Fun Fact:

A flea beetle, *Altica subplicata*, feeds on dune willow leaves, and can limit the growth and speed up the death of a plant.

Dune Building Plants

Mary Penney, Stewardship & Habitat Program Coordinator,
New York Sea Grant

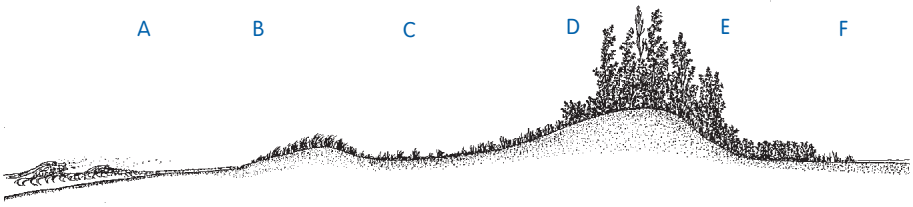

Figure 1: Profile of the Eastern Lake Ontario Dunes and Wetlands Area, which has six main zones: A - beach; B - foredune; C - trough or swale; D - inland or secondary dune; E - backdune; and F - wetland, pond or creek. Woodlands and meadows are found inland of the wetland zone. (Illustration courtesy of Bob McNamara.)

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Look at the plants that are around you when visiting the Eastern Lake Ontario Dunes and Wetlands Area (ELODWA). Do you notice differences between the plants growing on the sand dunes and those growing in your own backyard? Dune conditions are often too harsh for some plants to grow. Extreme temperatures, strong winds, and shifting sands which are dried out by intense sunlight all make the ground unstable. Dune plants that are tough enough to survive often thrive in these conditions. All have adapted to life in the shifting sands, and each play an important role in dune building along the ELODWA. In fact, without dune plants, it is unlikely that these dunes would exist in their current form.

"Pioneer" species, such as beachgrass, change the conditions of the dunes, making it possible for other, larger species of shrubs and trees to grow. This gradual change in plants is known as **succession**. Forests change in stages, with different plants growing at the same site at different times. In the ELODWA there is a progression from lakeside or foredunes to the forested backdunes (see illustration above). In addition to beachgrass, some other dune building species along ELODWA are (low) sand-cherry, sand dune willow, tall wormwood and eastern cottonwood.

Dune Building Plants

Five common dune building plants of Lake Ontario

What is beachgrass?

Beachgrass is the true pioneering plant of the sand dune environment. It stabilizes the dunes by holding the sand in place and changes the environment by retaining moisture and nutrients. Other plant species can then colonize the area because of these changes.

Two varieties of beachgrass are found along the dunes of eastern Lake Ontario, Champlain beachgrass and American beachgrass. Champlain beachgrass is a native dune builder of the ELODWA, and can be recognized by its early to mid-summer bloom. This strain of beachgrass blooms around July 4th, as compared to the more common and larger (non-native) American beachgrass, which blooms around Labor Day.

Long underground **rhizomes** produce clumps of beachgrass plants often in a straight line. The clumps of beachgrass have long, slender shoots (leaves) and can grow two to three feet tall. Tall "spikes" that are packed with seeds grow while the plant is in bloom. Beachgrass is a perennial plant, meaning it does not die after one year of growth. The constant burial by sand encourages beachgrass growth in two directions: horizontal and vertical.

Common name: American beachgrass
Scientific name: *Ammophila breviligulata*

Vertical and horizontal growth allows beachgrass to trap sand, and stabilize the dune. Underground, beachgrass grows rhizomes and roots. Rhizomes are "runners" that grow horizontal to the surface. From the rhizomes new shoots grow vertically through the sand. Rhizomes are sometimes responsible for up to a foot of horizontal growth each year. With the hot, dry conditions that exist on the dunes where seeds are less effective, rhizomes are the primary mode of reproduction for beachgrass.

Where is beachgrass found?

Champlain beachgrass (our native variety of beachgrass) is found only along the shores of the St. Lawrence River and Lakes Champlain and Ontario. Beachgrass grows mainly on top and on the lake-side of sand dunes. Locally you can see beachgrass at all the dunes that have public access along ELODWA, where the growth of this pioneer plant species helps stabilize the sand and create the necessary conditions for other dune building plants.

What is low sand-cherry?

Low sand-cherry, or sand cherry, looks like a small pathetic shrub that rarely grows taller than three or four feet. Despite the plant's thin appearance, its roots are great at trapping and holding the sands of smaller dunes in place.

When visiting the dunes in early June, look for sand cherry's delicate white flowers. Each flower has five petals, which appear before the lance-shaped green leaves of this plant have grown. Dark red-black fruit appears in the summer that ripens from August to September. While some birds and small mammals calling the dunes home eat these cherries, they should not be eaten by people.

Where is low sand-cherry found?

