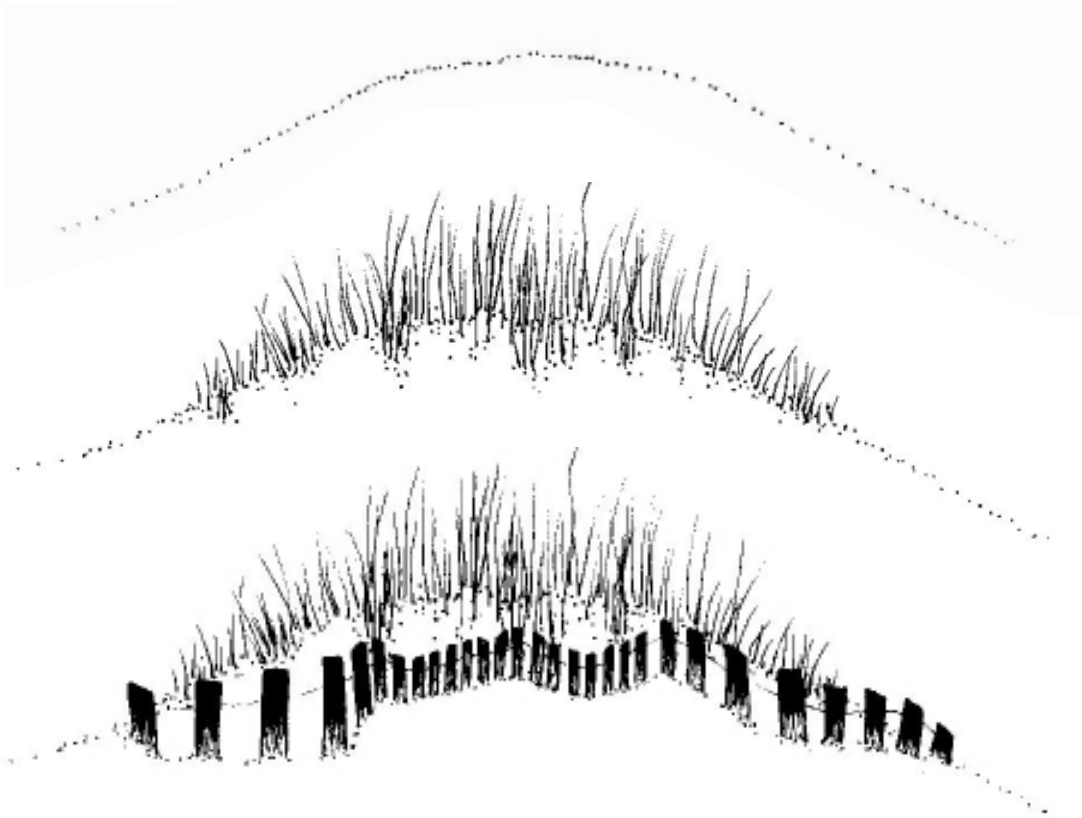
Dune Planting Guide:

Wise Stewardship
of Lake Huron Coastal Dunes



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Designed to help naturalize the Lake Huron coastal dunes, the information presented in this Dune Planting Guide provides the following benefits:

Ease of maintenance: healthy dunes prevent sand erosion and drifting.

Shoreline protection: the beach and dune system offers protection from storm waves. Protective sand bars result from temporary erosion of waves.

Health benefits: healthy dunes help prevent wind erosion, which can expose wet sands containing bacteria and other organisms.

Extraordinary beauty: dunes and their natural vegetation provide beauty unlike any other ecosystem in Ontario.

Socio-economic benefits: naturalization of the dunes can prevent the socio-economic loss that would result from the degradation of dunes and beaches.

No vegetation = No dunes
No dunes = No beach

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Introduction

Have you ever wondered if the beach that you enjoy so much is healthy?

The coastal dunes along Lake Huron's shoreline are considered one of the most fragile environments in Canada, and their rarity makes them even more special.

For example, did you know that sand dunes account for a mere 1.5% of Canada's Great Lakes' coastal areas?

This guide is designed to provide private landowners, municipalities and landscape professionals with guidelines and tools for naturalizing Lake Huron's coastal beaches and dunes, for everyone's benefit.

the Coastal Centre
THE LAKE HURON CENTRE FOR COASTAL CONSERVATION

Figure 1

Darkened areas show coastal dune locations

Did you know?

Dunes provide natural shore protection that responds to the dynamics of the lake.

Dunes are home to a wide array of rare species, sometimes including Species at Risk.

About the Dunes

Lake Huron's sand dunes are part of a complex system combining sand, vegetation, and geography.

Formed over thousands of years as a result of the last ice age, beaches and dunes form what is called a dune system.

The dunes depend on the beaches for their ongoing supply of sand. During storms and when lake levels are high, beaches borrow sand from the dunes. This helps the beach protect itself from erosion.

Some dune systems along the lake contain sand supplies that are no longer being added to. It is therefore important not to remove any sand from the beaches or dunes, but protect the anchoring vegetation.

Benefits

Did you know?

Dunes support a wide range of natural plant biodiversity when properly maintained.

Many animals including birds, insects, and reptiles make the dunes their home.

Dunes provide natural shore protection from wave attack, reducing wind erosion and drifting of sand.

Dunes protect water quality.

Dunes provide aesthetic value and recreational enjoyment for tourists and landowners.

Sand dunes provide a number of benefits to you and your property.

The dunes are home to an unusually large number of rare, native species. A disproportionate number of rare plants exist here in relation to other natural areas.

Dunes act as a reservoir of sand that protects the shoreline during storms and periods of high lake levels. Since healthy dune systems provide free shore protection, their stewardship is in everyone's best interest

Equally important is the role dunes play in ensuring water quality. Loss of sand dunes can cause 'lowering' of the beach profile. When sand dunes are destroyed or removed, wet beach sands are vulnerable to contamination by micro-organisms, including E. coli. Destruction of the dunes can have serious consequences for everyone along the lake.

Dunes also provide natural protection from wind erosion and drifting sand. This can cause ongoing property maintenance challenges in the form of sand removal, which can create unnecessary costs.

Healthy dunes equal healthy beaches. Stewardship of our beaches and dunes is everybody's responsibility - maintaining their health will ensure a high quality lakeshore for enjoyment now, and for future generations.

Anaturalizedlandscapehasmany benefits. From a practical point of view, it requires less work and fewer resources – so you have more time to enjoy it!

Healthy Beach and Dune System

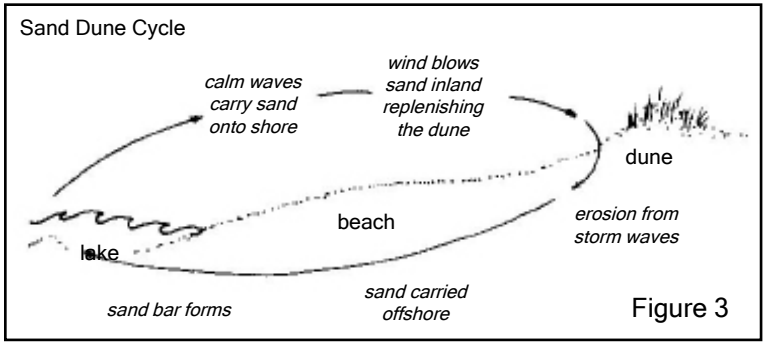


Figure 3

Figure 2

The **foredune** area, which includes the *primary vegetation zone,* (see figure above) is where the native dune grasses grow. These plants have adapted to growing in bare sand and act as a trap for blowing sand.

Once the beach grass has established, small shrubs and trees are able to take root and grow in the *secondary vegetation zone*. The **dune swale** is a low spot that allows water to move quickly through sandy soils.

The **backdune** contains the *tertiary vegetation zone* where native trees and shrubs are able to grow and protect the properties behind them from the wind.

In a healthy dune system earlier plant groups, like beach grass, prepare the way for groups of plants, like those found in a woodland. This kind of growth over time is called **succession.**

How to Plan, Implement and Maintain Your Dune Property

This section provides important information on dune restoration, rehabilitation and naturalization.

Dune Basics: Restoration or Rehabilitation of a Foredune
Planting Dune Vegetation
Planning New Development along the Dune Shoreline

Residential: Planning and Maintaining a Residential Dune Property
Phasing Plan for Naturalization

Municipal: Maintaining Dune Health on Public Property

Restoration or Rehabilitation of a Foredune

The following section explains where to locate a sand fence on your property, and how to construct and install it.

Without a vegetated foredune, sand will drift inland, farther and farther away from the beach. The best way to prevent the build up of sand on your property initially is to prevent sand drifting using a wooden sand fence. Dune vegetation can then be planted behind it to anchor the sand. Fencing is usually only necessary for the first 2 or 3 years until the dune vegetation is established.

A sand fence is the first line of defence for creating a base where dune vegetation can begin to grow. The fencing will slow the onshore wind causing the sand to fall on the downwind side of the fence. A fence made of wooden slats works best, and is often available at the local Co-op.

Proper placement of sand fencing is critical for collecting sand in the correct location. The fence should face perpendicular towards the prevailing winds. Existing dunes in your area can be a good guide for where your dune should be developed. The deposition zone behind the fence (where you can expect sand to be deposited), should be about 8 m (26 ft) leeward of the fence. If you can line up with existing dunes on your beach, the fence should be installed about 3-4 m (10-13 ft) in front of the base of the dune. The fence may become buried, so repositioning the fence as sand accumulates should be considered.

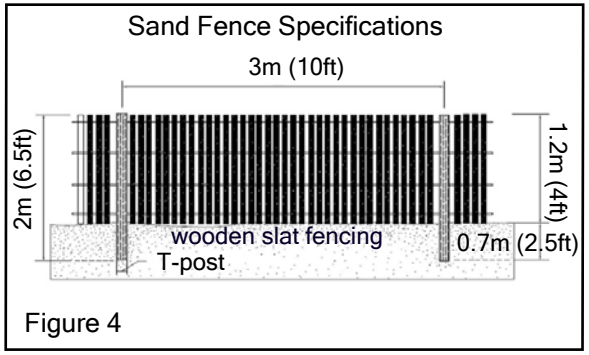


Figure 4

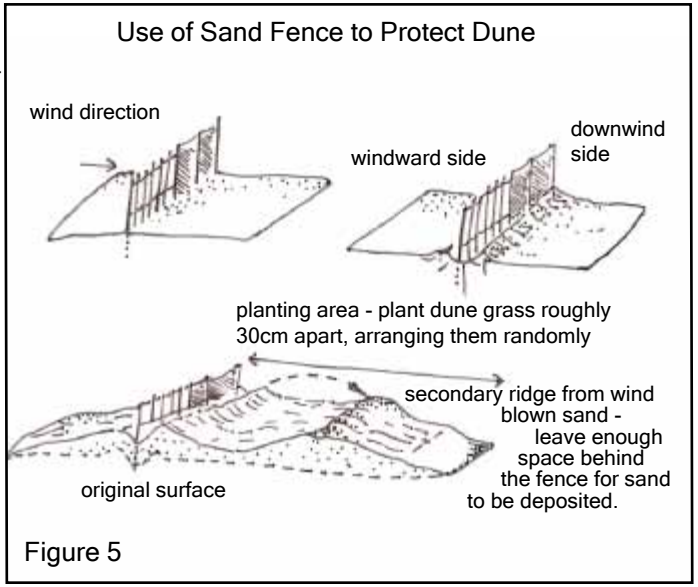


Figure 5

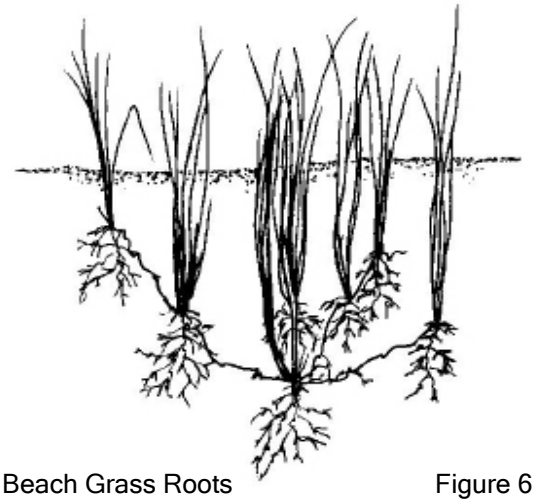
Sand fencing should be composed of natural wood which has not been chemically treated and that breaks down over time. Materials can be found at your local hardware store. Wooden slat fencing can be bought in 18-30 m (60-100 ft) rolls and is 1 m (3 ft) in height, along with 2 m (7 ft) T-posts to anchor the fence. Alternately, 4x4 inch wooden posts available from the lumber yard could be used.

