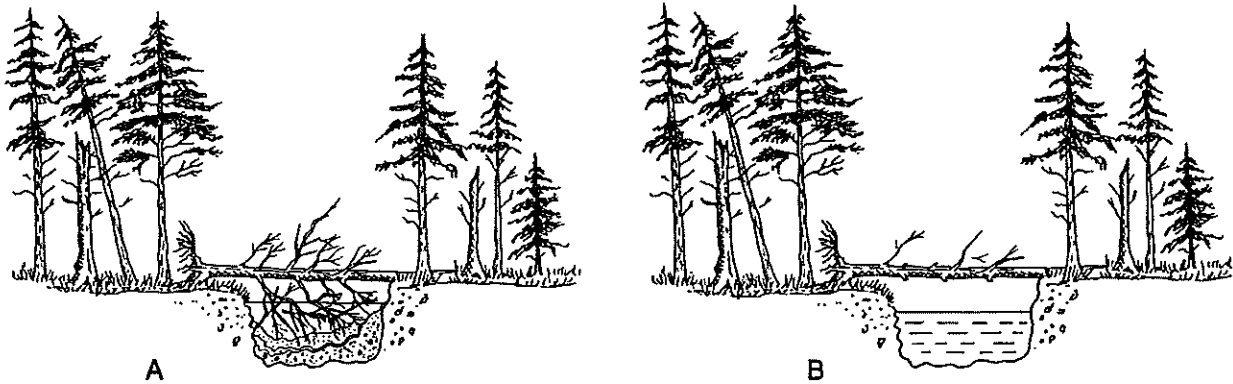
Water Temperature

Water temperature is extremely important to trout and salmon as well as many other water dwelling organisms. Trout and salmon can die if exposed to stream temperatures of 30° C. Fortunately, almost all streams on the Island are spring fed and most are quite cool. To determine how sensitive your stream is, keep a water temperature record throughout the summer and into the early fall. If water temperature exceeds 25° C, harvesting decisions along the stream should be restricted.



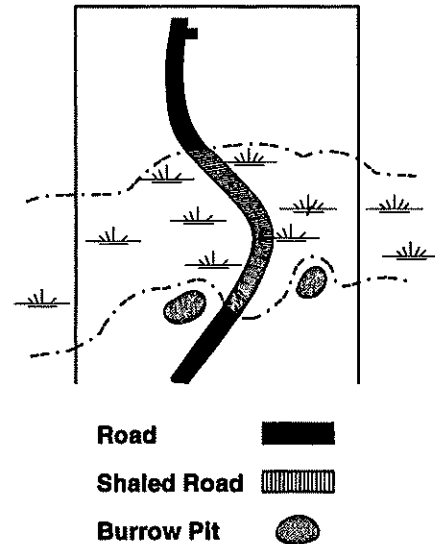
Stream Cross-over Logs

Cross-over logs are important travel routes for some animals such as the red fox and the red squirrel. Logs which have heavy branches in the water (see A below) tend to trap debris and silt which removes trout and salmon spawning habitat. Trimming these bottom branches (see B below) prevents silt from damming, but still allows cross-over. Logs which are clear of branches and located near the bank may provide important cover and pool creation features to a stream. Before you undertake any cleanup of material in a stream or wetland you require a Watercourse Alteration Permit from the Department of Environmental Resources. If the stream is used by people in canoes or small boats, ensure that there is sufficient clearance to allow these boats under, or around the log. In this case, be very sure that the cross-over log cannot fall and trap a boater.



Ponds for Salamanders, Frogs and Other Wildlife

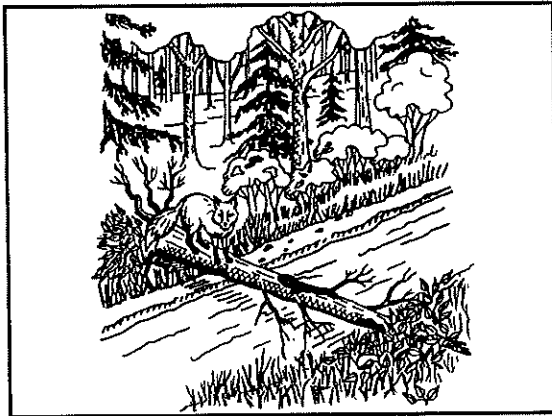
Often during road construction a wet surface area is encountered. Shale is required to build-up the road over this type of terrain. If the shale is excavated from your property, and if the water there is not too acidic, it may be possible to construct a burrow pit (the excavation area from which shale or fill is removed) for frog, toad and salamander breeding. Landowners are cautioned that this may increase the mosquito population. Care should be taken in construction technique and in design to ensure that the pit does not become a potential hazard. Children should always be supervised when near such a pit. A permit from the Department of Environmental Resources is required if this type of project is undertaken in a wetland.



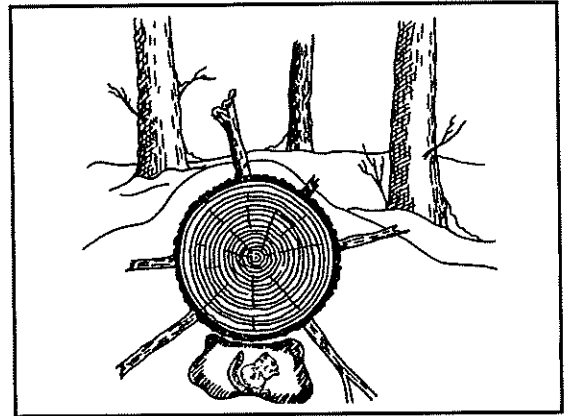
• COVER, NESTING and SPECIAL NEEDS of FOREST WILDLIFE •

Cover for Animals

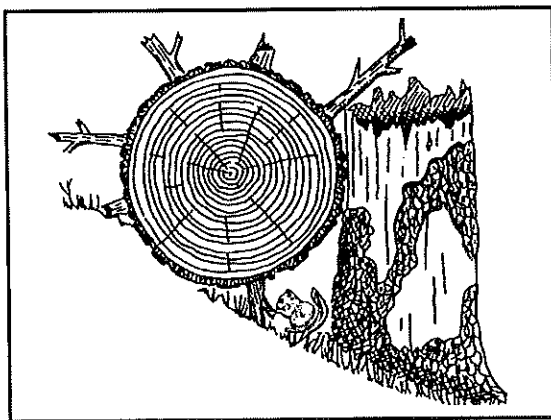
When moving from one area to another in the woodlot, many species of animals make use of existing plant life to provide cover. The routes that they frequently use are called travel corridors and an effort should be made to maintain these pathways during the management of the woodlot. These areas of cover also serve as hiding spots (escape cover) and nesting areas for many animals.



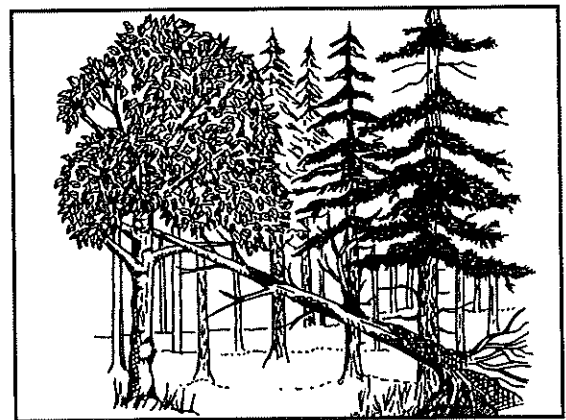
A. A stream buffer with heavy ground vegetation serves as a travel route (corridor) for many animals including the red fox, mink and raccoon.



B. A log which is lying off the ground retains a snow free area under the trunk and heavy branches. These snow tunnels serve as travel corridors for red squirrels and other winter-active small mammals. This undersnow habitat is called subnival habitat. When extreme cold prevails, the air temperature in this habitat can be a balmy few degrees below freezing.



C. The cavity created by the accumulation of leaves and branches on the upper side of a log lying across a slope serves as a good travel corridor for small mammals such as the red-backed vole.

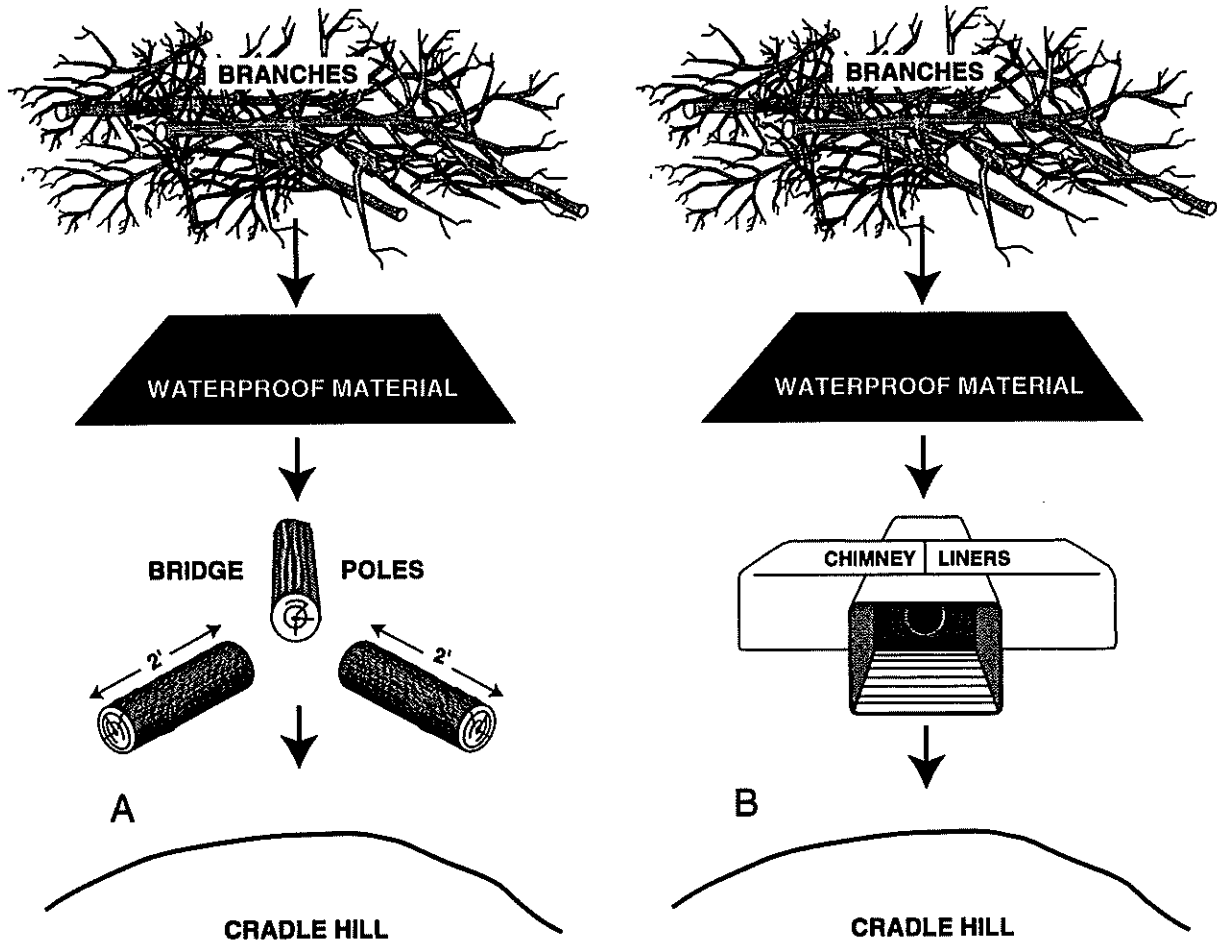


D. A windthrown tree which has become caught in the crown of an adjacent tree (referred to as lodged) can serve as a travel path for tree dwelling mammals such as the flying squirrel. The only windthrown trees which should be retained are those which are securely lodged and located away from areas frequented by people.



