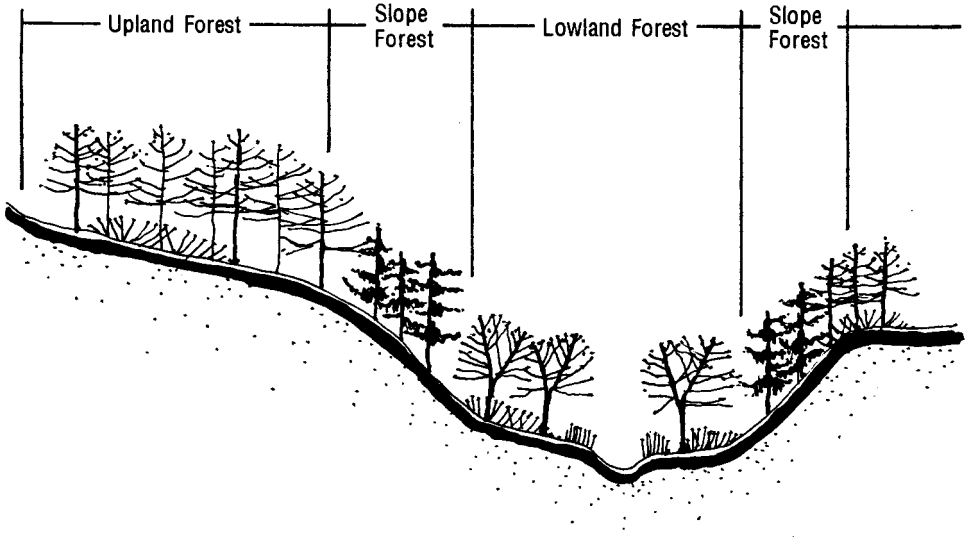
WOODLANDS

5.1 SITE CHARACTERISTICS AND TYPICAL PLANT ASSOCIATIONS

A woodland is defined as an area naturally vegetated with forest species of at least 10 cm diameter at breast height, with a tree canopy cover of 20% or more and a woodland understorey. Its stage of development will determine both canopy cover and species. Woodland is frequently initiated by predominantly pioneer species. Gradually, climax species will establish and eventually form the canopy. The species composition of a woodland varies with moisture regime and soil type. Generally, three distinctions are made: upland forest, valley slope vegetation and lowland forest (swamp).



Upland, lowland and slope forests

Upland forest

In the Great Lakes/St. Lawrence Forest Region, the dominant upland forest type is the maple-beech association. Upland forest, which occurs on table lands, was the primary forest cover prior to settlement. Soil conditions are generally well-drained and sometimes dry, yet impervious clay soils can lead to poorly drained conditions.

Valley slopes

Valley slopes are generally moist, but well drained. The wide range of species on valley slopes includes many upland plants.

Lowland forest (swamp)

In low lying areas adjacent to water courses and lakes, or in localized wet areas, soils with a high moisture content give rise to distinct plant associations. Lowland forest may have high moisture levels due to overland runoff, temporary flooding, or groundwater discharge at peak periods, particularly during spring and fall. In coniferous woods, cedars often are the predominant species. Lowland deciduous woods may include a variety of species, depending on stage of succession, soils, and moisture regime.

Site characteristics, reviewed during the site inventory, will affect the nature of woodland restoration. Soil type, moisture level and microclimate of the site influence plant associations and the ultimate character of the woodland. Prior to finalizing restoration plans, the type of woodland should be determined: upland vs. lowland vs. valley slope; sandy soils vs. clay soils; exposed conditions vs. sheltered; or dry vs. wet vs. moist but well drained. The following chart summarizes soil moisture conditions and the predominant plant associations.

References at the end of this section provide more detailed information on the natural occurrence of plant species, their soil requirements and typical associations.