The posts should be pounded 3/4 m (2.5 ft) into the sand. To secure fence segments, attach the wooden slat fencing to the windward side of the posts.

Planting Dune Vegetation

Like sand fencing, the role of vegetation is to slow onshore winds and trap sand, allowing it to gather and build up. Used together, sand fencing and dune vegetation is an extremely effective way to restore dunes.

Plant stems and leaves help protect the sand surface from wind erosion. The plant's root structure knits the dunes together to stabilize them. Dune vegetation renews itself naturally, providing permanent cover, and needs no ongoing maintenance.



Beach Grass Roots Figure 6

Beach grass facts:
Beach grass will grow as more sand gathers around it, making it suited for the ever-changing dune system to which it has adapted itself.

Planting should occur in late autumn when plants are dormant. Autumn weather provides a cool and moist environment that reduces stress on new plantings. Fall planting also gives the grass a head start for growth in spring.

It is possible to plant beach grass in the spring, but the success rate drops by 25%. It takes about 3-4 years for beach grass to fully establish.

Beach grass, as it is referred to here, also goes by the name Marram or American Beachgrass (*Ammophilia breviligulata*). It is perhaps the most successfully used species in dune restoration along the Lake Huron coastline. Other important beach grasses like Long-Leaved Reedgrass and Great Lakes Wheatgrass are also important stabilizers.

Beach grass should be harvested locally. The closer to your property the better. Avoid plants from other dune systems in order to prevent the transfer of diseases and different plant genetics. Beach grass should be used in areas where sand drifting is a problem. (See Contact Information for specific suppliers)

Grasses should be planted 30 cm (1 ft) apart in an irregular pattern in order to slow wind speeds and prevent erosion. This will also help to achieve a more natural look.

Beach grass is different from the grass we associate with our lawn. Beach grass is a special coastal plant that capture wind blown sand – keeping it from continually blowing inland.

Planning New Development along the Dune Shoreline

Beaches and dunes are dynamic coastal features. All construction in dynamic beach areas is subject to zoning bylaws, building codes and conservation authority regulations.

Seek input first before starting any construction, as these sensitive environments have natural hazard elements, pose unusual challenges and require special considerations.

Before you start:

Contact your local municipality for information on building and construction regulations to find out what can and cannot be built.

Contact the local conservation authority for more information and regulations pertaining to private property. There are six conservation authorities along Lake Huron's coast. If there is no conservation authority in your area contact the Ministry of Natural Resources.

Construction and alteration along beaches is restricted by law.

Keep the following points in mind when choosing a location for a cottage or other building. These suggestions represent best practices:

- If you're planning a deck, check first with the local municipality or conservation authority to see if they are permitted. If they are, ask for advice on the best location.

- Keep a buffer of native vegetation between your cottage and the dune; the bigger the better! Wider buffers are more effective at water filtering, erosion protection and benefiting biodiversity. Restore a buffer if none exists.

- Locate septic fields as far away from the waterfront as possible, to avoid water quality problems. This is especially true in sandy soil areas where effluent can flow quickly to the lake.

- To conserve existing natural areas, establish clearly marked construction boundaries to minimize disturbance of the existing site. Restore damaged areas to provide habitat and promote biodiversity.

- Locate new buildings close to existing roads and behind the back dune.

- It is important to keep turfgrass lawn out of the dunes.

- Drain impermeable surfaces away from the waterfront to avoid storm water contamination in the dunes and at shore.

- Properly dispose of construction waste at your municipal landfill site.

Planning and Maintaining a Residential Dune Property

Beach access can subject dunes to foot traffic, trampling and potential tearing of the dune fabric. If your property is located in or near the foredune, tke special care in the design of your beach access pathway. Consider sharing beach access with neighbors, and try to maintain a single lane path. Minimizing the number of beach access points is critical to maintaining healthy, well-vegetated dunes.

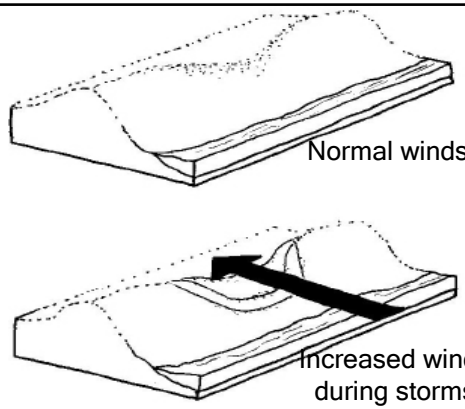
Make beach access pathways as narrow as possible.

Figure 7

Create an 'S' curve design for your path, as straight pathways tend to promote sand drifting.

With fencing, you can line both sides of the path to reduce erosion effects from the wind and sand movement across pathways, and help define where people should walk through the dune.

If your property is located farther back in the dune, it is best to design a natural landscape that fits in with the dunes and doesn't compete with existing vegetation. The benefits of naturalized landscapes are described on page 9, under "Phasing Plan for Naturalization".



How a 'blowout' develops

Figure 8

There will be less erosion and loss of sand by wind if an 'S' shaped path is made.

Figure 9

It is important to cordon off newly planted areas while plants are first establishing to protect them from foot trampling. This will help to create beautiful landscaping using native plants.

Phasing Plan for Naturalization

Lawns don't belong on the coastline. Native coastal plants help protect the natural resiliency of our lakeshore.

When landscaping, the preferred approach is to naturalize. Properties that are planted with turfgrass lawn, can be re-planted with native grasses and shrubs in patches. This will result in a more natural landscape and also reduce maintenance requirements. (See Appendix for a list of native plants you can use to naturalize your property.) Use a local contractor to remove turfgrass using a sod cutter or rent the equipment to do it yourself. (See Contact Information for help in contacting the right people.)

Alternative: If turfgrass is planted on the foredune, it is best to remove the turfgrass by digging it up until the bare sand is exposed. It is important to plant dune grass immediately to prevent the wind from blowing the sand away.

If turfgrass is located on the backdune, place newspaper over the grass to smother it. Use a thickness of 10-15 sheets along with mulch over top to hold the newspaper in place. It takes about 1 year for the turfgrass to die and hand weeding may be required in the following year to remove stubborn plants. Turfgrass can also be dug up, but, again, you will want to plant right away to prevent loss of precious soil and sand.

Geotextiles can also be used, and these can be obtained from a local landscape company or hardware store. They need to be anchored properly, usually with a sandbag (staples tend to pull out with the strong lake winds) to hold down the ends. It stays until the turfgrass is killed, then it can be removed.

Try to limit turfgrass as much as possible. It is especially important to keep it away from the special dune system on the waterfront. Reduce irrigation and fertilizing to a minimum

Native plant restoration means freedom from that noisy mower.

to avoid negative impacts on the dune.
Ideally, in dune areas the foredune should be covered with native dune vegetation. Then where the cottages are (usually, but not always, on the second dune ridge) it is a good idea to have a naturalized buffer between the foredune and the front of the cottage.

A naturalized buffer will promote good water quality, inhibit the introduction of invasive plants and prevent sand drifting.

Many native dune plants can take more than one year to mature; it is important to give them the time they need. Plants that are native to dune systems are especially suited to hot and dry conditions. No irrigation systems are required as plants do not need watering to ensure successful establishment.

Maintaining Dune Health on Public Property

Along the Lake Huron shoreline, there have been coastal dunes that have been severely damaged and displaced through the construction of buildings, parking lots, boat houses, and other structures. Development can impact dunes either through their direct removal or by blocking the movement of sand between the dunes, lake and beach.

Vehicles can quickly destroy dune vegetation with one crossing. Information and awareness signs can be useful in keeping vehicles off the beach. The only access that is permissible on the beach should be for emergency, patrol and maintenance vehicles.

In these situations, have a limited number of gated access points, with entry strictly for these vehicles. It is important to minimize their contact time on the beach, so their timw and location on the beach should be well planned.

The area of the dune that is protected from wind effects at beach entry points can be extended by adding a short segment of sand fencing to either side of the beachside gate. (See Figure 7)

Effects of vehicle tires can extend 20 cm (7 in) deep. The turning wheels disturb sand and break plant roots.

For maintenance, such as after a storm, it may be necessary to remove extensive amounts of driftwood - but important to leave the strand line untouched.

During the off-season, the placement of a sand fence across the width of the gated access opening will protect against erosion and wind scouring. This fence can be installed on Thanksgiving weekend and left over the winter until the May 24 weekend, when it can be removed again.

It is important to keep public access to designated pathways. For example, clearly marked pathways from the parking lot to the beach directs pedestrian traffic to specific pathways. This reduces the number of pathways people create from their cars over the dunes.

If there is on-road parking, use signs to direct pedestrian traffic to main pathways and use rope barriers along the dune to direct access to designated paths.

Having a pathway between the rope barrier and the front of the cars would help direct people to the designated crossings without forcing them to walk behind parked cars.

When implemented, these measures will reduce damaging effects to the dunes and dune habitat from pedestrians and vehicles.

Maintaining Dune Health on Public Property

Raking

The practice of mechanical beach raking is not recommended, as it is very disruptive to the dune system and the processes that maintain them.

Mechanical raking of the beach often removes the strand line debris, which is an important nutrient source for organisms living in the dunes. Raking also dries the top layers of sand making that sand more vulnerable to wind erosion, causing more inland drifting. Nuisance algae and other noxious debris can be raked by hand, causing much less disturbance.

Pathways and Boardwalks

Appropriate planning of pathways and boardwalks plays a key role in dune health. The following guidelines can assist in planning pathways and boardwalks across dunes. A qualified coastal professional should also be consulted as to the best design and placement of a boardwalk.