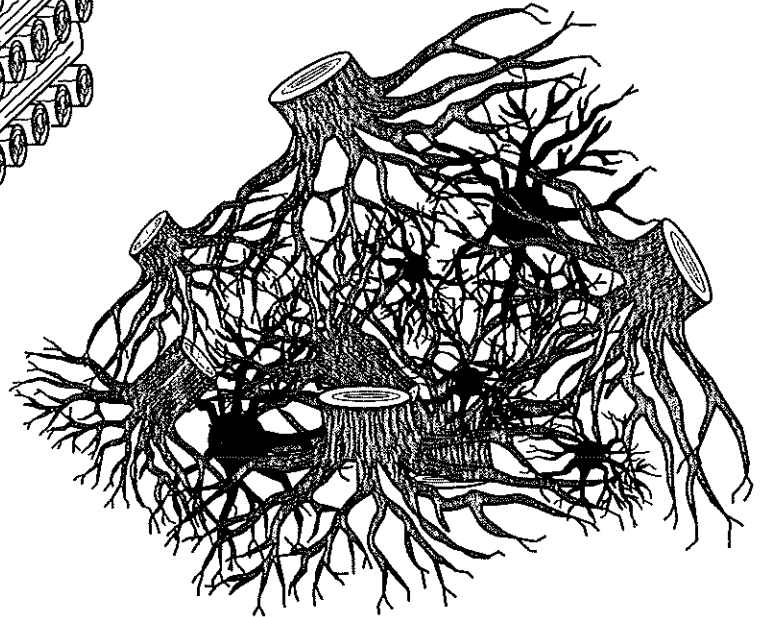
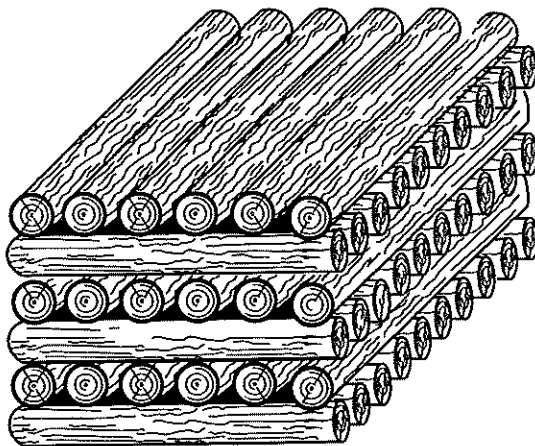
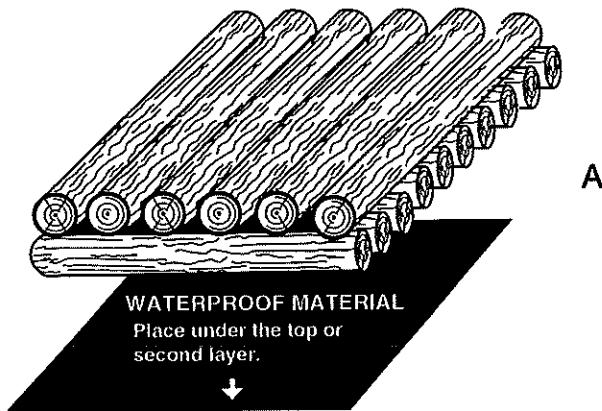
Artificial Cover Piles

Artificial cover areas can be created by establishing brush piles (refer to A or B). The tops of raised areas (referred to as cradle hills or hummocks) should be used for these structures so that heavy rains and spring snow melt do not flood out the animals using them. As an alternate technique, piles or deep rows of field stone can be useful to small mammals and snakes.



Butterfly, Moth and Salamander Improvements

Artificial nesting areas for butterflies and moths can be created by piling cut wood (A below) or stumps (B below). This illustration is modeled after demonstrations seen at the butterfly garden created by Mr. Bernard Jackson at the Oxen Pond Botanical Gardens in St. John's, Newfoundland. The bottoms of these piles are utilized by salamanders for feeding and resting areas. As the logs and stumps decompose, they are used as nesting habitat for the eastern redback salamander.

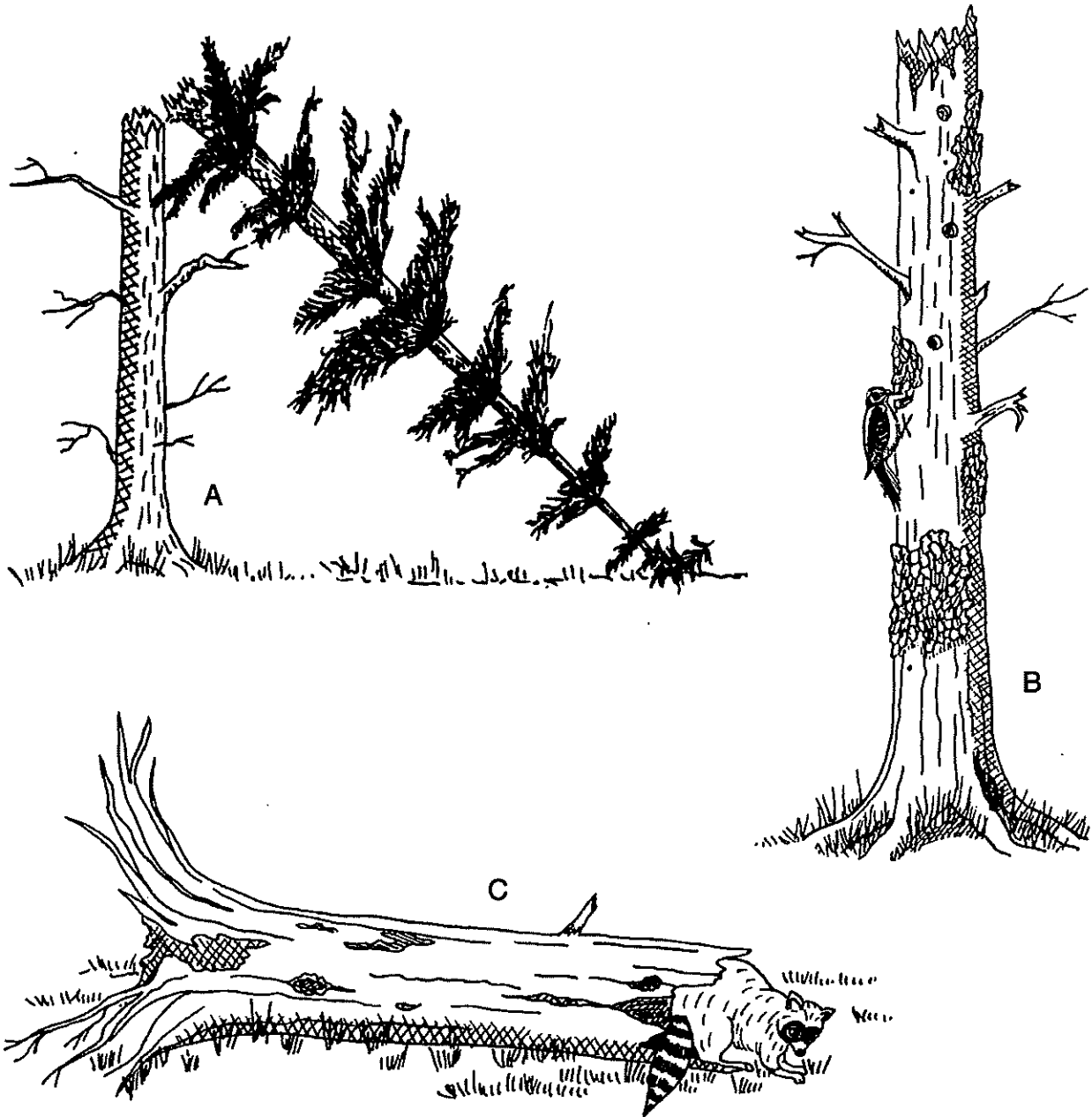


B



Snags—The Value of Dead Trees to Wildlife

Snags are created by the death and slow decomposition of trees. One manner in which snags develop is illustrated below. A living tree (which cannot resprout) is broken in a windstorm (A below). As time progresses, the bark of the snag gradually falls off, or is chipped off by three-toed woodpeckers. During this time period the snag is occupied by primary excavators, species which dig cavities in trees (e.g. birds such as the Common Flicker or Yellow-bellied Sapsucker). Eventually, secondary cavity users such as Tree Swallows or bats move into these cavities (B below). Ultimately the snag collapses to the ground (C below) where it serves as habitat for many species including salamanders and soil borne decomposing organisms. Larger snags are usually helpful to a greater number of animals than are smaller snags.



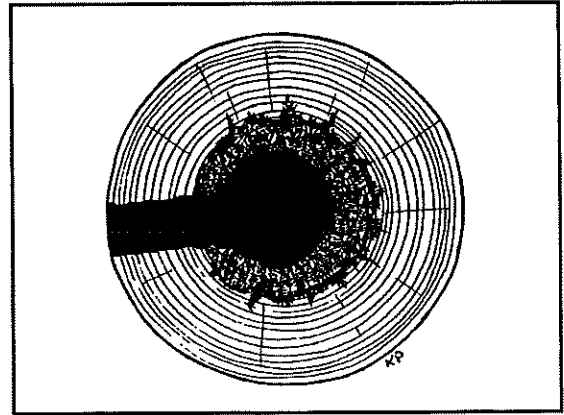
Cavity Trees and Snags in Clearcuts

A wide variety of birds and mammals utilize tree cavities for nesting, resting, roosting, and/or food storage. Both living and dead trees are used by some cavity excavating birds while others may use only one type. Normally these trees are larger than 10 cm (4") in diameter at shoulder height and taller than 1.8 m (6 ft).

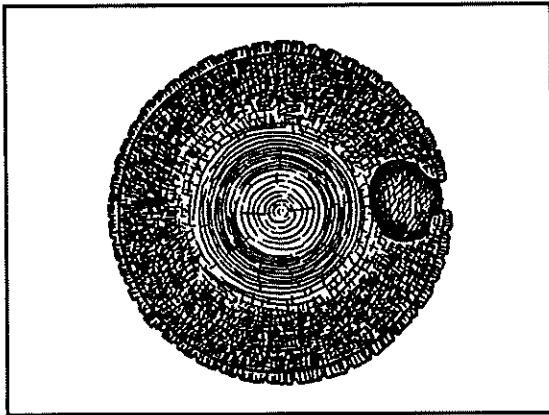
For average population levels of local cavity-using birds and mammals, at least six to eight cavity trees per hectare (two to three per acre) are needed. More should be left near water courses, especially ponds, or if the landowner is really interested in maintaining animals encouraged by cavity trees. Some landowners leave 20 or more cavity trees per hectare. Snags should not be left in places where they might fall on people, structures or equipment.



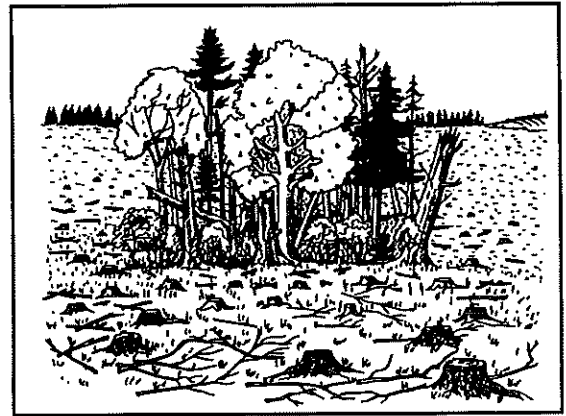
A. Nesting cavities are often excavated in living trees by woodpeckers such as the Yellow-bellied Sapsucker or Northern Flicker. These holes are later used for nesting, roosting and hibernating by a wide variety of wildlife.



B. A case hardened snag is hard on the outside and rotten in the center. Woodpeckers usually create the initial nesting cavity, although some are formed by bark damage and rot.



C. A soft snag rots from its surface towards the center creating ideal cavity excavating conditions for Chickadees and Nuthatches, species without the strong bill necessary to chip through a case hardened snag.

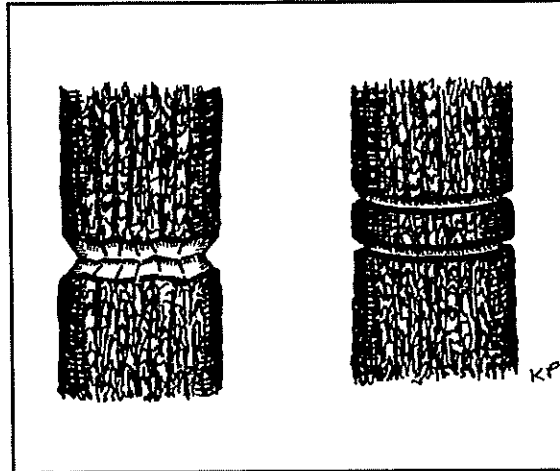


D. Some habitat managers select and keep blocks of live and dead trees containing actively used snags in cut areas. This allows new trees to replace the loss of snag trees through collapse. It also provides cover around the snag allowing various birds and mammals to approach their nest cavities without being observed.