Sand cherry is an extremely rare plant. The variety found on the dunes along the ELODWA is a New York State endangered species and grows naturally in Clinton, Hamilton, Jefferson and Oswego Counties.

Sand cherry grows on the foredunes, which are the small dunes nearest to the shore of Lake Ontario. Commonly you will find these plants growing in clusters. While visiting the ELODWA you can see sand cherry at Black Pond Wildlife Management Area at the raised boardwalk towards Lake Ontario.

Common name: sandcherry
Scientific name: *Prunus pumila* L. -

Illustration Credits:

Common name: American beachgrass
Scientific name: *Ammophila breviligulata*
Fernald - USDA-NRCS PLANTS Database
/Hitchcock, A.S. (rev. A. Chase). 1950. Manual of the grasses of the United States. USDA Miscellaneous Publication No. 200. Washington, DC.

Common name: sandcherry
Scientific name: *Prunus pumila* L.
USDA-NRCS PLANTS Database/Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 2: 326.

Common name: sand dune willow or heartleaf willow
Scientific name: *Salix cordata* (Michx.)
USDA-NRCS PLANTS Database/Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 1: 597.

Common name: tall wormwood
Scientific name: *Artemisia campestris*
L. ssp. *caudata*
(Michx.) H.M. Hall & Clem. - field sagewort
USDA-NRCS PLANTS Database/Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 3: 523.

Common name: eastern cottonwood
Scientific name: *Populus deltoides*
Bartram ex Marsh.
USDA-NRCS PLANTS Database/USDA NRCS. Wetland flora: Field office illustrated guide to plant species. USDA Natural Resources Conservation Service.

Common name: eastern cottonwood
Scientific name *Populus deltoides*
Bartram ex Marsh.
USDA-NRCS PLANTS Database/Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 1: 590.

What is sand dune willow?

Sand dune willow is a rare shrub that typically grows three to six feet tall and sometimes as tall as 12 feet! The lance-shaped leaves of this shrub are 1.2-2.4 inches long, are pointed at the tip and heart-shaped at the base. Leaves grow from the tops of stems that are a dark reddish color. These leaves are covered with small white hairs that turn green with age. All the small hairs help sand dune willow retain water in the hot dry dune environment.

April is a great time to see sand dune willow. In the spring sand dune willow produces flowers, called catkins, resembling pussy willows. Catkins are visible before the leaves. In early summer, the catkins grow long and fuzzy; these are the seed-bearing fruits.

Common name: sand dune willow or heartleaf willow
Scientific name: *Salix cordata* (Michx.)

Where is sand dune willow found?

In New York State, sand dune willow is an endangered species, and is found only along beaches and sand dunes of eastern Lake Ontario. It can also found along some dunes of other Great Lakes, Canada, and Northern Maine.

In the ELODWA, sand dune willow grows on the foredunes where there is plenty of sun and sand with some organic content. A good place to see it is at the bird viewing area at Sandy Pond Beach Natural Area.

Fun Fact:

Tall wormwood is a plant that has had many medicinal uses throughout the years. It has been used as a general cure-all to treat several different problems, such as colds and coughs, scalp infections, sore eyes, and upset stomachs.

What is tall wormwood?

You can see tall wormwood in many sizes along the eastern Lake Ontario dunes. This plant ranges from 4 to 40 inches tall. It begins growing in early summer, producing a small seedling with lacy light gray-green leaves.

With multiple physical stages, it may seem like the important processes are occurring aboveground, but there is much happening below the ground, too. Under the sand is where tall wormwood stores food in a large **taproot**. For several years it may overwinter, which is an adaptation that allows plants to remain alive during times of slowed growth while they store energy and prepare to bloom.

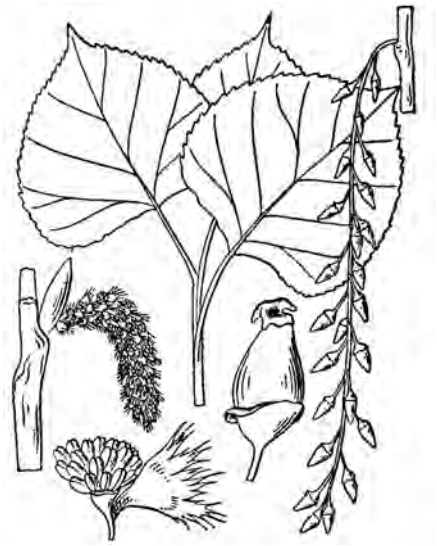
Tall wormwood is a plant that blooms only once in its life. It may take several years to bloom before dying. When enough energy has been stored, the plant will "bolt," quickly sending up a tall stalk loaded with small greenish flowers. Bolting, or blooming, occurs in the late summer. After the plant has bloomed and produced its wind-blown seeds, it turns brown and dies.

Where is tall wormwood found?

Tall wormwood is found throughout the eastern Lake Ontario natural beach areas, as well as along the Atlantic Coast. Locally, tall wormwood grows in single clumps in the foredunes, often among beachgrass. While visiting the area, see if you can identify the various stages of this interesting plant.