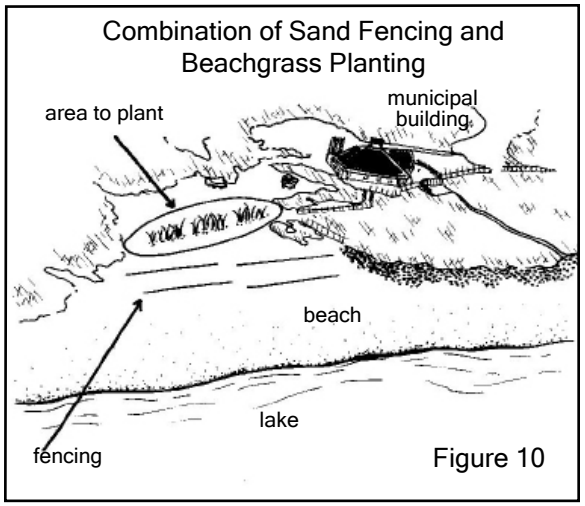


Figure 10

Raised wooden structures need to be considered with great care, and are only appropriate for intensively-used access corridors.

Angle beachside path entries or boardwalk stairs away from prevailing winds to minimize the funneling effect of the wind. Design wooden boardwalks or other moveable materials that can be lifted or cleaned off if sand starts to deposit.

Avoid permanent structures, such as asphalt and concrete, as they do not flex and move with the ever-changing dunes.

Choose convenient locations for paths. Avoid areas with rare plants. Limiting access by using well-marked pathways reduces the number of off-track crossings and unauthorized paths.

Planting Tips

The goal when planting is to achieve a naturalized landscape that will help the dunes.

Native dune vegetation is easy to maintain and a **cheaper alternative** since the plants live for a long time and are lower maintenance. Native dune plants are also your ally in protection from sand drifting and erosion.
Healthy vegetated dunes makes the beach more **resilient** to the effects of storms and high lake levels.
Plant dune grasses in a **natural random order** for a natural look.

Plant **different species** of native plants to maximize biodiversity.
If you wish to have a more formalized garden using ornamental plants, limit this type of gardening to areas around the cottage building, away from the delicate dune system.

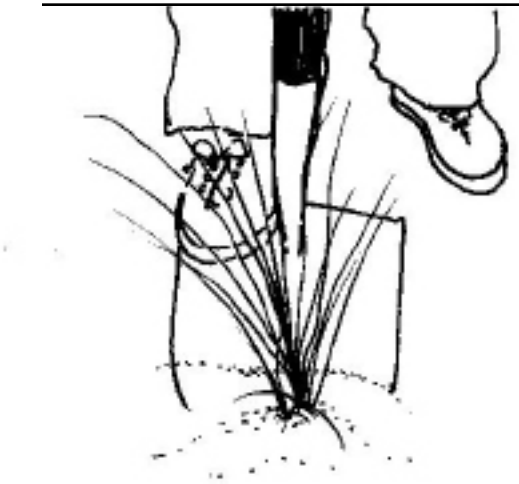
Do not use **armour stone** (quarry stone or rocks) as it interrupts the changing nature of the dune landscape.

Marram
or
American Beachgrass

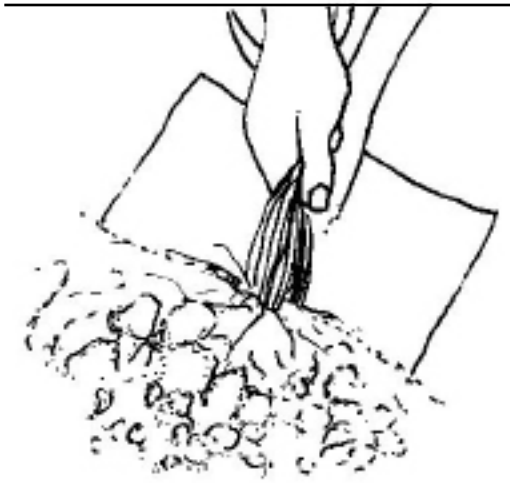
Ammophilia brevilugata

The Nitty Gritty: Beach Grass Harvesting Basics

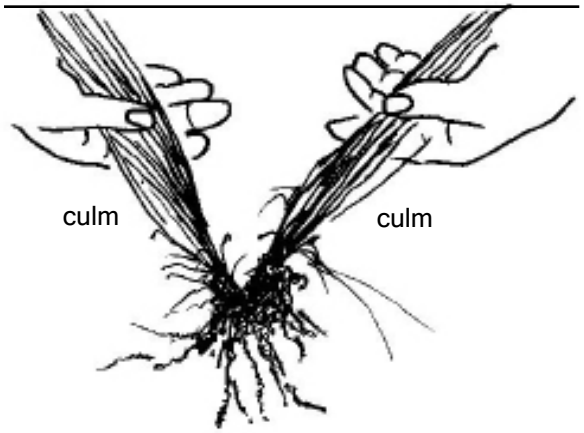
Step 1: Cut plants with a spade and make sure to cut the underground roots, in order to get the whole plant.



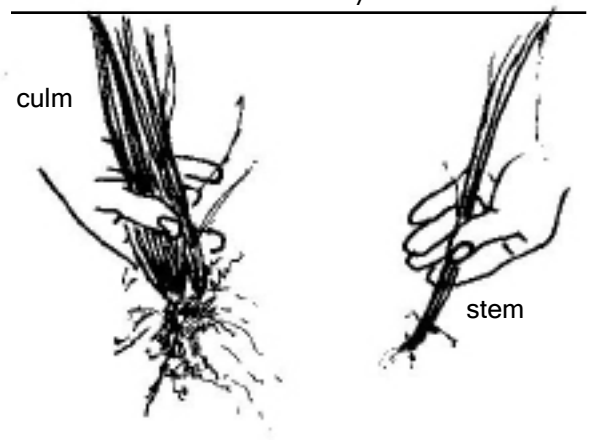
Step 2: Grab leaves of the plant and pull, shaking off sand.



Step 3: Separate the plant into single culms.



Step 4: Each stem will not typically have much of a root system.

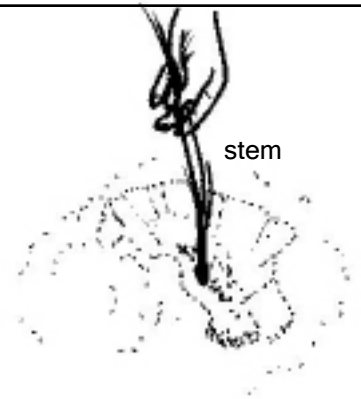


The Nitty Gritty: Basics for Transplanting Beach Grass

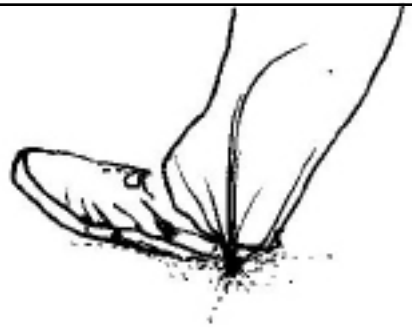
Step 5: To plant the grass, push the spade's blade 20-30 cm into the sand.

Step 6: Move the spade's handle forward, creating a hole in the sand.

Step 7: Place the grass stem into the hole. The grass should be planted 15-20 cm into the sand. The stem tolerates being buried.



Step 8: Take the heel of your foot and pack the sand around the plant to eliminate any air pockets around the roots. Do not water.



Living Fences

Use a living fence made up of medium to large shrubs as a privacy screen. This will also help keep the sand off your deck, if you have one.

Planting can follow a naturalized or more formal design, depending on the look you want. Living fences can also help direct where people should cross the dunes.

Plant Suggestions:
Less than 1.5 m

Note: These are example drawings

Arctostaphylos uva-ursi

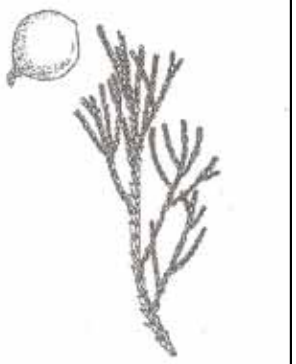
Bearberry

Hypericum kalmianum

Kalm's St. John's Wort

Juniperus communis

Common Juniper



Juniperus horizontalis

Creeping Juniper

Potentilla fruticosa

Shrubby Cinquefoil

Prunus pumila

Sand Cherry

Rhus aromatica

Fragrant Sumac

Rosa acicularis

Prickly Wildrose

Living Fences

Between 1.5 to 2.5 m:

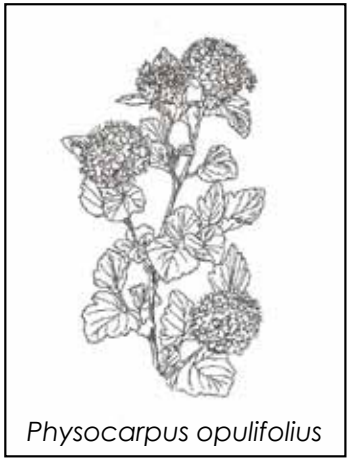
Note: These are example drawings

Cornus foemina

Grey Dogwood
(wet areas)

Cornus stolonifera

Red-Osier Dogwood



Physocarpus opulifolius

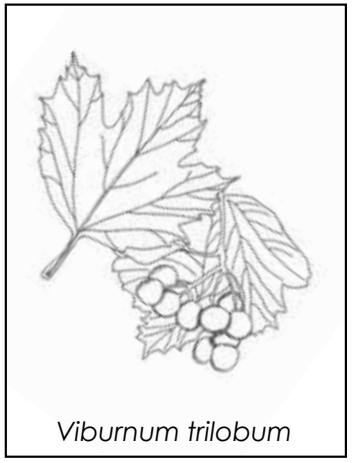
Ninebark

Salix cordata

Sand Dune Willow

Salix discolor

Pussy Willow



Viburnum trilobum

Highbush Cranberry
(wet areas)

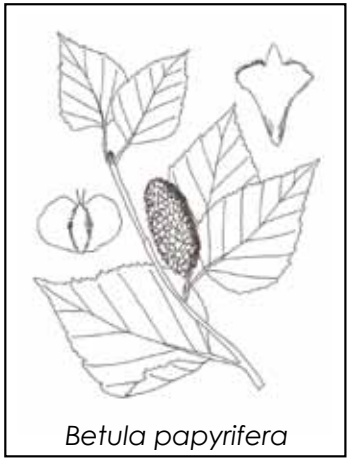
Living Fences

Between 3 to 8 m:

Note: These are example drawings

Acer spicatum

Moose Maple
(rocky places, slopes)

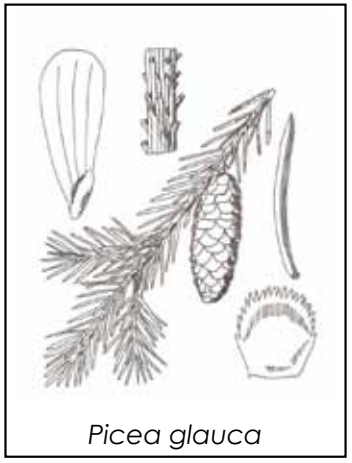


Betula papyrifera

Paper Birch

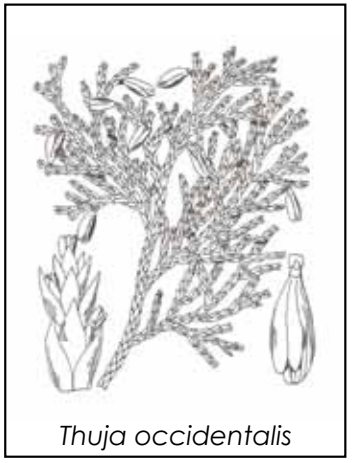
Larix laricina

Tamarack



Picea glauca

White Spruce



Thuja occidentalis

White Cedar

Passive Solar Energy

Consider planting one or several large deciduous trees on the south side of the cottage. This will help to reduce heat gain during the summer months, while maximizing sun exposure in the winter.