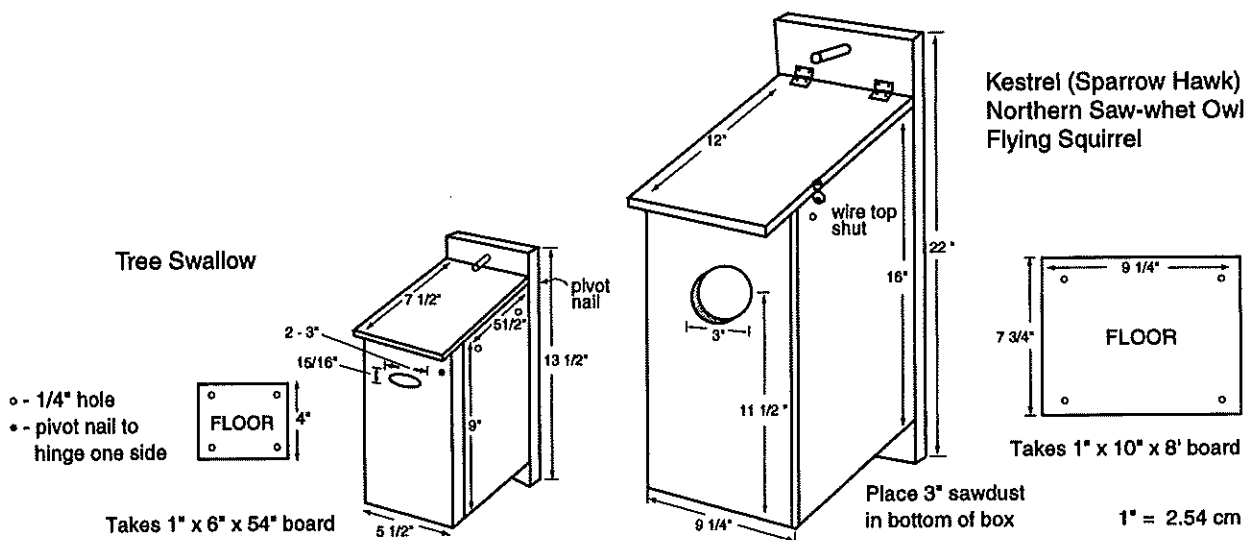
Creating Snags by Girdling

Younger stands of trees often have few if any snag trees. If no snags are close to, or in the stand, it is sometimes useful to create artificial snags either by girdling or herbiciding a living tree. Girdling involves chopping a shallow ring of bark one to three inches wide or making two parallel saw cuts completely around the stem of the tree. The cuts must go through the inner bark into the sapwood or the tree may heal over the cut. The cut must also be shallow enough to prevent the weakening of the stem. Some individuals prefer to use herbicides to kill individual trees for snags since they do not weaken the stem. Select at least six to eight trees for snag creation per hectare (two to three per acre) in areas away from dwellings, roads and pathways, so that the tree can slowly die and safely drop its branches. Different species of trees develop into snags over varying periods of time. The species of tree also influences the length of time the snag will last.



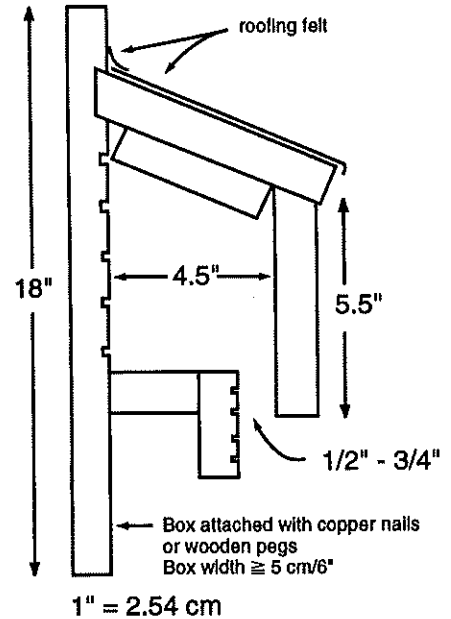
Nest Boxes—Substitutes for Cavity Trees

Nest boxes or roosting boxes are useful habitat improvement features in areas with few, or unsuitable, natural cavities. Roosting boxes have their entrance holes near the bottom of the side or front and are used by certain resting birds, mammals and other animals. The size and sometimes the shape of the entrance hole is quite important in attracting the bird or mammal you desire (refer to *Nest Box Sizes for Different Forest Animals* on page 20). Nest boxes require regular cleaning to prevent parasite build-up. After the nests are abandoned and you have ensured that wasps are not using the nest box, remove the nesting material using rubber gloves and spray the inside of the box with a 10% clorox (bleach) and water mixture. If you attach the nest box or roosting box to a tree which may eventually be cut, it is advisable to use a wooden dowel. When hit by a saw, steel or galvanized nails or screws used to attach a nest box can seriously injure a sawmiller or damage their milling equipment. Additional nest box designs are provided in books on the reading list. However, before building any box, review the "Field Checklist of Birds for Prince Edward Island" to see if that species breeds locally.



Nest Boxes for Bats

Bats can be harder to attract than birds, and they require a different type of nest box. The illustration shown here depicts the European style of bat box as promoted by the Forestry Commission in Great Britain. Plans for a larger box are available from Bat Conservation International c/o Milwaukee Public Museum, Milwaukee, Wisconsin, USA 53223. In bat houses, all inside surfaces and the area near the entrance should be rough so that the bats can crawl up the surface. If planed lumber is used, roughen inside surfaces with chisel or saw cuts. Bats require warmth (26-38° C, 80-100° F) in the breeding colonies to raise their young. Place the bat box in a location that has morning sun and afternoon shade. The box should be sheltered from the wind and approachable via an unobstructed flight path. The nest box should be 6+ meters (20+ feet) above the ground. Paint it black or cover the top and part of the sides with tarpaper to help maintain the appropriate temperature.



Nest Box Sizes for Different Forest Animals

Nest Box Dimensions for Various Woodland Birds and Mammals on Prince Edward Island

Place the entrance hole away from winter winds for species that over-winter. (Adapted from C.L. Henderson, 1987; R.W. Tufts, 1986; CWS "Nest Boxes for Birds", 1977)

Species	Entrance Size cm/in	Entrance Shape	Internal Box Dimensions			Installation Height m/ft
			Width cm/in	Height* cm/in	Depth cm/in	
Chickadee	3.20 cm 1.25 in	Circular	10.00 cm 4.00 in	18.50 cm 7.25 in	14.00 cm 5.50 cm	3.6 - 6 m
Nuthatch						12 - 20 ft
Deer Mouse**						1 - 1.3 m
White Footed Mouse**						3 - 4 ft
Barn Swallow	Shelf style nest	No front	16.50 cm 7.50 in	20.00 cm 8.00 in	17.50 cm 7.00 in	2 - 4 m
American Robin						6 - 13 ft
Barred Owl	17.50 cm 7.00 in	Circular at top, rounded corners at bottom	33.00 cm 13.00 in	56.00 cm 22.00 in	29.00 cm 11.50 in	6 - 9 m 20 - 15 ft
Little Brown Bat***	0.75 in	Rectangular slot in the bottom	18.50 cm 7.25 in	28.50 cm 11.25 in	10.80 cm 4.25 in	3.6 - 4.6 m 12 - 15 ft

* Remember to allow space on the back to attach the nest box to a pole or tree.

** If mice utilize a nest box, they may defend their home by killing a bird that enters.

*** All inside surfaces and the area near the entrance should be rough. If planed lumber is used, roughen the inside surface with a chisel or saw. Place box where it will obtain morning sun and paint it black or cover the top and part of the sides with tarpaper.

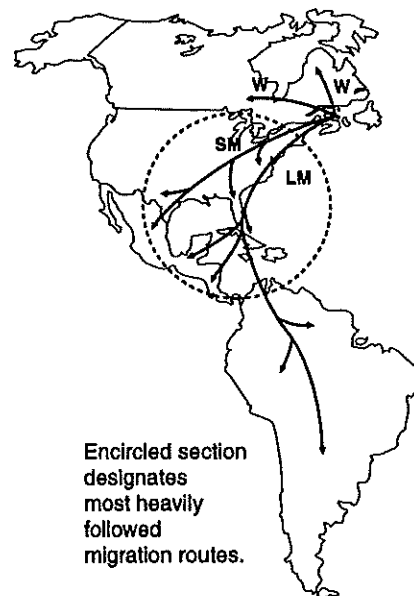


Resident and Migratory Forest Animals

Certain bird species stay on the Island all year while others migrate short or long distances. Some species also come to Prince Edward Island to over-winter. Even some insects migrate long distances each year (e.g. Monarch butterfly). These migratory species must find suitable habitat in their winter home if they are to return to the Island to either breed or over-winter in the future. The wildlife improvements you make must be supported by similar ones throughout the flight path regions and in the off-season destinations. In the table below, LM = long distance migrant (neo-tropical), R = resident species, SM = short distance migrant (Nearctic), and W = migrates to P.E.I. and elsewhere to over-winter. The birds are listed in the order of the Field Checklist of Birds of Prince Edward Island (Edition 5).

Species	Migration Code
Cormorant	SM, LM
Great Blue Heron	SM
American Black Duck	R, SM
Wood Duck	SM, LM
Hooded Merganser	SM
Northern Goshawk	R
Sharp-shinned Hawk	R, SM
Red-tailed Hawk	R, SM
Bald Eagle	R, SM
Northern Harrier	SM
Osprey	LM
Merlin	SM, LM
Kestrel	SM, LM
Ruffed Grouse	R
Ring-necked Pheasant	R
Gray (Hungarian) Partridge	R
Killdeer	SM, LM
American Woodcock	SM
Willet	LM
Herring Gull	R
Great Horned Owl	R
Barred Owl	R
Long-eared Owl	R
Northern Saw-whet Owl	R
Common Nighthawk	LM
Chimney Swift	LM
Ruby-throated Hummingbird	LM
Belted Kingfisher	SM, LM
Northern Flicker	SM, LM
Pileated Woodpecker	R
Yellow-bellied Sapsucker	SM, LM
Hairy Woodpecker	R
Downy Woodpecker	R
Black-backed Woodpecker	R
Eastern Kingbird	LM
Eastern Phoebe	SM, LM
Yellow-bellied Flycatcher	LM
Alder Flycatcher	LM
Least Flycatcher	LM
Eastern Wood Peewee	LM
Olive-sided Flycatcher	LM
Tree Swallow	SM, LM
Gray (Canada) Jay	R
Common Raven	R
American Crow	R, SM
Black-capped Chickadee	R
Boreal Chickadee	R
White-breasted Nuthatch	SM, R

Species	Migration Code
Red-breasted Nuthatch	R, SM
Brown Creeper	SM
Winter Wren	SM
Gray Catbird	SM, LM
American Robin	SM
Hermit Thrush	SM, LM
Swainson's Thrush	LM
Veery	LM
Golden-crowned Kinglet	SM
Ruby-crowned Kinglet	SM, LM
Bohemian Waxwing	W
Cedar Waxwing	SM, LM
Northern Shrike	W, SM
European Starling	R
Solitary Vireo	SM, LM
Red-eyed Vireo	LM
Philadelphia Vireo	LM
Black-and-white Warbler	LM, SM
Tennessee Warbler	LM
Nashville Warbler	LM
Northern Parula	LM, SM
Yellow Warbler	LM
Magnolia Warbler	LM
Cape May Warbler	LM
Yellow-rumped Warbler	SM, LM
Black-throated Blue Warbler	LM
Black-throated Green Warbler	LM
Blackburnian Warbler	LM
Chestnut-sided Warbler	LM
Bay-breasted Warbler	LM
Blackpoll Warbler	LM
Pine Warbler	SM
Palm Warbler	SM, LM
Ovenbird	LM, SM
Northern Waterthrush	LM, SM
Mourning Warbler	LM
Common Yellowthroat	SM, LM
Wilson's Warbler	LM
Canada Warbler	LM
American Redstart	LM
House Sparrow	R
Bobolink	LM
Eastern Meadowlark	SM, LM
Red-winged Blackbird	SM, LM
Northern Oriole	LM
Rusty Blackbird	SM
Common Grackle	SM
Brown-headed Cowbird	R, SM, LM



Encircled section designates most heavily followed migration routes.