FOREST TYPE	*UPLAND FOREST* (dry to well drained)	*UPLAND FOREST* (moist, well drained)	*VALLEY SLOPE* (moist, poorly drained)	*LOWLAND FOREST* (poorly drained)
EVERGREEN OR CONIFEROUS - COMMON SPECIES	white pine eastern white cedar hemlock	white pine hemlock	white pine hemlock	eastern white cedar tamarack
DECIDUOUS - COMMON SPECIES	red oak white oak sugar maple American beech white ash	sugar maple American beech white ash red oak basswood	red maple silver maple sugar maple white ash basswood American beech	silver maple red maple green ash elm
DECIDUOUS - ADDITIONAL SPECIES	hackberry white pine	red maple white pine black cherry	hackberry butternut bur oak red oak	Manitoba maple hackberry black ash bur oak willow
CAROLINIAN SPECIES	black maple shagbark hickory Chinquapin oak black oak sassafras	black maple bitternut hickory shagbark hickory	shagbark hickory bitternut hickory black walnut sycamore swamp white oak	shagbark hickory black walnut sycamore swamp white oak
UNDERSTOREY	serviceberry witch-hazel ironwood	alternate-leafed dogwood witch-hazel ironwood	mountain maple blue beech	red osier dogwood willow

Most pioneer species (including paper birch, trembling and large-tooth aspen, cottonwood and balsam poplar) occur widely irrespective of soil type and moisture. However, many of the species listed in the table have specific growing conditions that must be met. Some, such as mountain maple, require the shade found in an established woodland environment. White pine is intolerant of exposed conditions. Many species are susceptible to salt spray from highways. It may not be possible, therefore, to establish some of these species at the outset of a woodland restoration project.

Other site characteristics that influence the establishment of plant material include soil fertility, organic content, and soil pH. These factors also affect growth rate. In general, soil pH in the Greater Toronto Bioregion is predominantly alkaline. Sites with acidic soils

or low pH have different plant associations. While increasing soil fertility is relatively easy, it is neither necessary nor desirable in most restoration efforts. Exceptions may be highly altered sites, such as where topsoil has been stripped or mining has occurred.

5.2 DESIGN CONSIDERATIONS

Before you start

Review factors that will influence woodland establishment, including:

- soil conditions;
- wind exposure;
- current vegetation type;
- past herbicide use;
- adjacent land uses that might affect success of woodland restoration.

Wildlife considerations

A primary consideration for wildlife is the size of the woodland. Large, continuous woodlands are necessary for interior woodland species. Generally, the larger the habitat, the more diverse the plant and animal species that will be found there.

Caution

Human impacts on woodlands, which range from trampling to deliberate destruction of vegetation or dumping of garbage, can be greater than ordinary edge effect. Road access increases impacts on the interior of the forest, whereas pedestrian trails through a wood appear to reduce overall impacts, as people tend to stay on the trails. (Matlack, Glenn R., 1993).

Enhancing wildlife habitat in woodlands

To enhance interior woodland habitat:

- enlarge existing wooded areas;
- increase woodland interiors;
- create blocks (nodes) rather than narrow strips;

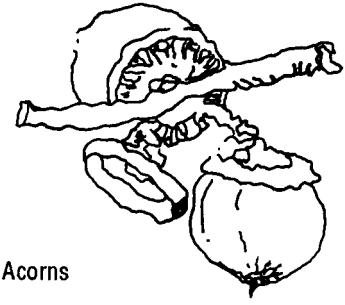
- infill gaps in the woodland fabric;
- provide edge vegetation to protect the interior from desiccation and intrusion;
- plant species for food and shelter.

To create a diversity of habitats:

- provide a balance between open and forested plant communities on larger sites (not within woodland communities);
- create wooded areas in a variety of soil conditions;
- provide different sized wooded areas linked by other habitat types;
- provide both nodes and corridors;
- provide uneven aged woodland representing of different seral stages (pioneer, climax species);
- provide edge vegetation immediately adjacent to woodlands to protect the forest community.

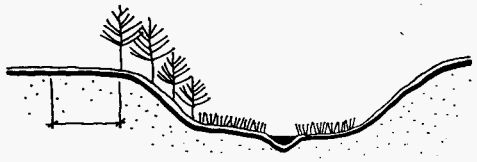
To provide food and shelter for wildlife:

- plant trees and shrubs with edible twigs, buds, seeds, nuts and berries;
- plant evergreens and edge species that form dense thickets.