Deciduous Trees:

Note: These are example drawings

Betula papyrifera

Paper Birch

Fraxinus pensylvanica

Green Ash

Larix laricina

Tamarack

Populus tremuloides

Trembling Aspen or
Big-toothed Aspen

Quercus rubra

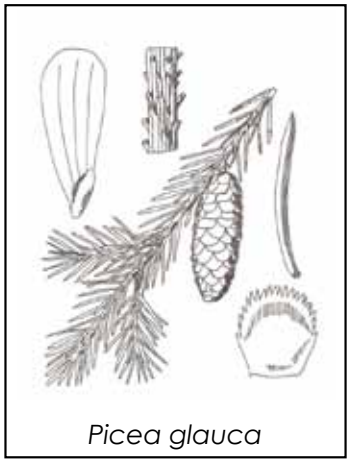
Red Oak

Windbreaks

If you have room and require a winter windbreak, plant evergreen trees on the north or northwest side of your cottage to act as a natural windbreak. The windbreak will provide privacy to adjacent properties, while also reducing cooling winds in the winter.

Evergreen Trees:

Note: These are example drawings



Picea glauca

White Spruce

Pinus resinosa

Red Pine

Pinus strobus

White Pine

Thuja occidentalis

White Cedar

Septic Fields

Septic systems do not belong on the beach and in dune areas, and if you have one, consider relocating it. When upgrading the system, consider these options:

- Place the septic field as far away from surface water as possible. Septic systems must comply with Public Health regulations. Please contact your Public Health Unit.

- The septic system must be located on the downwind side of the dune.

- When maintaining your system, carefully dig up plants and set them aside to be placed back on top of the system after maintenance is complete.

- Be careful that plant roots do not clog the septic system.

- Avoid parking on a septic field turfgrass lawn.

Plant Suggestions:

Note: These are example drawings

Arctostaphylos uva-ursi

Bearberry

Prunus pumila

Sand Cherry

Schizachyrium scoparium

Little Bluestem

Planting for Beauty

Spring Flowering:

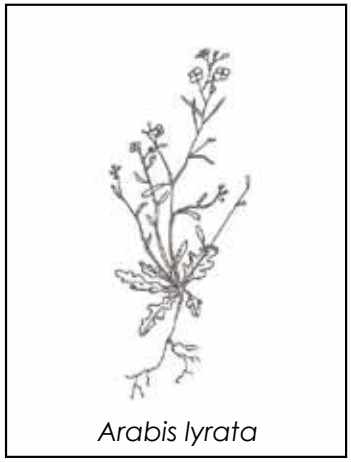
Note: These are example drawings

Anemone multifada

Cutleaf Anemone

Aquilegia canadensis

Columbine



Arabis lyrata

Lyre-leaf Rock Cress

Arctostaphylos uva-ursi

Bearberry

Castilleja coccinea

Indian Paintbrush

Iris versicolor

Blueflag Iris

Koeleria macrantha

June Grass

Maianthemum stellatum

Starry False Solomon Seal

Primula farinose

Bird's Eye Primrose
(wet areas)

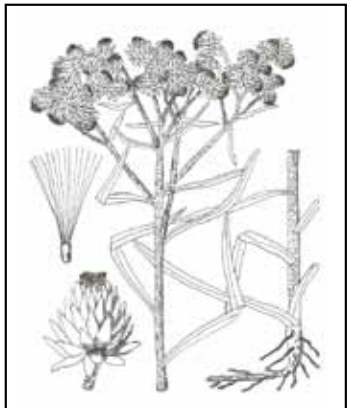
Planting for Beauty

Summer Flowering:

Note: These are example drawings

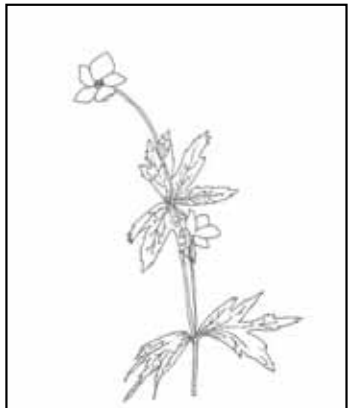
Achillea millefolium

Common Yarrow



Anaphalis margaritacea

Pearly-Everlasting



Anemone canadensis

Canada Anemone
(wet areas)

Artemisia campestris

Wormwood

Asclepias incarnata

Swamp Milkweed

Asclepias syriaca

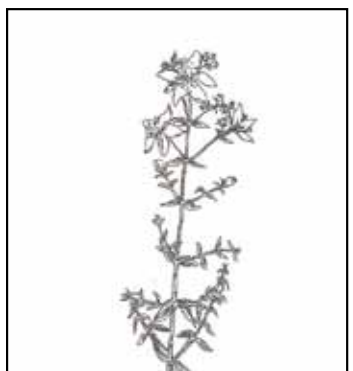
Common Milkweed

Campanula rotundifolia

Harebell

Castilleja coccinea

Indian Paintbrush



Hypericum kalmianum

Kalm's St. John's Wort

Lathyris japonicus

Beach Pea

Planting for Beauty

Summer Flowering:

Note: These are example drawings

Lillium philadelphicum

Wood Lily

Pycanthemum tenuifolium

Slender Mountain-Mint

Oenothera biennis

Evening Primrose

Senecio pauperculus

Balsam Ragwort

Planting for Beauty

Fall Flowering:

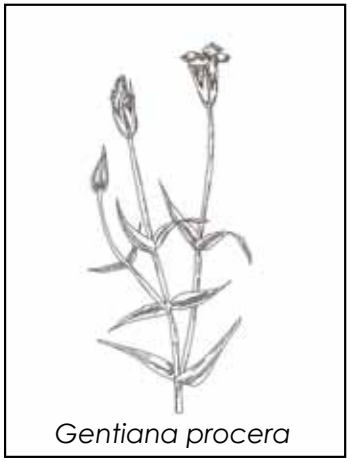
Note: These are example drawings

Andropogon gerardii

Big Bluestem

Camassia esculenta

Camas Lily



Gentiana procera

Fringed Gentian

Oligoneuron ohioense

Ohio Goldenrod
(wet areas)

Schizachyrium scoparium

Little Bluestem

Planting for Beauty

Winter Interest:

Note: These are example drawings

Arctostaphylos uva-ursi

Bearberry

Juniperus communis

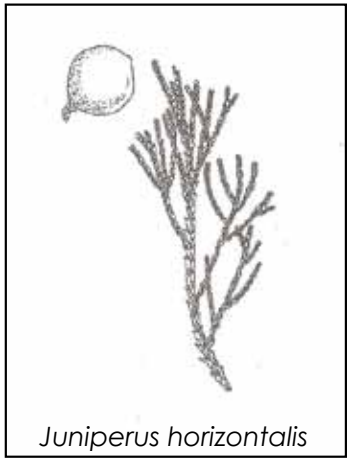
Common Juniper

Cornus stolonifera

Red-Osier Dogwood

Juncus balticus

Baltic Rush

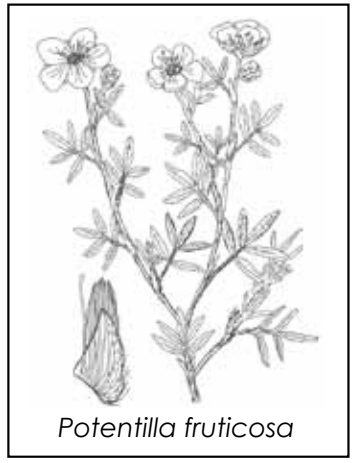


Juniperus horizontalis

Creeping Juniper

Physocarpus opulifolius

Ninebark



Potentilla fruticosa

Shrubby Cinquefoil

Sporabolus cryptandrus

Sand Dropseed

The Trouble with Invasive Species

Invasive plants can entirely overrun an area, choking out native species and completely changing the shoreline's appearance. Invasive plants often have no natural predators and are a serious threat to the health of the dune systems along Lake Huron's coast.

Get to know the plant community in which you live and select plants with the help of your local Conservation Authority, Naturalist Club, or a nursery specializing in native non-invasive species.

Never plant invasive plants on your property and understand which invasive species already exist in your area.

Alien invasive plants (non-native) typically spread quickly and may be difficult to control or eradicate. These plants are of concern because they can be detrimental to other plants and threaten entire ecosystems.

Invasive plants should be completely eradicated from your property and disposed of carefully.

NEVER compost invasive plants.

Refer to the invasive plant list on the next page for help in identifying some of the plants you may see on your property or in your area.

You can also refer to the 'Best Management Practices for the Control of Selected Invasive Plant Species in Coastal Dunes of Lake Huron' in the manual entitled *Management Plan for North Sauble Beach* for more information (found on the Lake Huron Centre for Coastal Conservation website at http://lakehuron.ca).

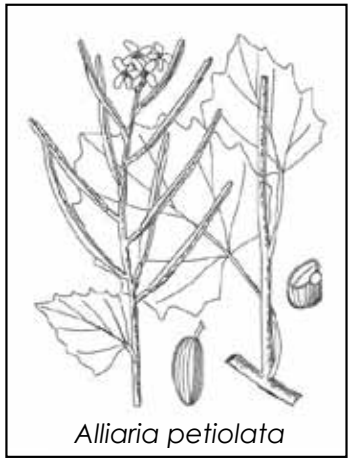
Invasive Plants List

Perennials:

Note: These are example drawings

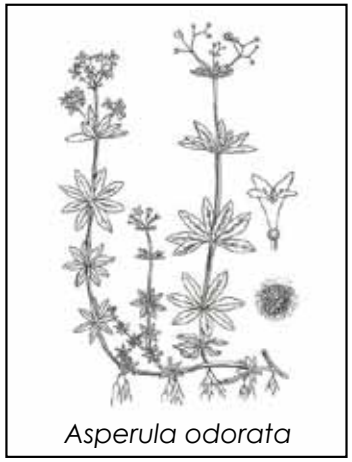
Aegopodium podagraria

Goutweed



Alliaria petiolata

Garlic Mustard

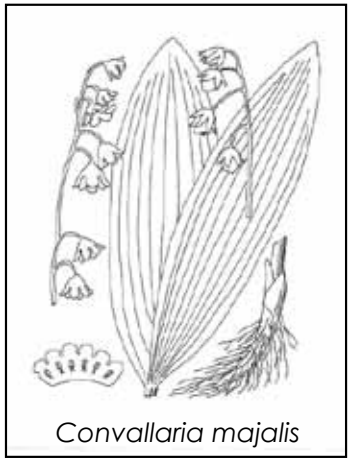


Asperula odorata

Sweet Woodruff

Campanula glomerata

Creeping Bellflower



Convallaria majalis

Lily of the Valley

Coronilla varia

Crown Vetch

Euphorbia esule

Leafy Spurge

Gypsophilla paniculata

Baby's Breath

Impatiens glandulifera

Himalayan Balsam
(annual)