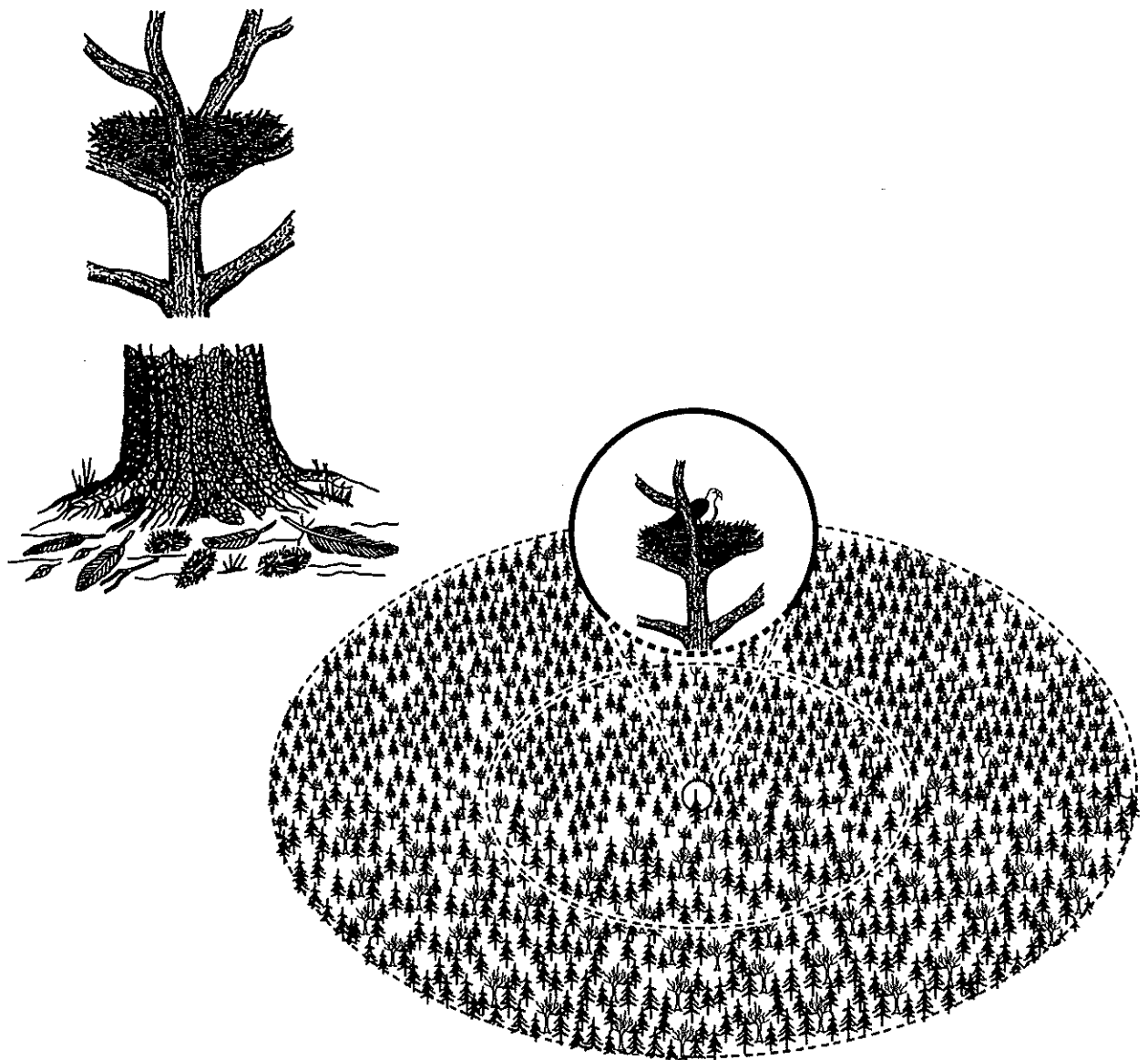
Species	Migration Code
Scarlet Tanager	LM
Rose-breasted Grosbeak	LM
Evening Grosbeak	R, SM
Purple Finch	R, SM
Pine Grosbeak	W, R
Common Redpoll	W
Pine Siskin	R
American Goldfinch	R, SM
Red Crossbill	R, SM
White-winged Crossbill	R, SM
Savannah Sparrow	SM, LM
Vesper Sparrow	SM
American Tree Sparrow	W
Chipping Sparrow	SM, LM
White-throated Sparrow	SM
Fox Sparrow	SM
Northern Junco	SM
Lincoln's Sparrow	SM, LM
Swamp Sparrow	SM
Song Sparrow	SM
Lapland Longspur	W
Snow Bunting	W



Helping Hawks and Owls

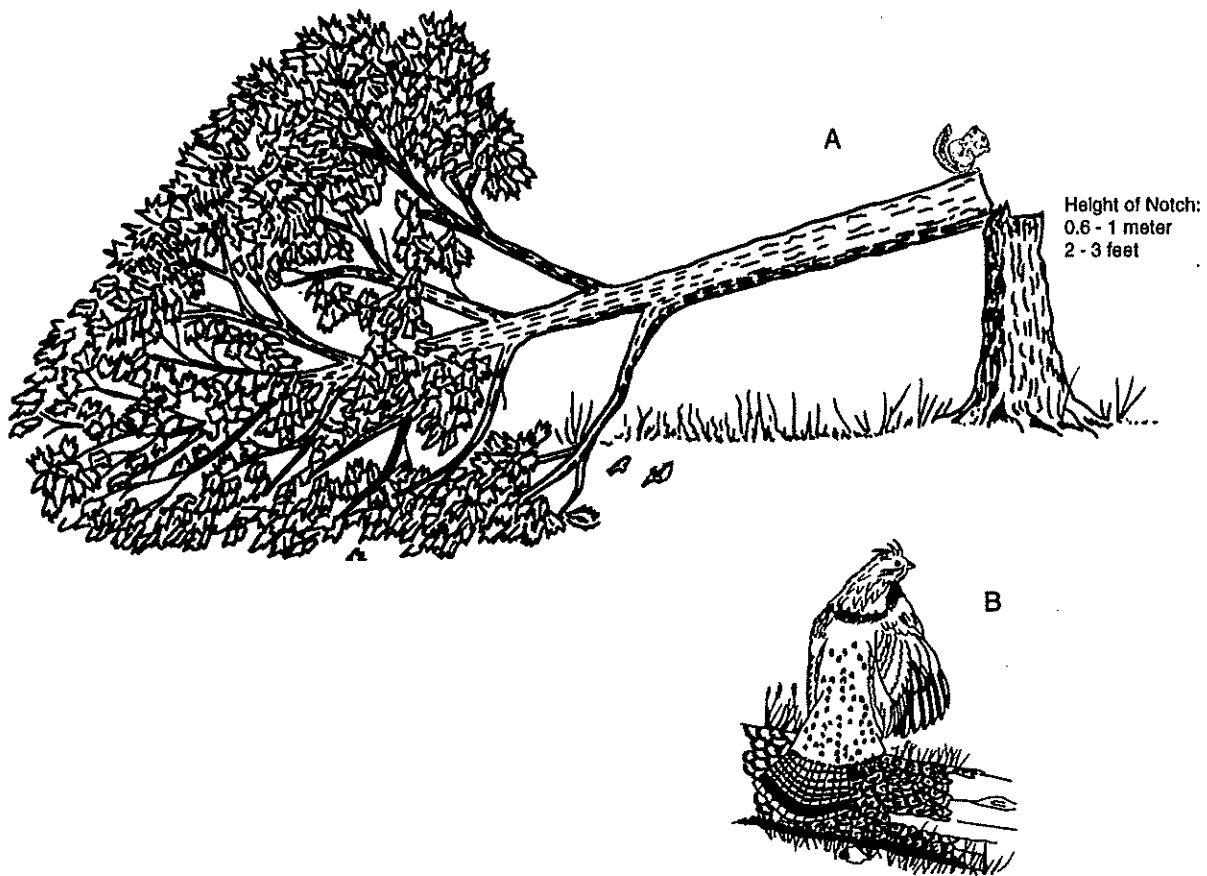
Landowners should check their woodlands during the nonbreeding season for stick nests with nest diameters of 40 cm (16") and up, as well as the feeding signs of hawks and owls. If a large stick nest is located, look for bones, feathers, or owl pellets (regurgitated clumps of indigestible objects such as bones and beetle wing-covers) beneath the tree. Infections may be contracted from owl pellets so they should not be handled. Hawks and owls are sensitive to disturbance during the nesting season so avoid the nesting area once their presence has been confirmed. Some hawks and owls are also quite protective of their nests and may attack intruders. If possible, report the nest information using the card shown on page 35.

Avoid tree harvesting operations within 100 meters (330 feet) of a hawk or an owl nest while it is occupied. This distance should be even greater for some species. Only partial cutting should take place within a further 50 to 100 meters (160 to 330 feet) of a nest which is being used year after year.



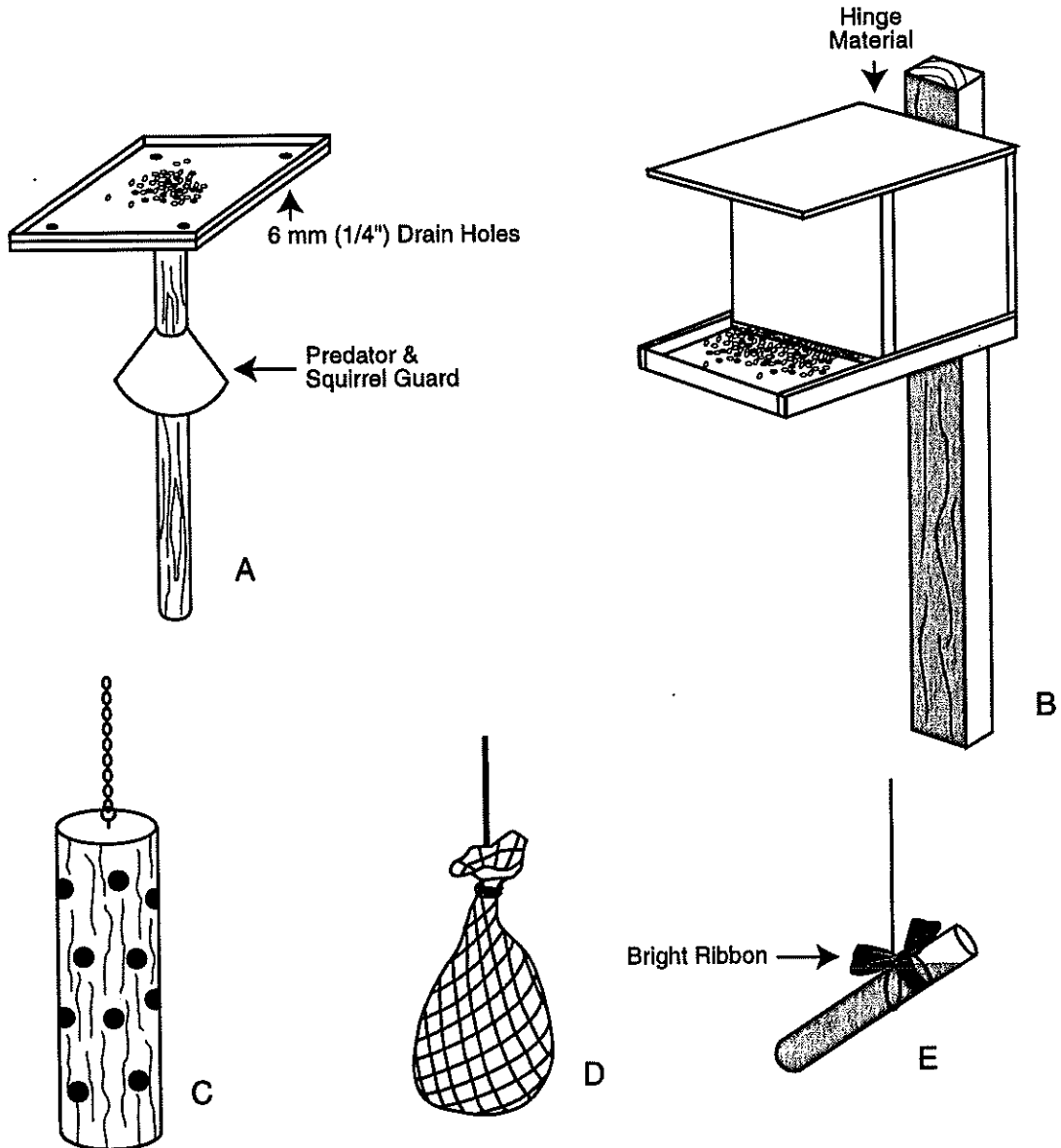
Display and Viewing Logs

Certain species of wildlife use raised logs as display areas (e.g., Ruffed Grouse), or as watching platforms (e.g., the red squirrel). The hinge tree (illustrated below) is created using small topped trees less than 15 to 20 centimeters (6 - 8") in diameter in appropriate habitat for the species you hope to attract. In stands where large limby trees are available, the tree can be felled by cutting close to the ground and the branches on the lower side of the stem can be used to keep the trunk raised off the ground. In the illustration below, (A), a red squirrel uses the log for a viewing platform. In (B) a Ruffed Grouse employs a drumming log for display in a woods opening. When the trees are felled, ensure that they are not located where they will create obstacles to travel in the woodlot.



