

# MASSACHUSETTS WILDLIFE

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## ANNIVERSARY

### Massachusetts Endangered Species Act





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# MASSACHUSETTS WILDLIFE

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**On the Cover:** There is perhaps no greater reminder of the vulnerability of species listed under the Massachusetts Endangered Species Act (MESA) and the great progress MassWildlife has made over the past 30 years under MESA than this recently hatched, ground-nesting seabird facing the dawn of a new day on a Bay State beach. This Least Tern (*Sternula antillarum*, Special Concern) is the smallest of our four breeding tern species. You can hear its squeak-toy calls on the sparsely vegetated coastal beaches where it nests. Photo © Dean Cerrati

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# TIGHT-KNIT GRASSLANDS

As one of the largest landowners in Massachusetts, MassWildlife manages a wide variety of habitats for wildlife. The focus is not just on hunting and fishing, but management of all wildlife, which includes conservation of the full range of species known to occur in the Commonwealth, from large mammals, birds, and fish, to beetles, butterflies, mussels, and plants, both common and rare. The agency's mandate to conserve all species necessitates conservation of the natural communities (habitats) where these species live. Some species have cosmopolitan needs, such as White-tailed Deer (*Odocoileus virginianus*) or Red Maple (*Acer rubrum*), while others, for example, the state and federally endangered American Chaffseed (*Schwalbea*

*americana*), are restricted to only one natural community (habitat type). This herbaceous perennial plant needs open and sunny habitat on sandy soil, with the right moisture regime and associated plants in the correct density.

One natural community MassWildlife has focused on restoring and managing is Sandplain Grasslands. It is a nearly treeless community dominated by native grasses and herbaceous plants, with sparse shrubs on sand or other dry, low-nutrient soils. In addition to native grasses, sedges, rushes, and forbs, there are areas of bare soil and clumps of lichen. This community requires management to maintain its open structure. Management may include cutting of trees, mowing, prescribed fire, or all of



Photo by Troy Gipps/MassWildlife

by Karro Frost, Robert Wernerehl

these tools. Without such disturbance, Sandplain Grasslands are eventually lost to growth of woody vegetation and the accumulation of dead plants and other decomposing organic material. The native grasses in this community support many rare and uncommon plants, birds, and insects. All are important components of the native biodiversity of Massachusetts.

The coastal Sandplain Grassland community and its inland variant are rare and imperiled in Massachusetts. These communities were more common before European settlement. So much of this habitat has been lost to development and the absence of disturbance that some plant species found only in Sandplain Grasslands are now rare and endangered. It is interesting to note that several of these rare plants require underground connections with other species. Two state listed orchids that inhabit this natural community require specific mycorrhizae (underground fungi) for seed germination and nutrient uptake by growing plants. In addition to these two orchids, Grass-leaved Ladies' tresses (*Spiranthes vernalis*, Threatened) and Bayard's Ad-der's-mouth (*Malaxis bayardii*, Endangered), two other rare plants, Sandplain Gerardia (*Agalinis acuta*, Endangered) and

American Chaffseed have root connections, or haustoria, with other plants. Though hidden underground, these root connections between plants and between plants and fungi are an essential part of Sandplain Grassland communities.

How are Sandplain Grasslands different from many of the fields and meadows originally cleared for farming across the state? One important difference is the native warm-season grasses that characterize Sandplain Grasslands, versus the cool-season grasses planted in fields for hay and pastures as forage for cattle, horse, or sheep. Native warm-season grasses include Little Bluestem (*Schizachyrium scoparium*), Big Bluestem (*Andropogon gerardii*), Indian Grass (*Sorghastrum nutans*), Switchgrass (*Panicum virgatum*), and several species of panic grasses (*Panicum spp.* and *Dichanthelium spp.*). In Massachusetts, warm-season grasses grow in clumps, rather than as even sod. These grasses grow best during hot summer days, while cool-season grasses (typical lawn and forage grasses) grow best during the spring and fall (April to May and September to October). Many of the warm-season grasses are also native to Midwestern prairies.



Photos by Robert Werner/MASSWildlife

*Stop and smell the New England Blazing Star (Liatrix novae-angliae, Special Concern). This stunning, late-summer blooming species occurs only in New England and New York in open, sandy habitats. This species thrives with prescribed fire, which reduces accumulation of organic debris and competition from other plants.*



## Sandplain Gerardia

Sandplain Gerardia (*Agalinis acuta*, Endangered) typically grows with Little Bluestem grass, and when in bloom, this plant's gorgeous flowers are often filled with foraging bees, particularly in the morning. These plants only occur at a few locations in the state, all in Southeastern Massachusetts on Cape Cod and Martha's Vineyard. Populations of Sandplain Gerardia can fluctuate widely from year to year depending on weather and fire or other disturbance. In some years, some populations may be down to only a few dozen plants; in others, populations may number over 100,000 plants. As with orchids, roots of this species need to connect to other plants, but in this case it is a direct connection to a plant such as Little Bluestem, rather than connecting through mycorrhizae (a fungal intermediary). The foliage of Sandplain Gerardia is often pale green compared to plants around it, possibly because it obtains most of its nutrients from other plants, rather than producing its own with green chloroplasts in its foliage.