Lunaria annua

Silver Dollar

Invasive Plants List

Perennials:

Lysirnachia nummularia

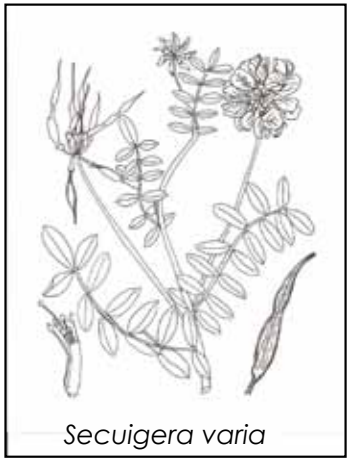
Moneywort

Lythrum salicaria

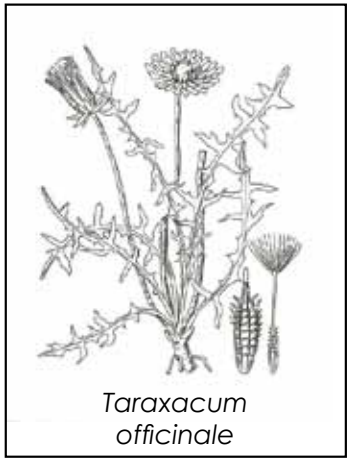
Purple Loosestrife

Phragmites australis

Common Reed



Secuigera varia



Taraxacum officinale

Common Dandelion

Vinca minor

Periwinkle

Trees:

Acer platinoides

Norway Maple

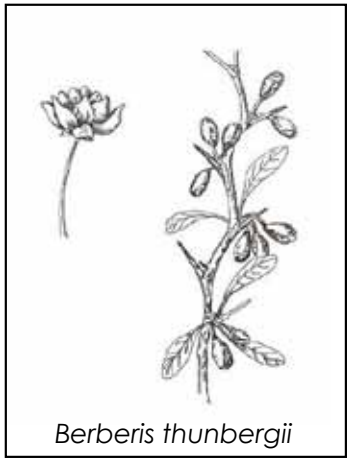
Aesculus hippocastanum

Horse Chestnut

Invasive Plants List

Trees:

Note: These are example drawings



Berberis thunbergii

Japanese Barberry

Berberis vulgaris

European Barberry

Betula pendula

European Birch

Eleagnus agustifolia

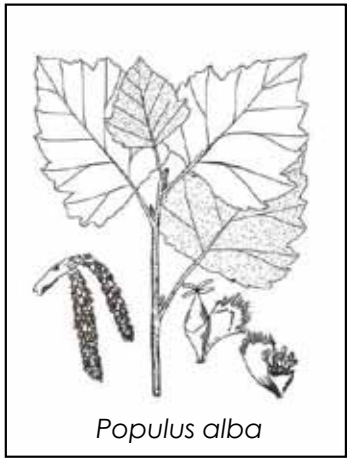
Russian Olive

Eleagnus umbellata

Autumn Olive

Pinus sylvestris

Scots Pine



Populus alba

Silver Poplar

Populus nigra

Black Poplar

Robinia pseudoacacia

Black Locust

Ulmus pumila

Siberian Elm

Invasive Plants List

Shrubs:

Note: These are example drawings

Celastrus orbiculatus

Oriental Bittersweet

Cynanchum nigrum

Dog-Strangling Vine

Hedera helix

English Ivy

Ligustrum vulgare

Common Privet

Rhamnus frangula

Glossy Buckthorn

Rosa multiflora

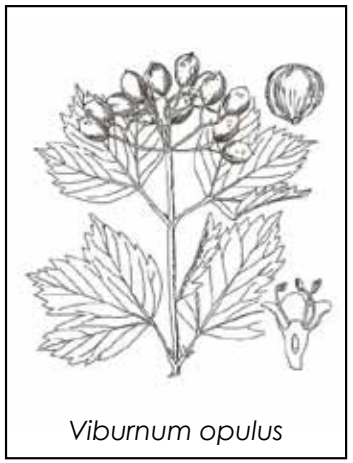
Multiflora Rose

Sorbus aucuparia

European Mountain Ash

Viburnum lantana

Wayfaring Tree



Viburnum opulus

European Highbush Cranberry

Where to Get Help and Advice

The organizations listed are demonstrated leaders in dune conservation and restoration along the Lake Huron coastline.

Through their mandates, they provide a wealth of information and assistance to individuals, municipalities and other organizations interested in improving the health of dune grassland ecosystems on public or private properties.

Lake Huron Centre for Coastal Conservation
The Lake Huron Centre for Coastal Conservation is a grassroots organization dedicated to protecting Lake Huron's coastal environment. Priorities include water quality, coastal processes, climate change, and biodiversity. The centre boasts over a decade of action in the areas of education, stewardship outreach, research and partnerships, and corporate planning.

Advocating stewardship with every segment of the coastal community, the centre is engaged, among other activities, in the planning and supervision of beach restoration projects in conjunction with community partners.
For more information, contact:

The Lake Huron Centre for Coastal Conservation
P.O. Box 178, Blyth, Ontario N0M 1H0
Telephone: 519-523-4478
E-mail: coastalcentre@lakehuron.on.ca
Internet: www.lakehuron.on.ca

Lake Huron Dune Grasslands Recovery Team
The Pitcher's Thistle – Lake Huron Dune Grasslands Recovery Team is engaged in activities aimed at protecting and maintaining Lake Huron dune grasslands ecosystems, the Pitcher's Thistle, and other species at risk. Recovery efforts involve discussions with landowners, municipalities and First Nations, as well as education and outreach, land-use planning, and management of dunes in protected areas. Monitoring and research activities also figure prominently in the team's Lake Huron Dune Grasslands Recovery Strategy.
For more information, visit:

www.pitchersthistle.ca

Contacts:

To obtain Marram grass in the southern Huron County and northern Lambton County areas, contact:

The Friends of Pinery Park
c/o The Visitor Centre
Pinery Provincial Park
R.R. #2, Grand Bend, ON N0M 1T0
Telephone: 519-243-1521
Internet: http://www.pinerypark.on.ca/

Note: If you obtain grasses from Pinery, do not transplant outside of the Huron/Lambton county areas. Contact the Coastal Centre for sources outside of the Grand Bend area.

To obtain some of the native plants listed in the guide contact the following native plant nurseries:

The Ark
Site 755
Bruce County Rd. 23
R.R. #2, Tiverton, ON N0G 2T0
Telephone: 519-396-7518
Internet: http://www.thearknativeplants.com/

Sweetgrass Gardens
470 Sour Springs Rd
R.R. #6, Hagersville, ON N0A 1H0
Internet: http://www.sweetgrassgardens.com/

Acorus
722 6th Concession Road
R.R. #1, Walsingham, ON N0E 1X0
Telephone: 519-586-2603
Internet: http://www.ecologyart.com/

Other Guides to Help You on Your Way:

Available at: www.lakehuron.ca (see publications)

Field Guide for the Control of Common Reed (*Phragmites australis*) on Lake Huron Beaches

Beach Stewardship Guide for the Township of Huron-Kinloss

Stewardship Guide for the Lake Huron Coastline

Conserving Delicate Balance: Management Plan for North Sauble Beach, Ontario, Canada

Beach and Dune Guidance Manual for Saugeen Shores (2003)

Beach & Dune Guidance Manual for Providence Bay, Manitoulin Island

Beach and Dune Stewardship Guide for Port Franks

Lake Huron Centre for
Coastal Conservation

www.lakehuron.ca

Glossary

Backdune – a stabilized dune found on the landward side of the foredune. Typically, it is recognizable by the presence of tree or shrub species. These species are able to establish themselves as a result of sand being deposited in the back dune by wind.

Beach grass – also known as Marram grass (*Ammophilia breviligulata*), is perhaps the most successfully used species in dune restoration along the Lake Huron coastline.

Biodiversity – an array of different animals, fish, birds and plants found existing together in nature.

Blow-out – a term used to describe that portion of a dune which has become mobile, or active, due to the absence of vegetation to stabilize it. It can be induced by natural processes, but is commonly a result of human impacts.

Conservation authority – agency mandated to ensure the conservation, restoration and responsible management of water, land and natural habitats through programs that balance human, environmental and economic needs in Ontario.

Dune swale – is an often wet, depressed area of land that occurs between dune ridges that may, during periods of high lake levels, become submerged with water. But it doesn't have to be from high lake levels, and it doesn't have to be submerged.

Erosion – the removal of sand or soil by wind and waves that generally occurs during periods of high lake levels.

Foredune – an active dune along a beach that naturally changes form over time in response to the forces of wind and waves. It is typically characterized by a predominance of dune grasses.

Invasive species – introduced plants or animals that are known to degrade natural areas by growing uncontrollably, often resulting in the loss of plants and animals that naturally exist in these areas.

Native dune plants – plants that exist naturally in an area, having evolved characteristics that make them ideally suited to their environment. Consequently, these plants require no maintenance, provided their natural environment is healthy and intact.

Relic sand – refers to a finite amount of sand that is cycled between the lake, beach and dunes, with no new sand being contributed to the beach and dune ecosystem.

Strand line – an accumulation of organic material on the beach that has been washed ashore, resulting in the formation of a line parallel to the shoreline. This material is an important nutrient source for the beach and dune, as well as an important source of food and habitat for birds, insects and other animals.

Succession – the process of establishment of successive communities of organisms. Each previous community prepares the ground for establishment of the following community. The end result is the climax community.

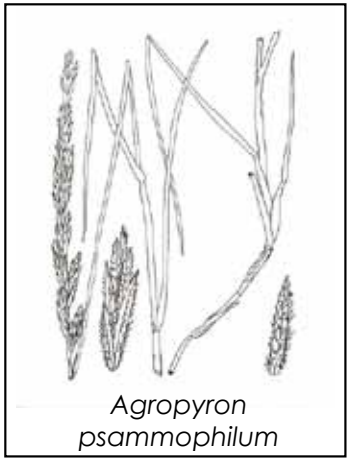
Appendix A - Rare and At Risk Species

Biodiversity is the diversity of plant and animal species in a natural environment. It is needed to sustain us and the ecosystems found on Earth. Biological diversity is continually threatened through human influences. Building roads, structures and homes displaces the natural wildlife from their habitats.

In order to protect our native biological diversity the Canadian government has created the Species at Risk Act to protect the native wildlife populations within Canada. This act was passed in 2003 to provide legal protection to wildlife by preventing extinction and aiding in the recovery of endangered wildlife communities.

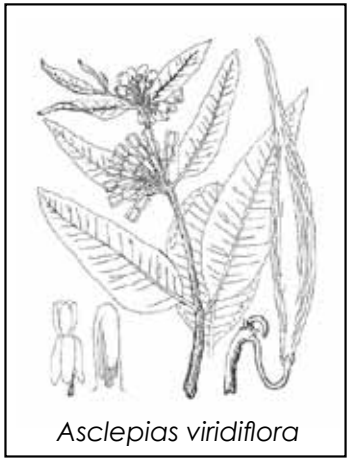
The Ontario Ministry of Natural Resources has developed a database to monitor the local diversity within Ontario. This database contains a ranking system for species found in Ontario based on their diversity with levels of diversity ranging from presumed extirpated (SX) to secure (S).