Acorns

	BERRIES	*NUTS*	*SEEDS*	*EDIBLE TWIGS AND BUDS*	*SHELTER*
TREES	hawthorn pin cherry black cherry mountain ash	hickory American beech black walnut oaks	maples birch ash spruce pine poplars/aspen willow cedar	birch poplars/aspen	hawthorn thickets cedar
SHRUBS	service-berry dogwood choke-cherry shrub roses raspberries elderberry viburnum wild grape	hazel beaked hazel	staghorn sumac willow	dogwood	shrub roses dogwood wild grape

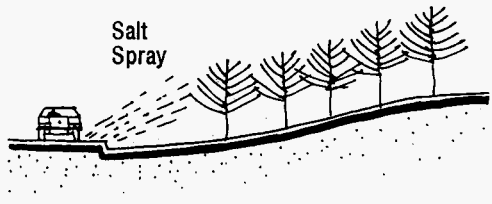


Top of Bank Setback
from Valley Slope

Buffer requirements

The proposed wooded area may need to be buffered from adjacent land uses and other impacts. Setbacks, such as top-of-bank setbacks along valley slopes, may be regulated through the official planning process.

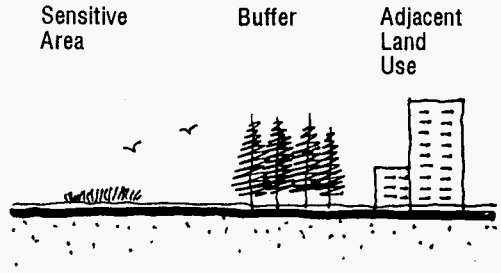
Top of Bank Setback
from Adjacent Natural Area



Salt spray from roads adversely affects a large number of native species, including maples, oaks, beech, white pine, and hemlock. In these situations, a buffer of salt-tolerant species may be necessary. They include poplars, aspen, white ash, chokecherry, mountain ash, and staghorn sumac.

Caution

For more information on salt-tolerant plant species, refer to horticultural publications and OMAF Factsheet 83-037: Salt damage to roadside plants *available from the Ministry of Agriculture and Food. Please note that most publications list both native and non-native species, and ratings in the different publications sometimes conflict.*



Evergreen buffers can reduce the visual impact of adjacent land uses. Buffers can protect existing woodland areas from new impacts or be part of a remedial strategy to enhance existing natural features. Woodlands can also be used as buffers to protect other habitat types, such as wetlands.

Edge treatment

Woodland edge is important to the overall health of the forest. Edge species serve to protect the woodland from drying winds, and ground flora from sunlight and competition from aggressive herbaceous plants. A dense woodland edge can also reduce human impacts by discouraging access and trapping litter.

SOIL MOISTURE	*DRY TO WELL DRAINED*	*MOIST, WELL DRAINED*	*MOIST, POORLY DRAINED*
EDGE SPECIES	serviceberry bittersweet gray dogwood bush honeysuckle pin cherry chokecherry staghorn sumac shrub roses flowering raspberry red raspberry snowberry	bittersweet gray dogwood red osier dogwood honeysuckle Canada plum staghorn sumac flowering raspberry red raspberry elderberry red elderberry highbush cranberry nannyberry	red osier dogwood firecherry staghorn sumac shrub willows elderberry nannyberry highbush cranberry wild grape

Access

Clearly demarcated access points and trails are important to reduce trampling through the understorey of a woodland. A well designed trail system can also enhance the woodland experience, by guiding the pedestrian through areas with different characteristics.

Caution

Mountain bikes and motorized recreational vehicles can cause tremendous damage to trails and to woodland understorey and ground flora. If trails are to be used for these types of recreation, their design should accommodate this type of use. Where mountain bikes are already causing damage to trails, or where habitat is too sensitive to tolerate bike traffic, signage, regular control, and alternate routes can discourage use in those areas.

5.3 RESTORATION OPTIONS AND TECHNIQUES

Prior to getting started, review some of the factors that will influence the establishment of woodland on a site, such as soil conditions, wind exposure, current vegetation type, herbicide use in the past. Are there nearby land uses, such as highways or industry, that could affect the success of the woodland? Ensure that you have collected the necessary information in order to select the appropriate restoration techniques.