Various Types of Bird Feeders

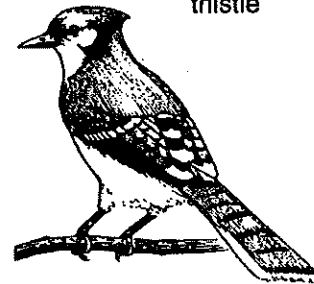
Many landowners feed birds on Prince Edward Island. The illustrations below show a tray feeder (A), a hopper type feeder (B), a suet log (C), a suet bag (D), and a homemade hummingbird feeder (E). To attract the largest number of species possible in your area you should provide a variety of feed types in a variety of ways. *Feeding Birds in Winter* on page 25 provides information on the food preferences of a number of birds that over-winter on Prince Edward Island. You can obtain more information on this topic by consulting the references at the back of this manual or by attending one of the evening workshops provided periodically by the Island Nature Trust and the Natural History Society of Prince Edward Island.



Feeding Birds in Winter

Food Preferences of Some Birds Which Over-winter on Prince Edward Island

	Sunflower Seeds	Cracked Corn	Beef Fat Suet	Berries & Fruit	Other Tempting Edibles
Red-breasted Nuthatch	•		•		
Black-capped Chickadee	•		•		thistle
Common Redpoll	•	•			oatmeal
White-breasted Nuthatch	•		•		
House Sparrow	•	•			grain
Downy Woodpecker			•		
Evening Grosbeak	•			•	
Bohemian Waxwing				•	
Blue Jay	•	•	•	•	grain
Ring-necked Pheasant		•			grain
Grey or Hungarian Partridge		•			grain
American Goldfinch					thistle
American Tree Sparrow		•			
Northern Junco		•			



Thistle = Niger seed



• PREDATION •

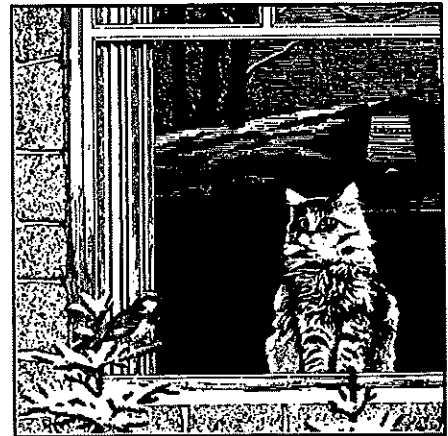
Cowbird Predation

The Cowbird is often found near forest edges created by people. This bird lays its eggs in the nests of other birds, sometimes removing an existing egg from the nest it chooses. In addition, when the Cowbird hatches, it often pushes the other eggs or young out of the nest where they will be abandoned. When this doesn't happen, the Cowbird's larger, brightly coloured mouth attracts the nest owner's attention and as a result it gets the majority of the food brought to the nest. In the southern and central United States this bird destroys the young of between 24 and 83% of the nests near forest edges. Fortunately, in the Maritimes, it occurs in less than 8% of the nests (Makepeace, 1991). Biologists need the assistance of landowners in reporting nest predation by Cowbirds (use the card shown on page 35) so that changes in this rate can be detected.



Unnatural Predators - Cats and Dogs

A number of animals are directly associated with people or their activities in the forest. Cats and dogs which are allowed to run free in your woodland, even for short periods of time, frequently kill or disturb wild animals. They should never be released to the wild as they become feral (wild) animals which feed on the local wildlife, especially birds during their breeding season.

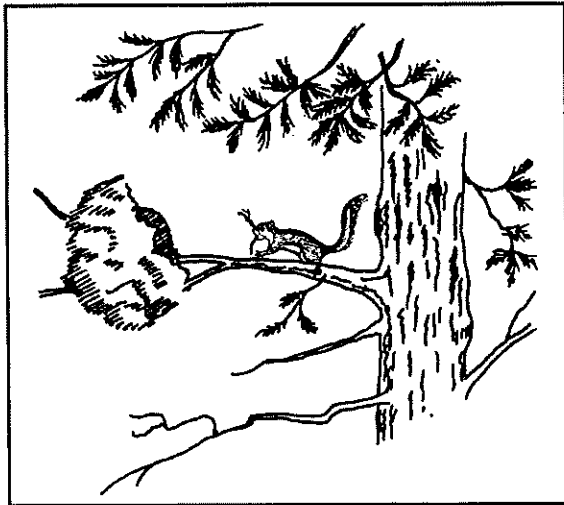


• FOREST IMPROVEMENT TECHNIQUES for WILDLIFE •

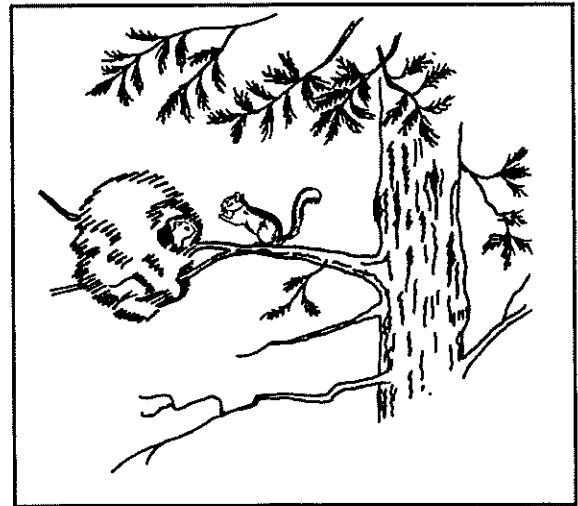
Timing Forest Harvesting Operations for Wildlife

Wildlife use of forests often varies with the season. Male and female red squirrels each defend their individual territories except during spring mating chases. They construct spherical leaf and grass nests for resting during the warmer parts of the year.

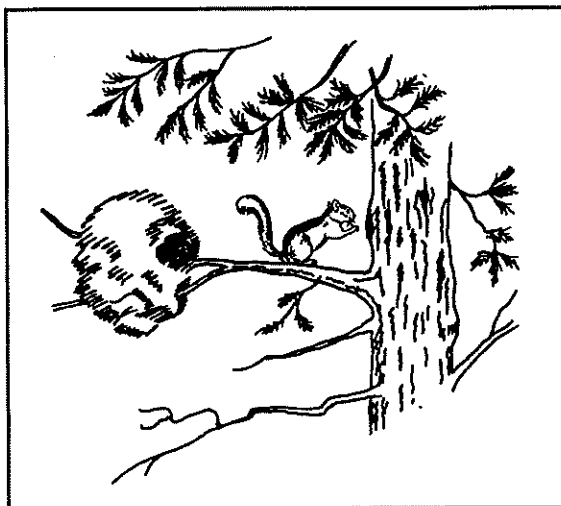
Unfortunately it is almost impossible to stop forestry harvesting operations during the nesting season of wildlife since the work season on P.E.I. is so short. However, if the wildlife in your woodlot is of primary concern, harvesting operations or burning should be avoided during the nesting or hibernating season. To prevent high maintenance costs and reduce erosion, forest roads should not be used in the spring when they may become rutted. Harvesting operations should be planned for late summer and autumn. If no occupied cavity trees are present, this time frame can be extended to include early winter since Great Horned Owls do not start establishing nesting territories until February or March.



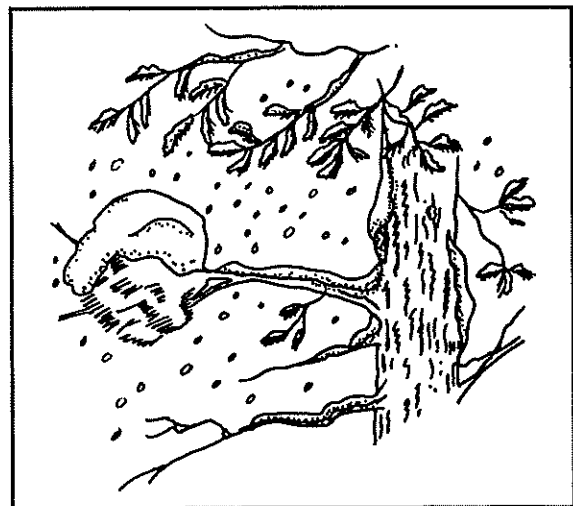
Spring



Summer



Fall



Winter



Planting to Prolong Seed and Berry Availability

The amount of seed or berries produced by a tree, shrub, or ground plant varies (often dramatically) from year to year. It is normally 6 to 12 years between bumper crops of red oak acorns and 3 to 5 between bumper cone years in white spruce. Softwood cones, excluding balsam fir (var), open slowly on the tree as they dry and drop their seed. Balsam fir (var) cones fall apart several weeks after they ripen. By careful selection of the species to be planted and the planting locations, landowners can provide a variety of seed and berry types during much of the year. The information in the chart below provides an estimate of the time frame in which seed will be available to seed-eaters and may prove helpful in planning your selections.

Some animals move the seed they collect to storage or hiding areas as the seed comes to full maturity. For example, in storing cones the red squirrel employs underground or in-tree storage areas which tend to have high air-moisture content. This moisture prevents the cones from opening, the seeds from falling out, or the cone from falling apart. Conversely, red squirrels store mushrooms and apples in branch forks of trees where they are preserved by drying. Both methods of storage ensure that the food supply is available for longer periods of time.

PLANT	MONTH DURING WHICH SEEDS ARE PRESENT											
	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Red Maple	█	█										
Elderberry			█	█	█							
Pin Cherry					█	█						
Choke Cherry					█	█						
Wild Pear					█	█						
Witherod (Viburnum)					█	█						
Balsam Fir (Var)					█	█						
Eastern Larch (Juniper)					█	█						
Hazelnut						█	█					
Witherod						█	█					
Mountain Ash						█	█	█	█	█	█	█
Red Pine							█	█	█			
White Pine							█	█	█			
White Spruce							█	█	█			
Bayberry							█	█	█	█	█	█
Alder							█	█	█			
Red Oak							█	█	█			
White Oak							█	█	█			
Butternut							█	█	█			
Wild Rose							█	█	█	█	█	█
Beech							█	█	█			
Hawthorne							█	█	█	█	█	█
Black Spruce							█	█	█	█	█	█
Austrian Pine								█	█	█	█	█



Wildlife Values of Some Trees and Shrubs

The feeding habits of animals determine which plants either can or will be used as food sources. Many birds which are thought of primarily as insect eaters, will eat fruit, seed, or other plant parts when they are available. For example the Tree Swallow eats bayberries during cold snaps in the spring and the Eastern Kingbird eats the fruit of cherries, elderberry and other plants. In addition to the plants themselves, the insects, spiders, fungi (e.g. mushrooms), and other organisms that live on the plants or in the surrounding soil, are fed on by many species. The value of certain plants for some common animals on Prince Edward Island are listed below. (Information adapted from R.M. DeGraaf and G.M. Witman, 1979; T.A. McElroy Jr., 1985; author's observations and reports in *Island Naturalist*.)

	Rufed Grouse	Ruby-throated Hummingbird	Northern Flicker (Woodpecker)	Yellow-bellied Sapsucker (Woodpecker)	Tree Swallow	Blue Jay	Black-capped Chickadee	Red-breasted Nuthatch	American Robin	Kinglets	Bohemian Waxwing	Cedar Waxwing	Rose-breasted Grosbeak	Evening Grosbeak	American Goldfinch	White-winged Crossbill	Snowshoe Hare	Red Squirrel	Eastern Chipmunk	Red-backed Vole (Mouse)	Beaver	
Balsam Fir (Var)																						
Larch (Juniper)																						
White Spruce																						
Red Pine																						
White Pine																						
Elderberry																						
Rose																						
Staghorn Sumac																						
Bayberry																						
Hawthorne																						
Red Maple																						
Yellow Birch																						
White Birch																						
American Beech																						
Butternut																						
Apple																						
Trembling Aspen																						
Pin Cherry																						
Choke Cherry																						
Red Oak																						
Mountain Ash																						
Alder																						
Service Berry																						
Bunch Berry																						
Red-osier Dogwood																						
Hazelnut																						

Food Source Key

- Browses sprouts or bark
- Catkins
- Flowers
- Nut or nutlet
- Feeds on nut opened by another animal
- Eats buds
- Fruit
- Leaves
- Seed
- Sap

Other birds that feed on berries include:

Eastern Kingbird, Hairy and Downy Woodpeckers, Thrushes, Red-eyed Vireo, White-throated Sparrow, Song Sparrow, Tree Sparrow, etc.