Although the legislation and data collection are being monitored by government organizations, all Canadians can help through conservation and stewardship. The following pages outline some of the native plant species that are at risk in dune landscapes along Lake Huron. Please protect these species by preserving and caring for their sensitive dune habitat.
A



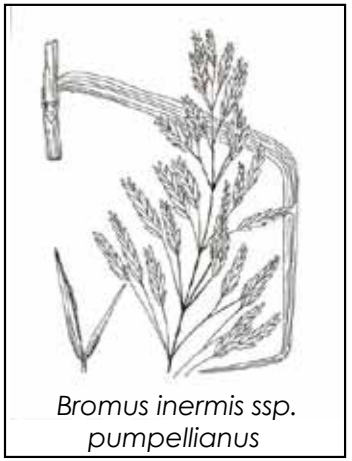
Agropyron psammophilum

Great Lakes Wheat Grass



Asclepias viridiflora

Green Milkweed



Bromus inermis ssp. pumpellianus

Pumpelly's Brome

Calamovilfa longifolia var. magna

Long-Leaved Sand Reed

Cirsium hillii

Hill's Thistle

Appendix A - Rare and At Risk Species

Cirsium pitcheri

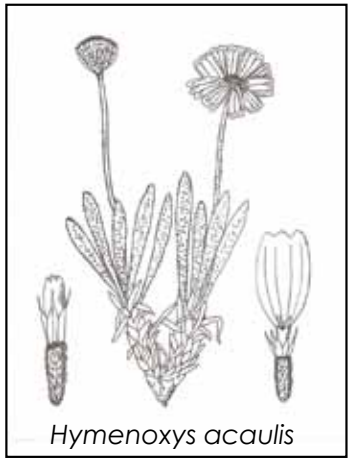
Pitcher's Thistle

Corispermum hookeri

Bugseed

Cyripedium pubescens var. pubescens

Large Yellow Lady's Slipper



Hymenoxys acaulis

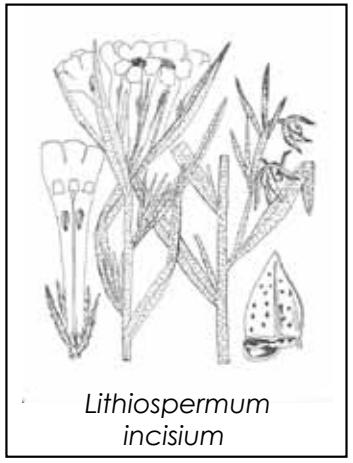
Lakeside Daisy

Liatris cylindracea

Ontario Blazing-star

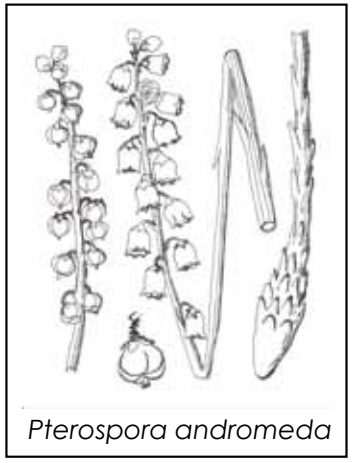
Lithiospermum caroliniense

Plains Puccoon



Lithiospermum incisium

Narrow-Leaved Puccoon



Pterospora andromeda

Pine Drops

Solidago hispida

Hairy Goldenrod

Solidago ptarmicoides

Upland White Goldenrod

Appendix A - Rare and At Risk Species

Botanical Name	Common Name	Identification	Habitat	Other Info
Agropyron psammophilum/ Elymus lanceolatus	Great Lakes Wheat Grass	Grass; yellow bloom April; silvery grey-green, narrow spike leaf, fine texture; 30-90cm tall; grain fruit; long-lived; low growth habit	Grows sheltered dune areas, often on leeward side of foredune or in interdunal meadow; on Canadian side of Lake Huron, found scattered from Point Clark to Manitoulin Island	Provincially rare; distribution so limited, it could be considered globally rare; attracts birds
Asclepias viviflora	Green Milkweed	Pale green cluster flowers June through September; leaves are variable in shape, plants from dry sites have long narrow leaves, while plants from moist sites have round leaves; 60 cm tall	Rare, usually found in high quality habitat in sand dunes	Monarch butterfly feeds on foliage, causes skin irritation in humans
Bromus inermis ssp. pumpellianus	Pumpelly's Brome	Grass; bloom inconspicuous; 50-100 cm tall; hairy leaves	Sandy prairies, sand beaches	Rare in Ontario
Calamovifa longifolia var. Magna	Long-leaved Sand Reed	Grass; brown flowers July to August; long tapering leaves; 30-180 cm tall		Provincially rare
Cirisium pitcheri	Pitcher's Thistle	Pink blooms mid summer; thistle-like leaves covered in white hairs; 1 m tall	Undisturbed sandy shorelines, dunes	Endangered species, protect and minimize disturbance in general vicinity
***Cirsium* hillii**	Hill's Thistle	Pink-purple flower July-August, 25-60cm tall, deep hallowed root system, stems soft rigid and some hairs	Alvars, open limestone woodland, sand dunes, sandy woodlands, Manitoulin Island and west side of Bruce Peninsula	Threatened status
Corispermum hookeri	Bugseed	Brown/green flowers on a spike; lance-like leaves in August to September; hairy stem	Sandy shores and dunes	Rare
Cypripedium pubescens var. pubescens	Large Yellow Lady's Slipper	Yellow slipper-like flower blooms in June; simple leaf; 20-30 cm tall	Moist woods, bogs	Do not transplant, will not survive

Appendix A - Rare and At Risk Species

Botanical Name	Common Name	Identification	Habitat	Other Info
***Hymenoxys acaulis**	Lakeside Daisy	Yellow daisy-like bloom in May to early June; dark green slightly hairy foliage; low growing clump 8-15 cm tall	Bruce peninsula	Rare
***Liatris cylindracea**	Ontario Blazing-star	Herbaceous perennial; linear leaves; long raceme of purple flowers blooms in August; 30-90 cm tall	Dry sand, low dunes, open pine woodlands, wet meadows, dry oak woods, alvars	Rare
***Lithospermum caroliniense**	Plains Puccoon	Deep yellow tubular flowers in clusters April to June; grey-green linear leaves covered with stiff hairs; 30-90cm tall	Dunes, open sandy woodlands	Sensitive status
***Lithospermum* incisum**	Narrow-leaved Puccoon	Tubular yellow flowers April to June; narrow leaves, less hairy than other puccoons; 30-90 cm tall	Dune savannah, sandy woodlands, open dry habitats	At risk status
***Pterospora andromedea**	Pinedrops	Yellowish-brown egg-shaped flowers June to August; reddish-brown leafless stems; winged seeds; 30-100 cm tall	Humus-rich soil in pine forests; occasionally in open sandy pine woods and savannahs	Rare
***Solidago houghtonii/Oligoneuron houghtonii**	Houghton's Goldenrod	Yellow flowers summer to fall; 90 cm; large flowers for a Goldenrod	Alvars, dunes	Extremely rare in and outside of Ontario, occurs only at a few sites on the Bruce Peninsula & Manitoulin Island
***Solidago simplex* spp. randii var. gillmanii**	Gillman's Goldenrod	Yellow disc or ray florets; narrowly oblanceolate, basal and proximal cauline leaves, margins often sharply serrate; 5-80 cm tall	Dunes and sandy shores	Extremely rare
***Stipa spartea**	Porcupine Grass	Grass; yellow flowers April to May; arching clumps; 60-120 cm tall; turns silvery white in fall	Open stabilized dunes, sandy openings in dry deciduous/ coniferous forest on dunes	Rare

Appendix B - Native Species - Trees

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Acer spicatum	Moose Maple	Multi-stemmed trees; reddish-brown bark; red orange fall color; 6-9 m tall	Tolerates partial shade; cool moist acid soils	Commercially available, seed	Attracts wildlife, shade tolerant
Betula papyrifera	Paper Birch	Yellow/green blooms in April; simple leaf; up to 20 m tall; white peeling bark	Intolerant of shade; wide range of soils	Commercially available or rooted by cuttings or by seed	Often multi-stemmed tree
Fraxinus pennsylvanica	Green Ash	Opposite, pinnately compound leaves; oval form; clusters of fruit samaras; 20 m tall	Wide range of soils, tolerates moist conditions	Commercially available	Shade tolerant
Larix laricina	Tamarack/ Eastern Larch	Deciduous conifer; flat-needled, light green spikes; 15-25m tall; bark is scaly, gray to reddish brown; open pyramidal shape	Found in cold poorly-drained sites such as bogs, swamps, lake edges. Requires full sun to partial shade	Commercially available; seed; easily propagated through cuttings from young trees	Casts a light shade; home for squirrels and birds; drops needles in fall
Picea glauca	White Spruce	Conifer; needles 15-22mm long pointed but not sharp, bluish-green; crown conical, irregular, densely foliated; 40m tall; spread to 9m	Most often found by streams and lake shores, full sun to partial shade	Commercially available	Excellent for nesting birds, good windbreak
Pinus resinosa	Red Pine	Conifer; 2-needled pine, needles 10-16 cm long, pointed and shiny dark green; bark reddish brown to pink; 23-32 m tall; 6-12m spread	Found on outwash plains, level or gently rolling sand plains, low ridges adjacent to lakes and swamps	Commercially available	Natural stands are found to occur on sandy soils only

Appendix B - Native Species - Trees

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Pinus strobus	White Pine	Conifer; 5-needle pine, needles 8-10 cm long, soft and flexible; 30 m tall; 10 m spread.	Best on moist fertile soils; can be found on dry rocky to moist wet conditions	Commercially available	Ontario's provincial tree; good for nesting birds
Quercus rubra	Red Oak	Leaves with 9 bristle-tipped lobes, acorn with flat cap	Full sun, sandy soils, well-drained soil	Commercially available	Fast growing for an Oak
Salix myricoides	Bayberry Willow; Blue-leaf Willow	Flowers May; strongly glaucous leaves, green above and bluish-white underneath; 3 m (shrub) or 5 m (tree)	Sand dunes, sandy shores, gravelly shores, shoreline thickets	Cuttings or seed	
Thuja occidentalis	White Cedar	Evergreen, scale-like, pointed leaves, opposite in alternating pairs (in 4 rows), bright green above and pale below; flattened branchlets, in fan-shaped sprays; 15-38 m tall; seed cones are ellipsoid	Wide-ranging habitat, from swamps to dry areas	Commercially available or by bare root or seed	Good windbreak