Common name: tall wormwood
Scientific name: *Artemisia campestris* L. ssp. *caudata* (Michx.)

Common name: eastern cottonwood
Scientific name: *Populus deltoides* Bartram ex Marsh.



Common name: eastern cottonwood
Scientific name: *Populus deltoides* Bartram ex Marsh.

What are eastern cottonwoods?

Many people may not expect trees to survive the harsh dune conditions, but you will see eastern cottonwood along the ELODWA. These trees are the primary dune colonizing tree species along the ELODWA. These are fast-growing trees. Imagine a tree growing 80 to 100 feet tall, and three to four feet wide on sand! Although these trees grow very large, they do not live very long. Generally eastern cottonwoods live about 80 years, a short period of time for such a large tree. When young, the bark of the eastern cottonwood is gray to yellow-green and smooth. The bark turns gray and develops deep ridges as the tree ages.

Many tree species cannot survive the stress of their trunks being buried; this is not true for the eastern cottonwood. These special trees can be buried by sand and even sprout new roots from their trunks for support. When you see these trees on top of the eastern Lake Ontario dunes, there will typically be others nearby building and stabilizing the dune. Cottonwoods are the only dune building trees along the eastern shore of Lake Ontario, making them a welcome addition to the dune system.

Cottonwoods get their name from the large number of cottony seeds released in June. Lightweight seeds are carried by wind, and will only grow in suitable conditions. Seeds live about five days. If they land in a damp area and are not disturbed for a few days, they can germinate. Often this happens along the edge of the wave line at the beach.

Where are eastern cottonwood found?

Eastern cottonwoods are found throughout the eastern United States, stretching into the mid-western United States in a variety of habitats. In the ELODWA, eastern cottonwoods are commonly seen at the top of dunes (Figure 1, Zone D), where they serve as a dune stabilizing species.

Fun Fact:

The eastern cottonwood grows extremely fast, creating large amounts of wood very quickly. This lightweight, soft wood is used mostly for making paper products. However, its ability to grow quickly has led to the exploration of using this tree as a possible source of renewable fuel in the future.

Dune Building Plants

Threats

Plants living on sand dunes as well as the sand dunes themselves are fragile in many ways, but the dune plants are tough enough to survive the harsh conditions of the dune environment. A major threat to these plants is foot and vehicular traffic. In a single summer, as few as 25 round trips on a path can destroy half the vegetation on the path. Similarly, use by an off-road vehicle will totally destroy the vegetation. When plants die the sand is no longer anchored and can easily be blown by the wind. A once tiny footpath becomes a large gaping hole as the wind eats the dune away. These large holes in the dunes are called **blowouts**, which are U-shaped depressions in the dunes and can be seen throughout the eastern Lake Ontario dunes. It is important to keep the dune plants and dunes intact because they protect inland wetlands from the storm energy of Lake Ontario. These storms can be the cause of some dune erosion. However, when lake levels are lower, newly-exposed sand can be transported by the wind to help rebuild the dunes. If lake levels remain unusually high over a long period of time, the dunes are unable to recover and their stability is threatened. Whether erosion is caused by humans or naturally it is always best to walk only on designated walkways and dune walkovers when visiting the ELODWA to help minimize negative impacts on this unique and fragile ecosystem.

Another threat to dune plants is the spread of invasive species, both plant and animal. Species that are not native to the dunes have been introduced there in recent years. A problem with invasive species is that they can spread aggressively, crowding out native species. Common reed (*Phragmites australis*) is an invasive plant species found at some local dune areas. Common reed is a tall invasive plant that can spread by sending out runners along the ground. New shoots can sprout out of the ground from the runners. The common reed often grows in thick colonies, replacing other plants and creating **monocultures** (literally meaning one culture) of common reed and decreasing species diversity.

Why should you care?

Don't be fooled by the size or appearance of dune building plants, No matter how small, all of these incredible plants play a role in stabilizing the eastern Lake Ontario sand dunes. Without these plants, the dunes would not be able to grow. Without the dunes, many communities would be impacted. Aside from all the animals, birds, and insects that call the dunes home, humans too, depend upon the dunes to shelter inland wetlands, forestlands, farmland, homes and outlying communities from storm surges. Sand dunes act as a barrier from storm energy, absorbing much of the destructive forces from storms, allowing the inland areas to remain calmer. This protection is particularly important for the wetlands found inland of the sand dunes. Wetlands are more than just swamps and marshes; they improve water quality, prevent flooding during times of excess rain and provide habitat for plants and animals.

Dune plants are a vital part of the ELODWA! Protecting dune plants from threats and maintaining a healthy dune plant community helps increase the likelihood that these unique and fragile sand dunes will be here for future generations to enjoy.

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Note: Illustration credits are listed on page 3.

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