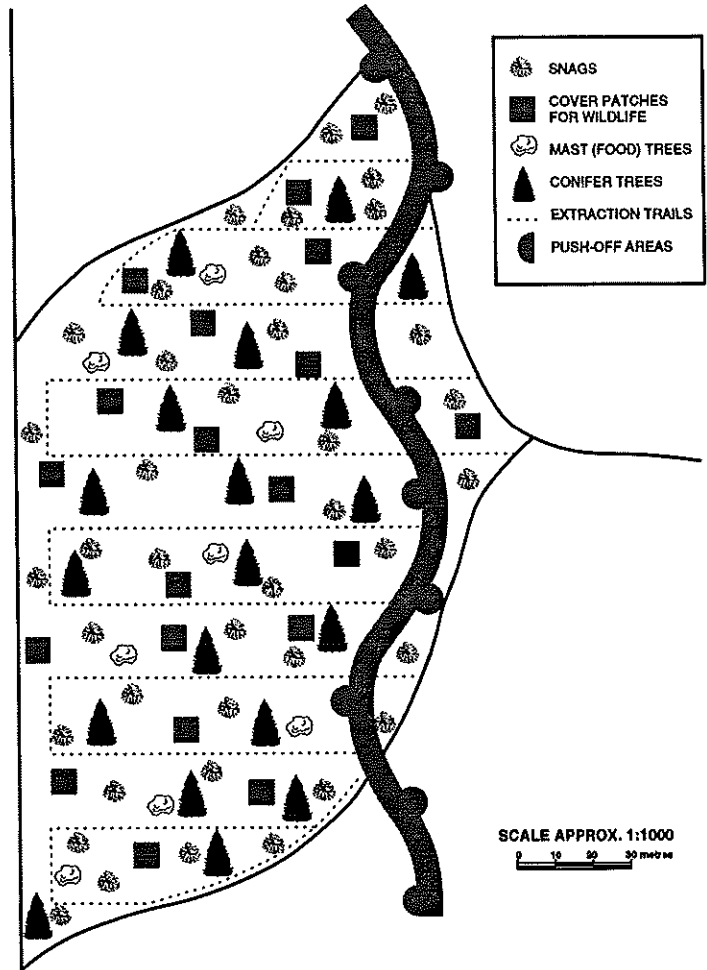


Thinning Hardwood for Wildlife

This enlargement of a hardwood stand (refer to illustration on page 4) shows a sample layout of thinning strips, snag trees, food trees and unthinned cover blocks designed for wildlife improvement. As this is a hardwood stand, it is desirable to retain scattered, mature softwood for certain birds such as the Blackburnian Warbler. The softwood trees selected for retention should be healthy, long-lived species.

Stand Description:

Red maple, sugar maple, and yellow birch make up 75% of the trees. The trees are 12 meters (39 feet) tall and they are growing so closely together that they seriously compete with each other.



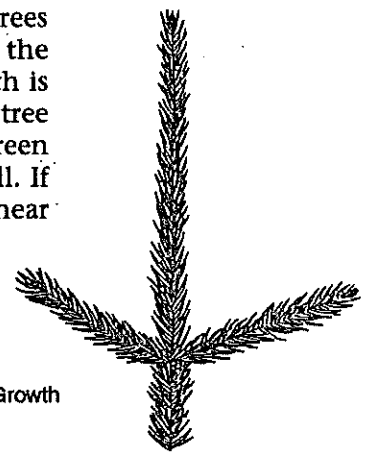
Assessing Tree Growth

By looking at the growth pattern on the ends of softwood (conifer) trees you can assess the health of the tree. The last year's growth is normally the distance from the last bud (terminal) to the first side branch. If growth is only an inch or two, growth is very poor. Another method of assessing tree growth, for trees in leaf, is to compare the amount of height that is green with the total height. If this is over 30%, the tree is usually doing well. If you're observing trees without leaves, look for the presence of buds near branch ends and the absence of branches without bark.

Poor Growth

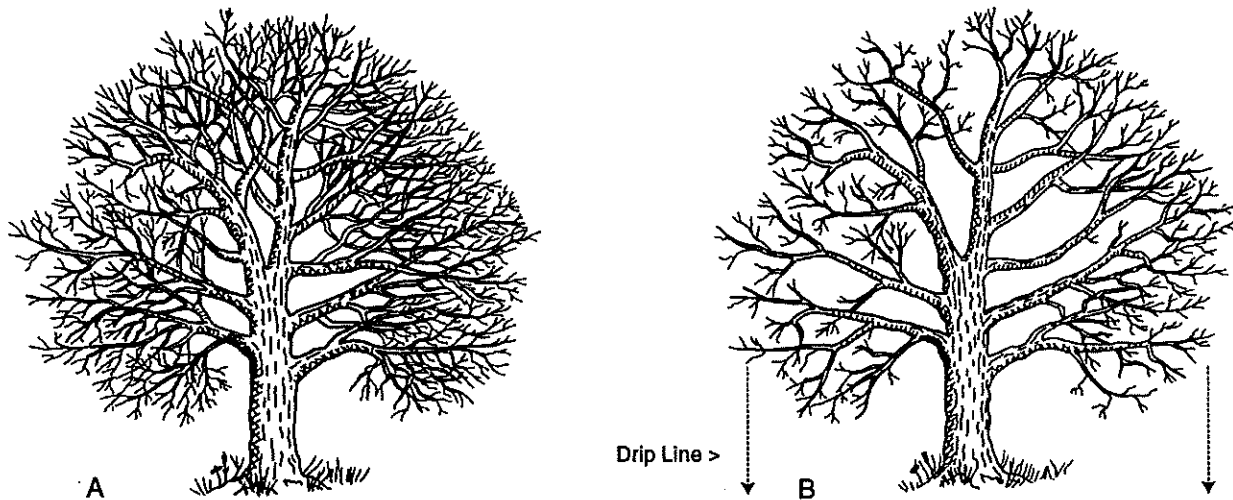


Good Growth



Improving Fruit Trees for Wildlife

Certain fruit and berry trees should be selected, kept and managed to produce food crops for wildlife (refer to page 28). Apple trees in particular should be retained for the production of wildlife food. Apple production can be enhanced by proper pruning (refer to A and B for before and after pruning views of the same tree). Apple and berry production can be increased by fertilization and/or mulching. Nearby vegetation should be thinned so that sufficient light reaches the tree but at least one softwood cover tree should be maintained near the apple tree. If the softwood tree is on the north side of the apple tree it will not block sunlight. Some local residents have reported successful regeneration of apple trees by placing the squeezings of apples (remnants of cider-making) along the edges of fields.



Trees can be fertilized by spreading compost or well rotted manure on the surface of the ground under the tree, or by spreading a balanced fertilizer near the drip line (the outside end of the branches). Do not apply granular fertilizer near the trunk as this can damage the bark and vascular tissues. Also, avoid spreading granular fertilizers after June 30th in a given year since the nitrogen balance of buds can be altered resulting in higher levels of winter kill and dieback.



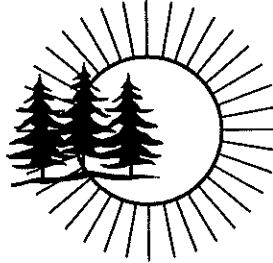
Trees and Shade

Before starting a specialty planting for wildlife refer to this chart to determine how much shade the species can withstand while still producing a good crop of fruit. Shade tolerant trees are those which can grow fairly well in shade. Intolerant trees are those which prefer full sunlight. To achieve abundant berry or nut production, trees require more sunlight than that required simply to survive.



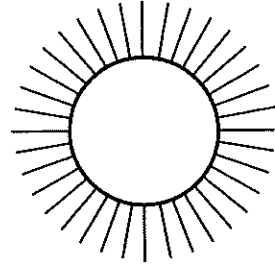
Tolerant

Sugar Maple
Beech
Red Maple
Eastern Hemlock
Red Spruce
Balsam Fir
Eastern White Cedar



Moderately Tolerant

Red Oak
White Oak
Yellow Birch
White Pine
White Spruce
Black Spruce
Hazelnut



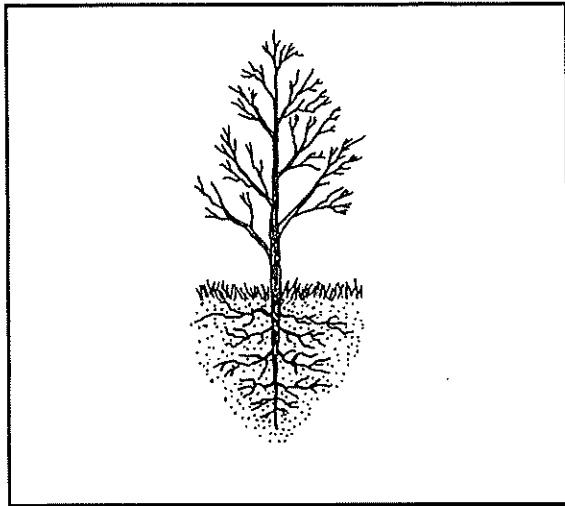
Intolerant

Poplar
White Birch
Mountain Ash
Willow
Eastern Larch
Pin and Choke Cherry
Red Pine
Austrian Pine
Elderberry
Alder

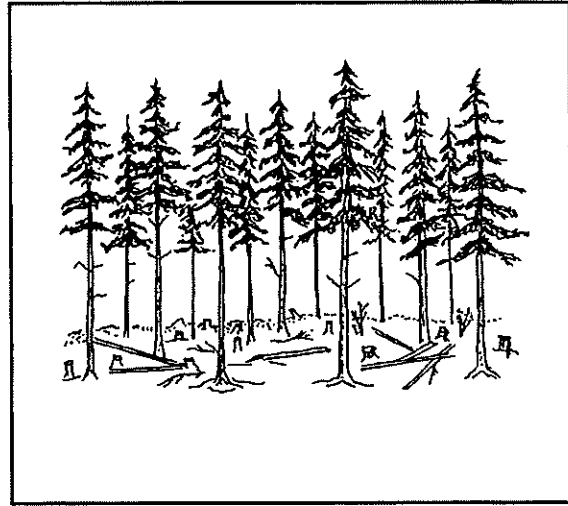


Planting Wild Seedlings

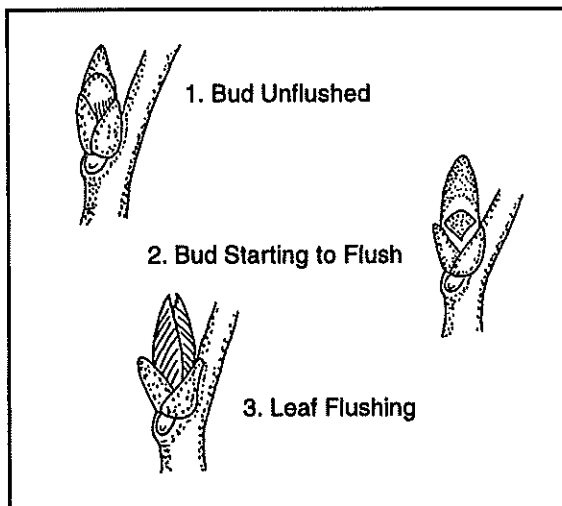
In addition to the planting described in *Forestry Programs* on page 34, landowners can undertake planting of food producing (mast) trees and shrubs such as red oak, white oak, butternut, white ash, yellow birch, hazelnut, mountain ash and other trees. The nut trees in this group are fairly easy to grow in your garden and then transplant to appropriate planting sites. For information on transplanting refer to the Forest Management Note "Transplanting Hardwood Seedlings" which is available from your District Forestry Office. In addition to these plantings, agricultural crops may be planted for wildlife or you can leave some unharvested edges in fields beside hedgerows.



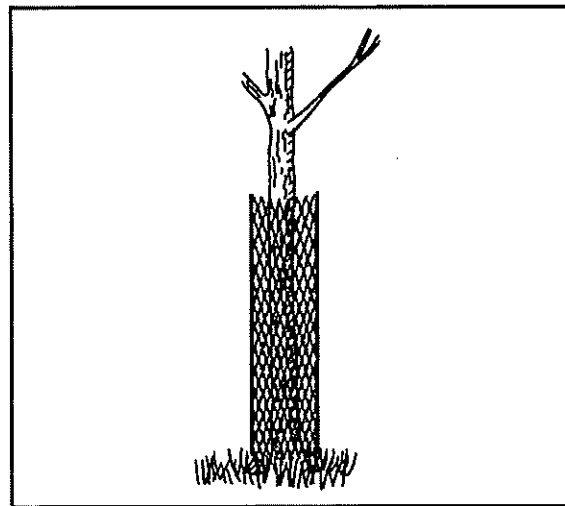
A. Identify, select and mark 20 to 40 cm. (8 to 16") tall seedlings of the species you wish to transplant for the shade and soil conditions of the site to be planted.