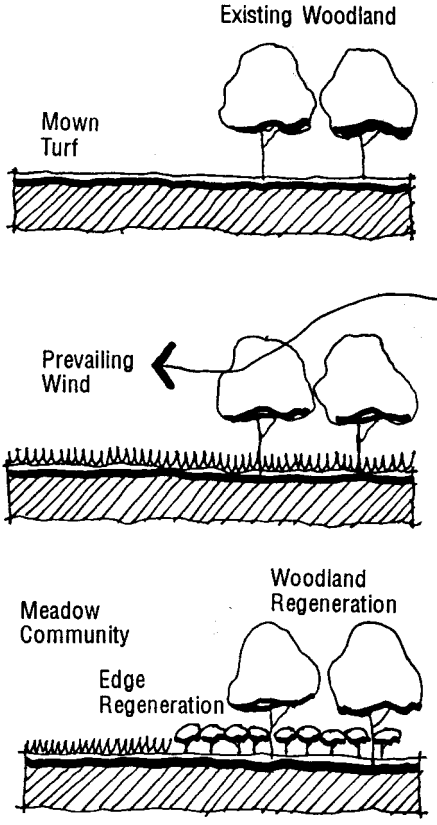
The selection of woodland restoration techniques is dependent on the time frame it takes to establish wooded habitat, the cost of implementation, and subsequent management requirements. The following techniques will be discussed:

- natural regeneration;
- nucleation;
- managed succession.

Direct seeding and topsoil applications, mentioned in *Ecological Restoration Opportunities for the Lake Ontario Greenway*, have not been successful in Ontario and have had only limited success elsewhere.

Natural regeneration

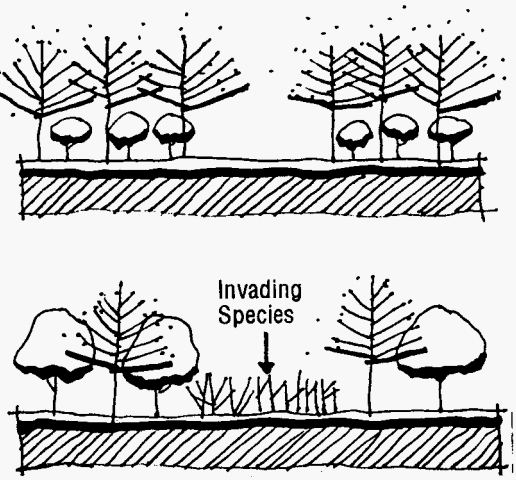
Natural regeneration occurs where mowing and other types of intervention are discontinued. In the absence of disturbance, the process of succession occurs naturally and woodland vegetation is re-established over time. This is the least costly approach. However, it takes longer to restore an area to woodland. Grasslands and old field communities have an inhibiting, or allelopathic, effect on the germination of trees and shrubs, and rodents, prevalent in grasslands, reduce the number of seeds available for regeneration.



Caution

Lands may appear abandoned in the initial phases of succession, which may affect public acceptance in urban areas. Where this is a concern, edge planting can be used to enhance the appearance of naturalizing areas and to protect them from trampling and vandalism. Edge species can also enhance wildlife habitat, providing food and shelter.

Natural regeneration is probably best suited to the expansion of existing woodlands, or sites for which a long time frame is acceptable.



Nucleation

Nucleation consists of planting patches of trees. This allows for key species to become established, thereby accelerating natural regeneration. Clumps must be sufficiently large to ensure that the trees are viable and survive in good condition. Over time, groves gradually become larger and eventually coalesce, creating an uneven, aged woodland.

Nucleation is a cost-effective method where large areas are to be restored to forest. It is a useful technique to introduce desirable species in a woodland lacking diversity.

The most desirable species for nucleation are those that produce a heavy annual seed crop and root suckering. Since the technique relies on natural regeneration, seeds must have high viability and be competitive in a grasslands or old field community. Species that rely on wind dispersal, or dispersal by birds, will produce seeds that are distributed over a large area. A few examples are given below.

	ROOT SUCKERING	*BIRD DISPERSED SEED CROP*	*WIND DISPERSED SEED CROP*
TREES	trembling aspen balsam poplar	black cherry hawthorn	paper birch poplars and aspen elm
SHRUBS	gray dogwood red osier dogwood staghorn sumac blackberry red raspberry	dogwoods pin cherry chokecherry staghorn sumac	shrub willow