Appendix B - Native Species - Shrubs

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Arctostaphylos uva-ursi	Bearberry	Broadleaf evergreen; white/pink flowers on a raceme bloom May to June; paddle-shaped leaves, thick and leathery leaves; bright red berries; 30-90 cm tall	Sandy soil, beach transition zones	Commercially available; seed; softwood cuttings	Attracts butterflies and other wildlife
Cornus foemina	Grey Dogwood	Small white cluster flowers bloom in July; bright blue fruit; 6m tall; twigs are reddish in colour and turn grey with age	Pinery, backdunes	Commercially available or by seed	Thicket forming
Cornus stolonifera	Red-osier Dogwood	White flat top clusters, May - July; leaves opposite arcuately veined; 4-5m tall; white fruit	Tolerates sand burial	Commercially available	Also known as *Cornus sericea ssp. sericea*
Hypericum kalmianum	Kalm's St. John's Wort	Broadleaf evergreen; yellow flower blooms July to August; small narrow leaves; dense mound; 60-100 cm tall	Dunes and rocky lakeshores. Prefers moist-wet rich sandy loam, tolerates poor soils and some drought. Full sun to partial shade	Commercially available	Good small shrub for mass planting. Attracts butterflies and bees
Juniperus communis	Common Juniper	Evergreen; 1m tall; blue waxy berry-like fruit; reddish bark	Open meadows, rocky shores	Commercially available	Berries favoured by birds
Juniperus horizontalis	Creeping Juniper	Evergreen; less than 30 cm tall; scale-like leaves; not prickly; blue berry-like fruit	Tolerates sand burial, found in backdune, Pinery	Commercially available	Berries favoured by birds

Appendix B - Native Species - Shrubs

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Physocarpus opulifolius	Common Ninebark	Whitish-pink flowers bloom late spring and early summer; multi-stemmed; upright and spreading with exfoliating bark to reveal several layers of reddish to light brown inner bark	Typically found along streams, rocky banks, gravel bars, and in moist thickets; full sun to partial shade; able to tolerate a wide range of soil conditions	Commercially available; spreads by underground runners	Effective as a hedge or screen for use as erosion control on banks; provides winter interest
Potentilla fruticosa	Shrubby Cinquefoil	Showy yellow flowers June to September; greyish-green pinnately compound leaves; 90-120 cm tall	Moist meadow to dry, between back dunes, tolerates sand burial, found as far south as Pinery	Commercially available or by seed or softwood cuttings	Good erosion control, pest free, maintenance free, attracts butterflies
Prunus pumila	Sand Cherry	White flowers in May; trailing and upright habit; 200 cm tall; edible fruit (1cm)	Tolerates some burial; full sun; tolerates dry conditions	Commercially available	Attracts birds
Rhus aromatica	Fragrant Sumac	Yellow catkin flowers April to June; trifoliate leaf; 1.8-3.5m tall	Backdune, full sun, tolerates dry conditions	Commercially available or by seed; suckering growth; looks best when planted in masses	Attracts butterflies and other wildlife
Rosa acicularis	Prickly Rose	Single white or pink flower, blooms in July; pinnately compound leaves; 1.3m tall	Rocky soils, sun to part shade	Commercially available; seed; stem cuttings	Attracts birds
Salix cordata	Sand Dune Willow/ Heartleaf Willow	Lance-shaped leaves with base that is rounded to heart-shaped; buds reddish-brown; 3-4m tall; fast growing	Typically found on dunes and along lakeshores. Grows on sandy, silty or gravelly soils. Does well also in wet, ill-drained and intermittent flooded soils	Seed or cuttings	Good for use as a low windbreak; erosion control
Salix discolor	Pussy Willow	Catkins in early spring; oblong to narrow elliptic leaves, green surface and white lower surface of leaves; flattened reddish-purple buds; bark grayish brown; 5m tall, 4m spread; multi-stemmed	Common to stream sides, ponds, or in low spots in the landscape; moist sandy, loamy and clay soils, tolerates dry soils; requires full sun to partial shade	Commercially available; cuttings, seed	Weak-wooded but rejuvenates from roots easily
Viburnum trilobum	American Highbush Cranberry	Leaves opposite with 3 lobes; fruit bight red; white flower blooms in early June; 3.5 m tall	Wide range of soils, tolerates moist conditions	Commercially available	Not to be confused with European Highbush (*V. Opulus)*

Appendix B - Native Species - Perennials, Annuals & Grasses

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Achillea millefolium	Common Yarrow	White clustered flowers July to September; alternate compound leaves that are 7-12 cm long with many fern-like leaflets; 90 cm tall	Meadows, poorer soils	Commercially available or by seed	Fragrant foliage when crushed
Ammophila breviligulata	American Beach Grass; Marram Grass	Grass; June -August bloom; spike; 20-60 cm tall; large tap root	Pioneer dune species which acts as a primary dune stabilizer; tolerates burial by sands, full sun and dry conditions	Commercially available; easily transplanted (see planting guide on page 6 for details)	Most common dune vegetation for Lake Huron dunes, with the exception of Sauble Beach
Anaphalis margaritacea	Pearly-everlasting	Yellow/white globe-like flowers June to October; leafy woolly stems; 30-90 cm tall	Meadows	Commercially available	Attracts butterflies
Andropagon gerardii	Big Blue Stem	Grass; blooms September to October; 1.3- 2.5 m tall	Drought tolerant, sun to partial shade	Commercially available; seed; root division	Attracts butterflies and birds
Anemone cylindrica	Candle Anemone	Greenish white thimble-like flower June to July; whorled leaved; 30-90 cm tall	Open sandy woodlands	Commercially available or by seed	All parts are toxic
Anemone multifida	Red or Cut-leaf Anemone	Yellowish-white within maroon coloured flowers May to June; clumping habit; leaves are deeply cut into linear portions with a long petiole; 15-50 cm tall	Shores and rocky banks	Commercially available or by seed or root division	All parts are toxic
Aquilegia canadensis	Red Columbine	Flowers are red with a yellow interior, bloom April to June; compound leaves with leaflets that have three rounded lobes; 60 cm tall	Partly shaded to shaded woodland and meadows	Commercially available or by seed	Attracts hummingbirds
Arabis lyrata	Lyre-leaved rock cress	Biennial; greenish white flowers May-July; rosette of basal leaves; 10-30 cm tall	Rocky and sandy soils	Commercially available	

Appendix B - Native Species - Perennials, Annuals & Grasses

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Artemisia campestris	Wormwood	Biennial; spike of pale yellow-green flowers blooms July-September; silvery green leaves; basal leaves pinnately lobed; 20-80 cm tall	Open sites, sandy soil	Commercially available	
Asclepias incarnata	Swamp Milkweed	Deep pink, cluster flower June to August; 120 cm tall	Inter-dune wet areas	Commercially available	
Asclepias syriaca	Common Milkweed	Pink drooping cluster flowers June to August; leaves are opposite, simple, broad, ovate-lanceolate; 1-2 m tall	Open sites, sandy soil	Can spread rapidly by rhizomes; by seed	Host plant for Monarch Butterfly larvae; toxic to livestock
Bromus ciliatus	Fringed Brome	Grass; yellow flower July to August; drooping florets oat-like appearance; clump-forming grass; 150 cm tall	Sun to part sun; moist soils; stream banks	Commercially available; not rhizomatous	Often in association with conifers such as cedar
Cakile edentula	American Sea-rocket	Succulent annual; white to purple racemes July to September; green fruit divided in two sections; leaves are alternate, oblong, ovate and deeply scalloped to wavy serrated margin; 10-50 cm tall	Sandy beaches above high water line	By seed, in situ	
Calamagrostis arkansana	Low Calamint	Herbaceous perennial; pale purple flowers bloom May to August; egg-shaped leaves along stems; 10-20 cm tall	Inter-dune wet areas	Commercially available	Mint smelling
Calamagrostis inexpansa	Northern Reedgrass	Grass; purple flower; dark green foliage; 1 m tall	Variety of open wet habitats	Commercially available	
Calamovifa longifolia	Sand Reedgrass	Grass; scaly underground roots; up to 2 m tall	Sandy shores	Commecially available	

Appendix B - Native Species - Perennials, Annuals & Grasses

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Campanula rotundifolia	Harebell	Blue or purple bell-shaped flowers June to September; rounded basal leaves; 10-40 cm tall	Open dry meadows, rocky shorelines; shade tolerant	Commercially available or by seed, root cuttings, stem cuttings	
Camas esculenta	Camas Lily	Purple flower, blooms in June; 30 cm tall	Sandy soils, prefers acid soil, semi shade	Commercially available; bulbs	Pollinated by bees
Carex eburnea	Bristleleaf Sedge	Sedge; green blooms in early spring; thin wiry leaves; 30 cm tall	Rocky and sandy outcrops	Commercially available	
Carex scirpoidea	Northern Singlespike Sedge	Sedge; ovate to lanceolate leaves; long rhizomes; 45 cm tall	Rocky outcrops, sedge meadows; tolerates partial shade	Bare root or seed	
Castilleja coccinea	Indian Paintbrush	Annual or biennial; red bract blooms May-July; leaves with 3 narrow lobes; 30-60 cm tall	Wet meadows	Commercially available	Difficult to transplant
Corispermum pallasii	Siberian Bugseed; Pallas' Bugseed	Annual forb; tiny, 5-parted clustered flowers late summer to fall; alternate, stalkless, linear to lanceolate leaves; branches from base; stems covered sparsely with hairs, becoming smooth; 10-45 cm tall	Sandy shores and dunes	From seed	
Corispermum villosum	Hairy Bugseed	Annual forb; compact and dense flowers late summer to fall; linear-oblanceolate or linear leaves; plants usually branched from the base; densely or sparsely covered with hairs occasionally becoming smooth; 10-30 cm tall	Sandy shores and dunes; occasionally adventive on roadsides and railways	From seed	
Cyperus houghtonii	Smooth Sand Sedge	Sedge; rhizomes; v-shaped leaves; 10-100 cm tall	Open sandy habitats	Seed or bare root	

Appendix B - Native Species - Perennials, Annuals & Grasses

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Elymus canadensis	Canada Wild Rye	Grass; yellow, green or brown spike flower August to September; linear leaves; 60-100 cm tall	Dry meadows, dunes and sandy shores	Commercially available or by seed or root division	
Elymus lanceolatus var. psammophilus	Great Lakes Wheat Grass	Grass; blue-green, slightly pubescent, leaves 4-8mm wide; underground rhizomes; 30-90 cm tall	Sand dunes, sandy soils	Seed 1/2" into sand in early spring	Low maintenance, dune stabilizer
Equisetum hyemale	Horsetail	Rush; no bloom; reed-like; hollow evergreen, unbranched stems with black bands; 90 cm tall	Full sun to part shade, wide range of soils	Commercially available or by root division	Attracts dragonflies; spreads from colonies, aggressive
Euthamia graminifolia	Flat-top Goldenrod	Yellow flat-top flowers bloom July-September; grass like leaves; 60-150 cm tall	Sandy pannes between dunes, marsh edges, lake borders, prairies. High organic, sandy soils. Drought tolerant	Commercially available; root division	Plant is attractive to bees, butterflies and/or birds
Festuca saximontana	Rocky Mountain Fescue	Grass; panicle flower; grass-like leaf; basal habit; 25-50 cm tall	Grassland-upland areas with sandy soils, requires full sun to partial shade, drought tolerant	Seed	Useful for erosion control on sandy, gravelly soils; grows well in harsh conditions
Gentiana procera	Fringed Gentian	Blue or violet tublular flowers, bloom in July; leaves opposite and narrow; 15-20 cm tall	Wetlands and bogs	Commercially available	
Iris versicolor	Blue Flag Iris	Blue flower blooms May-June; 10-100 cm tall	Marshes, swamps, wet meadows, soils with high organic content and direct sunlight	Commercially available; single corms or bulbs can be divided or cut from the parent root system	Provides good shoreline protection; the root stock is fed on by aquatic rodents
Juncus balticus	Baltic Rush	Rush; pink/brown flowers blooms spring to mid-summer, clump forming, 100 cm tall	Moist meadows, along streams or lakes, silt and clay loam to coarser sandy substrates	Commercially available, divide in spring, space 25-30 cm apart	Excellent for erosion control; also known *J. arcticus*