B. Prepare the planting site by removing cover or lower branches so that snowshoe hare (called a rabbit on P.E.I.) and small mammal (mice and voles) damage will be reduced as much as possible and light conditions are appropriate for the species being transplanted.



C. Transplant the tree after the leaves fall and before the bud flushes. Remember to prune back the side branches of the top by 1/3 to compensate for root loss.



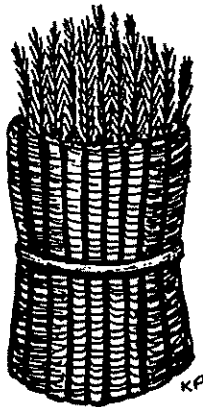
D. Protect from competition and browsing after planting. If a wire screen is used, instead of a plastic screen, ensure that it is removed before becoming embedded as it could eventually kill the tree.



Forestry Programs

The planting of trees will improve the value of certain habitats for many species of animals. The P.E.I. Department of Agriculture, Fisheries and Forestry has a variety of tree purchase and/or planting programs available. These range in size from the sale of seedlings in multiples of 50, to hedgerow planting and planting for sites requiring 500 or more trees, to reforestation programs on larger sites. Many trees and shrubs not available through the Forestry District Offices can be purchased from Bunbury Nursery or private commercial nurseries. In addition, seedlings can be grown or they can be transplanted from the wild (see previous page). For a full description of these services and the trees available, please consult your District Forestry Office at: Central District (368-4800), Eastern District (961-2172), or Western District (854-2155). Bunbury Nursery (569-2207) also has information.

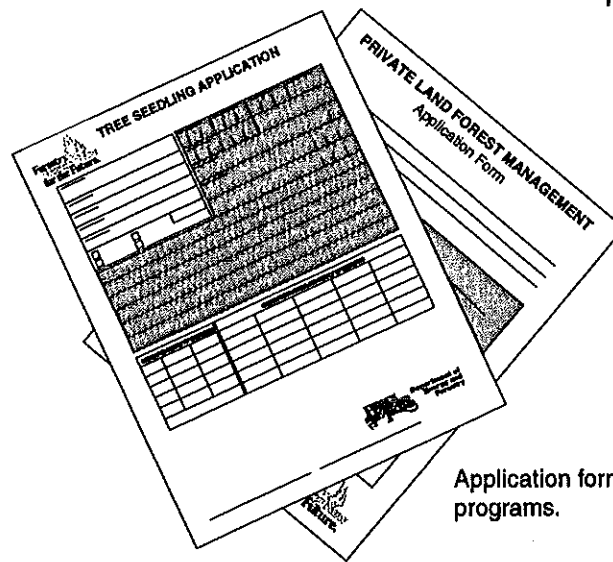
- A. Pick up orders
- B. Hedgerow planting
- C. Small scale reforestation
- D. Woodlot Management Plan Reforestation
- E. Bunbury Nursery sales
- F. Private Commercial Nurseries



Bundle of 50 seedlings for reforestation.



Hedgerow design.



Application forms for forestry programs.



• STUDYING FOREST WILDLIFE •

Helping Count Forest Wildlife

Obtaining information on how animal numbers respond to forest habitat change is often difficult. You can assist us by keeping records on animal numbers and sending these to the various record keeping agencies. The card shown below is a Nest Record Card modified to provide additional information on the types of forest stands used by various species of birds. These are available from, and collected by, the P.E.I. Department of Agriculture, Fisheries and Forestry. After review by Department staff, they are submitted to the Maritime Nest Record Scheme kept by the Canadian Wildlife Service in Sackville, New Brunswick. In addition to this volunteer program there are several others that may be of interest.

- Christmas Bird Counts are held in the mid-December to early January period in several areas of the Island. Contact the Natural History Society of P.E.I., Box 2346, Charlottetown, P.E.I. C1A 8C1.
- The Natural History Society of Prince Edward Island keeps animal and plant records and publishes sightings in its newsletter. These are used to help update provincial bird checklists and record unusual or new sightings.
- The Long Point Bird Observatory has a bird feeder watchers program which keeps records on the birds at registered feeders across North America.
- The Natural History Society holds the Francis Bain birdathon on the last Saturday in May each year.
- The Canadian Wildlife Service uses volunteers who can identify birds by both sight and sound to conduct breeding bird surveys each year in late spring and early summer.

Canadian Wildlife Service
P.O. Box 1590
Sackville
New Brunswick
EOA 3C0

Long Point Bird Observatory
P.O. Box 160
Port Rowan
Ontario
NOE 1M0

P.E.I. DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY FOREST NEST RECORD				
FILL IN OR CIRCLE ANSWER				
ADDRESS		SPECIES		PROVINCE _____ YEAR _____
DATE	TIME	BOSS	YOUNG	COMMENTS
LOCALITY _____ FOREST TYPE HWY MIX BVD DC HEDGEMOW SLOPE IN CLOSURE _____ % LIVE CROWN _____ AVERAGE DBH _____ CM DBH AGE _____ % SLOPE _____ % B.A. _____ STAND SIZE _____ NA UTM _____ (E-N) _____				
TYPE OF NEST: Ground _____ Tree _____ HABITAT IN WHICH NEST WAS LOCATED: Nest Tree: Species _____ % sure _____ Diameter _____ cm (est - meas) _____ Height _____ m (est - meas) _____ Nest Tree Condition: Live _____ Dead _____ (_____ to green) _____ Origin of Parity Dead Branch: Crown Damage _____ Insect or Disease _____ Nest Entrance Date: Flight _____ Approximate Diameter _____ Nest quality indicators: Sprague _____ Booby _____ Entrance wear _____				
DISTANCE TO NEAREST STAND EDGE _____ m Opening (between road, field etc.) _____ m Probability of blowdown: Minimal _____ Moderate _____ High _____ NAME AND ADDRESS OF OBSERVER: _____				

OUTCOME OF NEST (check one or more spaces below)			
Evidence for Success:			
Young	<input type="checkbox"/> seen leaving nest naturally, or seen or heard near nest.	<input type="checkbox"/> old enough at previous visit to have left nest if disturbed, or seen or heard near nest.	ADDITIONAL COMMENTS OR NEST DESCRIPTION
Nest empty but in use:	<input type="checkbox"/> parents carrying food, or <input type="checkbox"/> droppings <input type="checkbox"/> feather scale <input type="checkbox"/> hatched shells	<input type="checkbox"/> parents giving store into nest	
Evidence for Failure:			
Office Use Only	<input type="checkbox"/> empty but early for young to have left nest <input type="checkbox"/> damaged <input type="checkbox"/> rotten	<input type="checkbox"/> Egg: <input type="checkbox"/> damaged <input type="checkbox"/> deserted <input type="checkbox"/> Young: <input type="checkbox"/> dead, injured <input type="checkbox"/> dead, unpaired	
Outcome Unknown:			
<input type="checkbox"/> because evidence for or against success is not conclusive, or <input type="checkbox"/> because observations were not sufficient			
If the tree is dead, indicate the following by visual estimate:			
Amount of Bark Remaining:		Furred Cortex:	
Branch Presence:	Fine branches _____ 0% - 10% No fine branches _____ 10% - 20% Fine outer branches _____ 20% - 40% Branch stubs only _____ 40% - 60% No branches _____ 60% - 100%	0 _____ 1 - 4 _____ Wood Ash Signs: Present _____ Absent _____	
RETURN COMPLETED CARD BY OCTOBER 1			



Woodland Birds and Their Forest Use Patterns

The Use of Woodlands by the More Common Birds of Prince Edward Island

A summation of information from Robie W. Tufts *The Birds of Nova Scotia* and the John Bull and John Farrand Jr.'s *The Audubon Society Field Guide to North American Birds*.

SPECIES	FEEDING HABITAT	NESTING HABITAT
Cormorant	Not applicable	Colonial: trees, cliffs, islands
Great Blue Heron	Not applicable	Colonial: trees, usually on small islands
American Black Duck	Not applicable	Will use cutovers, woodlands, hollow trees
Wood Duck	Not applicable	Large tree cavities close to fresh water
Hooded Merganser	Wooded rivers/ponds	Large tree cavities, abandoned hawk nests
Northern Goshawk	Woodland	Trees (will attack humans near nest)
Sharp-shinned Hawk	Woods and fields	Coniferous trees (usually 15 to 30 feet)
Red-tailed Hawk	Woods and fields	Tall trees, often birch
Bald Eagle	Not applicable	Tall, very large trees
Northern Harrier	Field/marsh/cutover	Ground nester, sometimes in cutovers and young plantations
Osprey	Not applicable	In tree tops, 20 to 60 feet up
Merlin	Fields and woods	Usually in trees
Kestrel	Fields and woods	In tree cavities, often old flicker nests
Ruffed Grouse	Woods and fields, deciduous buds in winter	On ground often in open second growth (drumming logs in spring are important)
Ring-necked Pheasant	Fields and hedges	Hedgerows important
Gray Partridge	Fields and hedges	Hedgerows important
Killdeer	Open areas	Ground nester, will use cutovers and young plantations
American Woodcock	Wet woods and marsh	On ground in open woodlands
Willet	Not applicable	Possibly will use cutovers near saltwater
Herring Gull	Not applicable	Rarely in spruce trees
Great Horned Owl	Woods and fields	Trees; often in abandoned crow/hawk nests
Barred Owl	Older growth woods	Large tree cavities 15 to 40 feet up, sometimes abandoned crow nests
Long-eared Owl	Conifer/deciduous	Abandoned crow/hawk nests in conifer woods, sometimes on mistletoe clumps
Northern Saw-whet Owl	Woods and edge	Tree cavities, often old flicker nests
Common Nighthawk	not applicable	Bare ground, often recent burn areas
Chimney Swift	not applicable	Once large, hollow trees, now often chimneys
Ruby-throated Hummingbird	Flowered areas, especially spotted touch me not	Trees, on a horizontal branch
Belted Kingfisher	Not applicable	Burrows in exposed banks, trees used as hunting perches over streams and ponds
Northern Flicker	Trees with ants and wood borers	Excavates a tree cavity in a dead tree
Pileated Woodpecker	Trees with wood insects	Excavates a tree cavity in a large snag
Yellow-bellied Sapsucker	Trees with sap and insects	Excavates a cavity, often in live poplar
Hairy Woodpecker	Trees with insects	Excavates a cavity, often in live poplar
Downy Woodpecker	Trees with insects	Excavates a cavity, often in soft trees
Black-backed Woodpecker	Dead trees with loose bark, stripped bark lying around the base of a tree is often a sign of feeding	Excavates a cavity
Eastern Kingbird	Woodland openings	Trees and bushes, often along streams
Eastern Phoebe	Open woodland near streams	Sometimes under roots of fallen trees
Yellow-bellied Flycatcher	Alder and willow thickets and second growth	On ground in nest of moss or rootlets
Alder Flycatcher	Alder and willow thickets and second growth	In low bushes in thickets, often in alders
Least Flycatcher	Open areas	In the fork or crotch of deciduous trees
Eastern Wood Peewee	Forest, open woods	On a horizontal limb, usually in deciduous trees
Olive-sided Flycatcher	Black spruce and fir	Usually on a horizontal tree limb
Tree Swallow	Ponds, streams, tree canopy, edge	Tree cavities, nest boxes
Gray Jay	Forests and towns	Usually in dense conifers
Northern Raven	Woods and fields	Trees, 15 to 60 feet up
American Crow	Woods and fields	Trees, 10 to 50 feet up
Black-capped Chickadee	Deciduous and mixed woods	On underside of bark slabs of fir and spruce, branch stub cavities
Boreal Chickadee	Coniferous woods	Natural cavities close to the ground often in conifers, may also excavate in soft snag