Photos by Robert Wernereh/MassWildlife

Warm-season grasses have evolved a more efficient way to capture the energy of sunlight during the summer, called the “C4 photosynthesis pathway.” They use specialized “bundle sheath cells” in their leaves to combine carbon dioxide from the air with energy from the sun in a chemical reaction that produces sugars. Only about 5% of plants in the world utilize the C4 photosynthesis pathway that warm-season grasses use, while 95% of plants, including cool-season grasses, use a different, “C3 photosynthesis pathway.” The C4 pathway is more efficient during hot, dry summers when warm-season grasses grow best. In turn, warm-season grasses structure the

native Sandplain Grassland communities that rare plants rely on.

MassWildlife has restored and now manages several large Sandplain Grassland communities. These include Frances A. Crane Wildlife Management Area (WMA) in Falmouth and Southwick WMA in Southwick. In addition, MassWildlife is working with partners at Katama Plains (owned by The Nature Conservancy) in Edgartown, and the Middle Moors (owned by the Nantucket Conservation Foundation) on Nantucket, as well as with the Massachusetts Department of Conservation and Recreation on the Granby Sand Plains (part of Mount Holyoke Range

*Volunteers conduct a stem count of Sandplain Gerardia (Agalinis acuta, Endangered) on the coast.*



## Grass-leaved Ladies'-tresses

This mid-to-late-summer blooming orchid has a spiral of white flowers on a stalk. It blooms slightly earlier than most other ladies'-tresses, and is covered with fine pubescence (hairs) on the stem and flowers. In similar species, there are glands at the tips of the hairs, while Grass-leaved Ladies'-tresses (*Spiranthes vernalis*, Threatened) lacks such glands. This orchid relies on mycorrhizae (underground fungi) for seed germination and nutrient uptake by growing plants. Mycorrhizae are connected to other plants and carry nutrients from both the soil and other plants to the growing orchid. Without the appropriate mycorrhizae, the orchid can't survive. Grass-leaved Ladies'-tresses produces hundreds of minute seeds each year, which fall to the ground beneath the plant, or are carried on the wind to a new location. If they are to germinate and grow, the seeds must reach a location with sandy soil, the right moisture regime, and the necessary mycorrhizae.



Photo by Robert Wernerehl/MassWildlife

State Park). These partnerships are very important for protecting and maintaining Sandplain Grassland communities and the rare species that inhabit them across the state. Montague Plains and Frances A. Crane WMAs are managed to support populations of Frosted Elfin (*Callophrys irus*, Special Concern), a rare butterfly that inhabits Sandplain Grasslands and Pitch Pine-Scrub Oak Barrens. Walking at these WMAs, it is not unusual to see photographers capturing images of the beautiful plants, insects, and birds found in Sandplain Grasslands.

The Sandplain Grassland communities unique to the Northeast are typically found in areas near the coast. The rarity of the habitat and the diversity of rare species has focused conservation efforts of a variety of organizations. One important partnership, formed in 2016, is the Sandplain Grassland Network, with a membership from Long Island, New York, to Nantucket and the Connecticut River Valley of Massachusetts. MassWildlife is an active member of this group. Other groups that focus on Sandplain Grasslands conservation in Massachusetts include The Trustees, the Linda Loring Foundation on Nantucket, and the Woodwell Climate Research Center (formerly Woods Hole Research Center).

Every year, MassWildlife botanists request assistance to census the populations of rare plants that occur in Sandplain Grasslands. We turn to the New England Plant Conservation Program (sponsored by the Native Plant Trust), the Botanical Club of Cape Cod and the Islands, the Army National Guard Environmental and Readiness Center at Joint Base Cape Cod, and others, all of which have trained volunteers to assist in identification and counting of rare plants. With all its diverse, varied, and colorful components, both above and below ground, with their dynamic animal and fungal interactions, Sandplain Grasslands of Massachusetts represent a “tightly knit” natural community worthy of research, restoration, and preservation!

MassWildlife, in cooperation with its many partners, will continue to meet its mandate to conserve all wildlife, in part by protecting, restoring, managing, and monitoring Sandplain Grassland communities across the state.



### About the Authors

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Can you identify these MESA-listed species? See answers on page 41.



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