Appendix B - Native Species - Perennials, Annuals & Grasses

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Juncus brevicaudatus	Narrow-panicle Rush	Rush, greenish-brown spike flowers blooms mid-summer to fall; grass-like leaves	Found along emergent shorelines; grows best in acidic or peaty moist soils	Divides in spring	
Koeleria macrantha	June Grass	Grass; yellow bloom April-June, grey-green; clump forming, 30-90 cm tall	Prairies, stabilized dunes, openings in sandy woodlands, found in rocky Bur Oak stands	Commercially available, collect seeds in September, mature plants may be divided	
Lathyrus japonicus	Beach Pea	Pink-purple flowers bloom in summer; low sprawling leguminous plant; 30-60 cm tall	Found on sandy shores; grows in sandy, loamy or clay well-drained soils; requires full sun, will not grow in shade	Seed; root division in spring; it may not transplant well so care should be taken	Fixes atmospheric nitrogen; flowers are pollinated by bees, moths and butterflies
Liatris aspera	Rough Blazing-star	Spiked purple flower blooms August to October; stem zigzagged; narrow green leaves; 20-60 cm tall	Full sun, tolerates dry conditions; open sandy woodlands, sandy prairies	Commercially available, seed	Attracts hummingbirds and butterflies
Liatris spicata	Dense Blazing-star	Grass-like leaves that are clumped at the base; tall spike of rose coloured flowers; blooms August to September; 90-120 cm tall	Moist meadows	Commercially available	
Lilium philadelphicum	Wood Lily	Red-orange cup shaped flower blooms July to August; long and narrow whorled leaves; 30-90 cm tall	Open woods, meadows, tolerates shade	Commercially available	
Maianthemum stellata	False Solomon's Seal	White flower blooms in early summer; 30-60 cm tall	An indicator of cool, moist environments; found adjacent to streams; grows best on gravel to silty and sandy loams soils	Commercially available; seed; rhizomes	Different from true Solomon's Seal in that it has its flowers at the end of the stem

Appendix B - Native Species - Perennials, Annuals & Grasses

Botanical Name	Common Name	Identification	Habitat	Propagation	Other Info
Oenothera biennis	Evening Primrose	Yellow flowers bloom spring to late summer; 30-150 cm tall.	Meadows, dry or moist sandy and loamy soils prefers full sun and will not grow in shade; drought tolerant	Commercially available; sow the seeds in situ from late spring to early summer	Attracts bees, butterflies and moths; flowers open in the evening with a strong pleasant smell
Oligoneuron ohioense	Ohio Goldenrod	Yellow flower, blooms July to September	Wet fields, bogs and fens	Commercially available	
Panicum acuminatum var. acuminatum	Hairy Panic Grass	Grass; blooms July-September; olive green to purple tufted grass; 30-60 cm tall	Found in wetlands, prairies and open woods; grows best on sandy soils	Seed	Also known as *Dichanthelium acuminatum var. acuminatum*
Pycnanthemum tenuifolium	Slender Mountain-mint	Whitish to lavender terminal flower with two-lipped petals with purple spots; blooming June to September; narrow leaves; clump forming; 50-75 cm tall	Prairie remnants, open sandy woods, old fields	Commercially available or by seed or root division	Mint smelling
Schizachyrium scoparium	Little Bluestem	Grass; white/green or brown flower August to October; fine textured silver-grey foliage, grows in clumps; 60-90 cm tall	Sheltered areas behind foredunes or in a meadow between the dunes; tolerates dry conditions; full sun	Commercially available or by root dividing and readily reseeds	Erosion control; attracts birds and butterflies
Senecio pauperculus	Groundsel	Long-stalked, deep yellow ray and disc florets late June to July; basal, usually tufted, oblong-lance-like, spatulate, or oblong-elliptic shaped scalloped or saw-toothed leaves; 30-60 cm tall	Alvars and open woodland	Commercially available, seed, root cuttings	
Solidago hispida	Hairy Goldenrod	Yellow flower August to October; broadly oblanceolate to obovate or elliptic, basal and proximal cauline leaves tapering to winged petioles; 20–100 cm	Woodland and forest edge	Seed, root division	Attracts bees, and migrating butterflies; shelter and food for many songbirds and small mammals

Appendix C - Invasive Species - Trees

Botanical Name	Common name	ID	Control Method
Acer platanoides	Norway Maple	Leaves with 4-7 lobes, dark green, opposite	Remove bark around base of trunk, remove saplings with shears or chain saw
Aesculus hippocastanum	Horse Chestnut	Bell-shaped red/white flowers. 5-9 leaflets, palmately compound leaves, thorny round fruit	Remove bark around base of trunk, remove saplings with shears or chain saw
Berberis thunbergii	Japanese Barberry	Yellow drooping flower clusters, many stems; green or red leaves; bright red oblong fruit	Remove bark around base of trunk, remove saplings with shears or chain saw
Berberis vulgaris	European Barberry	Simple, alternate leaves, ovate or obovate; bright red fruit	Remove entire shrub, including roots, suckers
Betula pendula	European Birch	Triangular ovate leaves, double-toothed; 3-7 cm long	Remove bark around base of trunk, remove saplings with shears or chain saw
Elaeagnus angustifolia	Russian Olive	Leaves narrow and oblong, dull green, olive-like fruit; small fragrant flower clusters	Remove bark around base of trunk, remove saplings with shear or chain saw
Elaeagnus umbellata	Autumn Olive	Oval, pointed silver leaves; fruit silver to red	Remove bark around base of trunk, remove saplings with shears or chain saw
Pinus sylvestris	Scots Pine	Evergreen, 2 needled bundles, orange bark; cones conical to ovoid	Remove bark around base of trunk, remove saplings with shears or chain saw
Populus alba	Silver Poplar	3-5 lobed blue green leaves	Remove bark around base of trunk, remove saplings with shears or chain saw
Populus nigra	Black Poplar	Diamond shaped leaves	Remove bark and phloem layer from 10 cm band around trunk, do not damage xylem layer, may encourage suckering, check girdle for re-development of bark
Robinia pseudoacacia	Black Locust	White fragrant flower in drooping clusters, alternate, pinnately compound, oval; bean-like fruit	Remove bark around base of trunk, remove saplings with shears or chain saw
Ulmus pumila	Siberian Elm	Dark green single toothed leaves; fruit round and smooth	Remove bark around base of trunk, remove saplings with shears or chain saw

Beware of  Invasives

Appendix C - Invasive Species - Shrubs & Vines

Botanical Name	Common name	ID	Control Method
Celastrus orbiculatus	Oriental Bittersweet	Greenish-yellow flower clusters, leaves alternate, simple; round orange-yellow fruit; shrub or vine	Remove bark around base of trunk, remove saplings with shears or chain saw
Cynanchum nigrum	Dog-strangling vine	Vine, flowers purple with 5 lobes, leaves opposite, simple, twining stems	Hand pull each stalk at ground level before seed set, remove root to prevent resprouting
Hedera helix	English Ivy	Leaves alternate, simple leaf with white veins, small yellow flowers, groundcover or vine	Hand pull each stalk, dig up root systems or cut stems close to ground with trimmer
Ligustrum vulgare	Common Privet	White flowers in clusters, leaves opposite; simple berry like fruit	Remove bark around base of trunk, remove saplings with shears or chain saw
Rhamnus frangula	Glossy Buckthorn	Small white flowers, alternate rounded leaves that resemble dogwood; black fruit	Remove bark around base of trunk, remove saplings with shears or chain saw
Rosa multiflora	Multiflora Rose	Pink, red, yellow or white flowers; prickles; 1 m tall	Hand pull or dig up root system with spade
Sorbus aucuparia	European Mountain Ash	White flowers; compound leaves 11-17 leaflets; bright scarlet to orange-red berries; underside of leaves are fuzzy	Remove bark around base of trunk, remove saplings with shears or chain saw
Viburnum lantana	Wayfaring Tree	White umbrella shaped flowers, leaves opposite, simple; clusters of black fruit	Remove bark around base of trunk, remove saplings with shears or chain saw
Viburnum opulus	European High Bush Cranberry	Yellow or white flower, leaves opposite, 3 lobed; bright red berries	Remove bark around base of trunk, remove saplings with shears or chain saw

Beware of  Invasives

Appendix C - Invasive Species - Perennials & Annuals

Botanical Name	Common name	ID	Control Method
Aegopodium podagraria	Goutweed	Dense white flower clusters; leaves with long petioles, variegated leaves, 9 leaflets	Hand pull each stalk before seeds set, dig up root system
Alliaria petiolata	Garlic Mustard	White flowers on stalk with terminal clusters; leaves toothed; 1m high	Hand pull, cut stems close to ground with trimmer
Asperula odorata	Sweet Woodruff	White 4-lobed flower; leaves in whorls, laceolate or elliptical; stems hairy	Cut stems close to ground with trimmer, dig up root system with spade
Campanula rannculoides	Creeping Bellflower	Blue flowers; leaves alternate, simple, unevenly toothed	Dig up root system with spade, cut stems close to ground with shears
Convallaria majalis	Lily of the Valley	White bell-shaped flowers; 2-3 basal leaves, oblong, dark green; pale red berries	Dig up root system with spade
Coronilla varia	Crown Vetch	White/purple flower; 7-12 leaflets in pairs, oblong; fruit bean-like	Dig up root system with spade, cut stems with trimmer
Euphorbia esula	Leafy Spurge	Leaves spirally arranged; greenish yellow flowers	Cut stems close to the ground with trimmer
Gypsophila paniculata	Baby's Breath	Leaves linear-lanceolate; white, pink or purple flowers	Dig up root system with spade, before flowers set seed.
Impatiens glandifera	Himalayan Balsam	Lanceolate leaves opposite/whorled and toothed; fruit is club shaped; red-pink cluster of flowers	Dig up root system with spade, cut stems close to ground with shears, do not allow to set seed.
Lunaria annua	Silver Dollar	Leaves cordate, coarsely toothed; reddish-purple flower; stiff hairy stems	Dig up root system with spade, cut stems with trimmer
Lysimachia nummularia	Moneywort	Simple yellow flower; leaves opposite	Dig up root system with spade, cut stems with trimmer
Lythrum salicaria	Purple Loosetrife	Tall plant, opposite leaves; purple flower on a spike	Dig up root system with spade, cut stems with trimmer
Phragmites communis	Common Reed	Reed; perennial, 1-4 m high; tufted spike with white flowers	Cut stems close to ground with trimmer or chainsaw, dig up root system if possible
Taraxacum erythrospermum	Red-seeded dandelion	5-30 cm tall; basal growth, bright yellow flower.	Hand pull each stalk, dig up root systems, do not allow to produce seeds
Taraxacum officinale	Common dandelion	5-30 cm tall; basal growth; bright yellow flower	Hand pull each stalk, dig up root systems, do not allow to produce seeds
Vinca minor	Periwinkle or Myrtle	Short plant; dark glossy green foliage; small purple flower; leaves elliptical and lanceolate; groundcover	Dig up root system with spade, cut stems with trimmer

Beware of  Invasives