SPECIES	FEEDING HABITAT	NESTING HABITAT
Red-breasted Nuthatch	Coniferous woods, also deciduous	Excavates a cavity in a soft snag
Brown Creeper	Deciduous and mixed woods	On underside of bark slabs of fir and spruce
Winter Wren	Coniferous and mixed woods	Often in blowdown areas under roots
Gray Catbird	Thickets and brush	Low down in thickets
American Robin	Fields and open woods	Usually in tree crotches, or branches
Hermit Thrush	Coniferous and mixed woods, deciduous woodlands and thickets in winter	On ground or low bush in forests
Swainson's Thrush	Coniferous woods, willow thickets	Often in conifer or low shrub
Veery	Moist deciduous woodlands	In ground cover or low shrub in tree
Golden-crowned Kinglet	Dense old conifers, deciduous forests and thickets in winter	In trees (up to 40 feet) between conifer twigs
Ruby-crowned Kinglet	Thickets in winter	In tree (up to 40 feet) between conifer twigs
Bohemian Waxwing	Open coniferous, berry trees in winter	In a conifer tree
Cedar Waxwing	Open woods	In a tree in the open, usually deciduous
European Starling	Not applicable	In tree cavities or building crevices
Solitary Vireo	Coniferous and mixed	Usually a fir or hemlock
Red-eyed Vireo	Deciduous and residential areas	In trees
Black-and-white Warbler	Chiefly deciduous woods	On the ground, set at the base of a tree or shrub
Tennessee Warbler	Open mixed woods	On the ground in open woodland or clearing
Northern Parula	Wet coniferous woods and swamp	In clumps of old man's beard (<i>Usnea</i>)
Yellow Warbler	Moist thickets	Low bushes or upright fork of a sapling
Black-throated Blue Warbler	Mixed and conifer	In a dense young fir, tree or shrub near the ground
Black-throated Green Warbler	Open hemlock and pine	In branches of a conifer
Blackburnian Warbler	Mixed woods	Usually high in a conifer
Chestnut-sided Warbler	Young open woods	Small tree or bush
Palm Warbler	Bogs in summer	On the ground in a clump, rarely in a tree
Ovenbird	Mature dry mostly deciduous woods	On the ground in a nest with a side entrance
Mourning Warbler	Raspberry thickets, wet woods with thick underbrush	On or near the ground
Canada Warbler	Wet mixed woodland with blowdowns	On or near ground at base of tree or fern clump
American Redstart	Second growth and thickets	Usually low in a deciduous tree or shrub thickets
House Sparrow	Farms and towns	Tree cavities, crevices, barn swallow nests
Bobolink	Abandoned fields	On ground
Northern Oriole	Deciduous woods and shade trees	Woven pendant from branch tips
Rusty Blackbird	Boreal bogs, wooded swamps	Dense shrubs near water
Common Grackle	Open woodlands	Anywhere from low bush to high in trees
Brown-headed Cowbird	Woods edge	In nests of other birds
Rose-breasted Grosbeak	Moist woodlands, hedgerows	Usually in small deciduous tree or bush crotch
Evening Grosbeak	Coniferous woods	In conifers
Purple Finch	Mixed or deciduous woods	Often in the top of small to medium-sized spruce or fir
Pine Grosbeak	Coniferous woods	Usually close to the trunk of a conifer
American Goldfinch	Bushy thickets	Usually in the upright fork of a tree or shrub
Northern Junco	Coniferous or mixed woods	Well hidden on or near the ground
White-throated Sparrow	Coniferous woods with underbrush cutovers	On or near the ground in underbrush, under brush in cutovers
Lincoln's Sparrow	Willows and alders	In forest undergrowth
Swamp Sparrow	Wooded swamps, freshwater marshes	In dense shrubs
Song Sparrow	Thickets	On or near the ground



Larger Woodland Mammals and Their Forest Use Patterns

The Use of Forest Land on Prince Edward Island by Larger Mammals

Adapted from information in Banfield (1964), Bateman and Prescott (1984), Wilson (1988), and observations by the author.

SPECIES	FOOD PREFERENCES
Raccoon	The raccoon is an omnivore feeding on agricultural crops such as sweet corn, as well as cherries, elderberry, gooseberries, insects, and mussels.
Ermine (Short-tail Weasel)	Ermine feed primarily on mice and shrews, but also on hares, birds, squirrels and fish.
Mink	The mink eats fish, meadow voles, muskrat, shrews, frogs, salamanders, insects, birds, earthworms and snakes.
Striped Skunk	The skunk is active mostly at night and feeds on mice, insects, grubs, berries and carrion.
Coyote	Voles, apples, dead farm and wild animals, snowshoe hare, grouse, and berries are all eaten by the coyote.
Red Fox	The fox is an omnivore feeding on small mammals, muskrats, snowshoe hare, squirrels, grouse, ducks, ground-nesting birds, insects, and vegetable materials.
Eastern Chipmunk	The chipmunk eats a wide variety of seeds, fruits, nuts and some green vegetation. It also eats slugs, worms, frogs, salamanders and snakes. Chipmunks drink water from rainfall.
Red Squirrel	Conifer seed is the primary food of red squirrels but they also feed on apples, various mushrooms, nuts, sap, buds and bark.
Flying Squirrel	Flying squirrels eat nuts, tree lichens, buds, leaves, seeds, mushrooms, fleshy fruits of trees and shrubs, plus insects, birds and bird eggs.
Snowshoe Hare	The hare is a browser. In winter it feeds mostly on the buds, twigs, and bark of willow, birch, hazelnut, maple, hawthorne, and aspen trees, and the buds, twigs, bark and evergreen leaves of all native conifers. It will also consume carcasses of other animals. In summer it feeds on grassy, herbaceous and woody plants.
Beaver	The beaver's favorite food is the cambium; leaves, twigs and buds of trembling aspen; then willow, white birch, balsam, poplar, mountain ash, maple, hawthorne, cherry and sometimes pine. In summer it also feeds on cattail, duckweed and herbaceous wetland vegetation.



Woodland Amphibians and Reptiles and Their Forest Use Patterns

Amphibians and reptiles of Prince Edward Island. Information as adapted from Cook (1967) and Morton, Prescott and Ouellette (1981), Natural History Society of P.E.I. records, and observations by author.

Species	Abundance
Blue-spotted Salamander	Abundant
Spotted Salamander	Common
Red-spotted Newt	Uncommon
Red-backed Salamander	Common
American Toad	Abundant
Spring Peeper	Abundant
Green Frog	Common
Wood Frog	Abundant
Leopard Frog	Common
Red-bellied Snake	Common
Maritime Garter Snake	Common
Eastern Smooth Green Snake	Rare



Common Name Key

Common Prince Edward Island names used for the animals and plants referenced in this manual

Common Island Name	Common Name	Scientific Name
Trees		
Var	Balsam Fir	<i>Abies balsamea</i>
Soft or Swamp Maple	Red Maple	<i>Acer rubrum</i>
Hard Maple	Sugar Maple	<i>Acer saccharum</i>
Juniper	Eastern Larch	<i>Larix laricina</i>
Mammals		
Rabbit	Snowshoe Hare	<i>Lepus americanus</i>
Mouse or mice	Meadow Voles	<i>Microtus pennsylvanicus</i>
	Jumping Mice	<i>Zapus spp.</i>
	House Mouse	<i>Mus musculus</i>
Birds		
Shags	Cormorant	<i>Phalacrocorax species</i>
Native Partridge	Ruffed Grouse	<i>Bonasa umbellus</i>
Huns	Hungarian Partridge	<i>Perdix perdix</i>
Woodpeckers	Northern Flicker	<i>Colaptes auratus</i>
	Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>
	Hairy Woodpecker	<i>Picoides villosus</i>
	Downy Woodpecker	<i>Picoides pubescens</i>



• ADDITIONAL READINGS •

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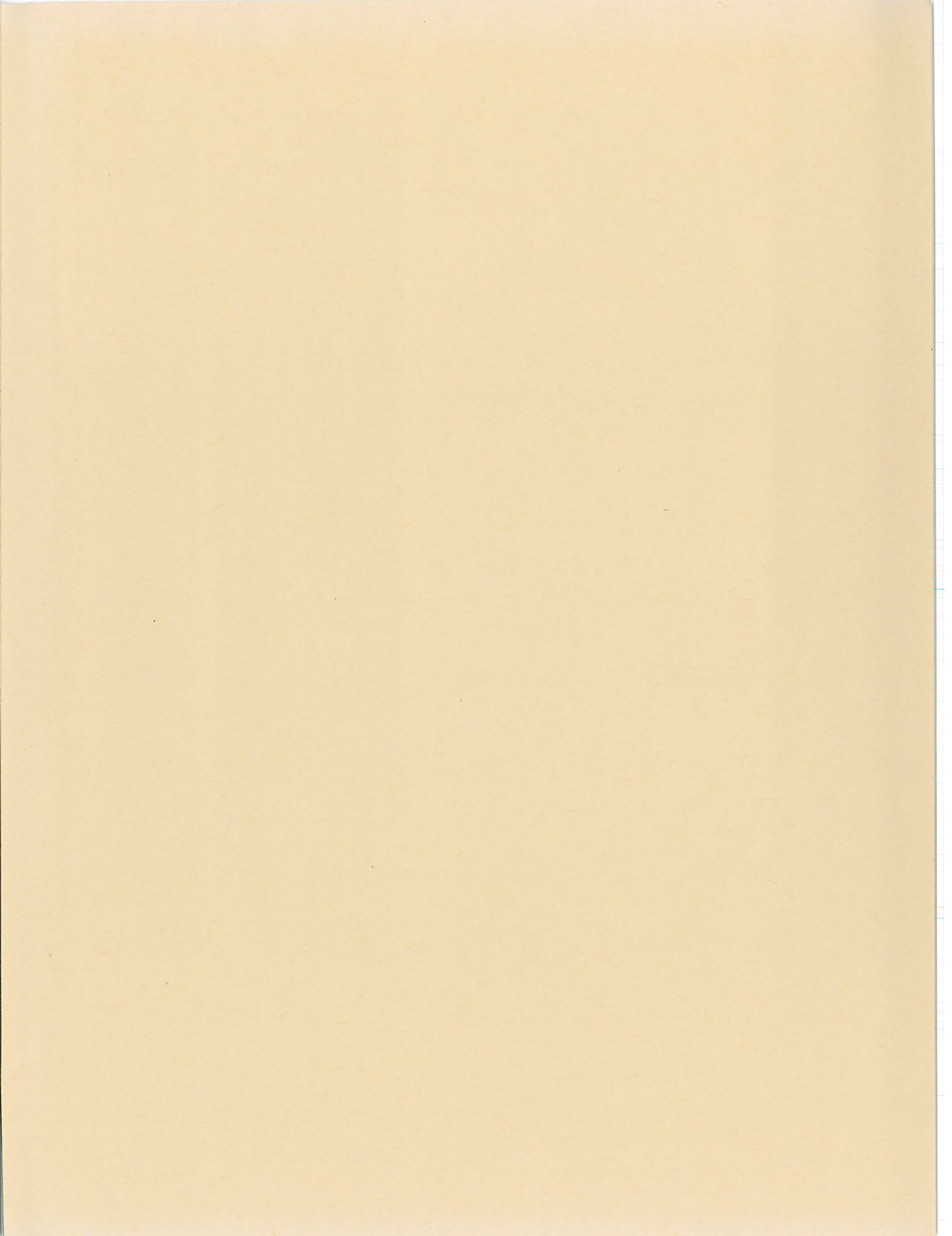
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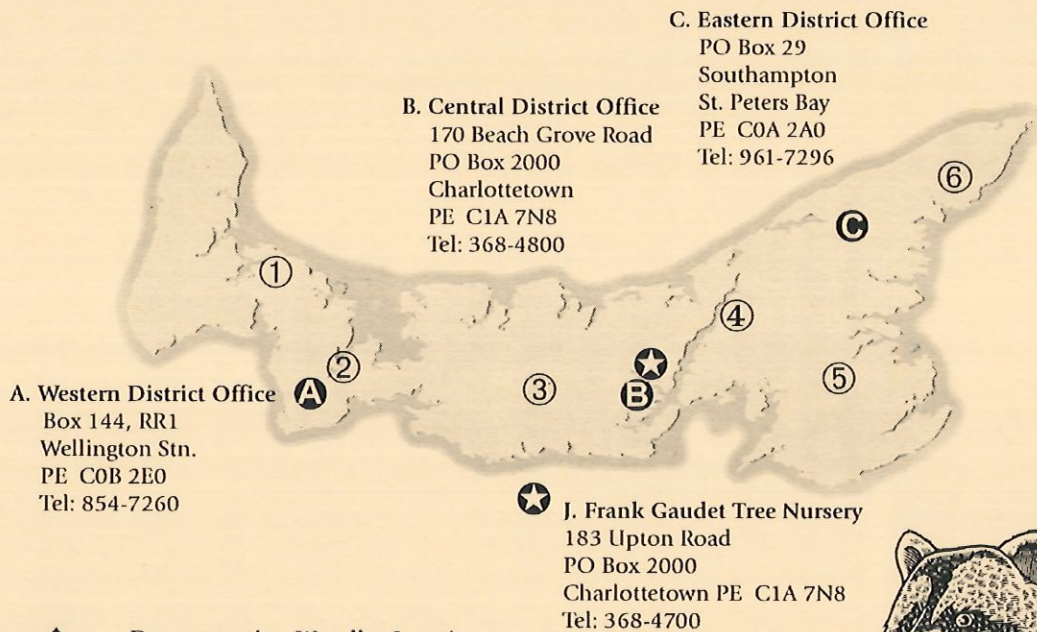




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