

Sandplain Grassland & Heathland

For the most part, sandplain grasslands persisting in New England today have been strongly shaped by human activity, traditionally, fires. There are perhaps a few exceptions, where coastal salt spray and wind combine with dryness and poor soil to maintain this early successional stage naturally.

Many of the plant and animal species that occur in these grasslands, or their close relatives, also occur in the grasslands of the Midwest. Little bluestem, big bluestem, switchgrass, and Indian grass are major constituents of both the sandplains of Martha's Vineyard and the tall-grass prairies of Iowa and surrounding states.

A broad rolling expanse of prairie with waving grasses, patches of colorful wildflowers, birds singing on the wing beneath a blue, domelike sky, and the smell of rain in the air is one of the most pleasing landscapes on earth. Emotional responses aside, sandplain grasslands contain some of the greatest concentrations of rare species in New England, including the globally rare bushy rock-rose and sandplain gerardia, extraordinary birds such as the short-eared owl and upland sandpiper, and a rich diversity of butterflies, including the aptly named regal fritillary, now all but extinct in New England."

"CONSERVATION STATUS

Successional communities such as sandplain grassland have evolved over millions of years in response to natural disturbances and often contain concentrations of rare species. Before European settlement, wildfires set by lightning strikes or Native Americans were benign, natural events that burned hundreds or thousands of acres, creating sporadic openings of grasslands and shrublands in the dominant forest cover and thus ensuring the continual reemergence of the sandplain grassland community. Since we can no longer depend on spontaneous wildfires to create a mosaic of biologically diverse habitats in various stages of succession over extensive landscapes, we are left with the alternative of maintaining habitats such as sandplain grassland by retarding natural succession, using technologies such as prescribed burning. Many of the best sandplain grassland sites on Cape Cod, Nantucket, and Martha's Vineyard are now being intensely managed and monitored in this way, and it is gratifying to report that the many globally rare species of this community, whose existence is at stake, seem to be thriving on this peculiar kind of tender loving care.

PLACES TO VISIT

Sesachacha Heathland Wildlife Sanctuary, Nantucket. Massachusetts Audubon Society (MAS).
Miacomet Plains, Nantucket. Nantucket Conservation Foundation and the Nantucket Land Bank.
Katama Great Plains, Edgartown, Martha's Vineyard. The Nature Conservancy.
Wellfleet Bay Wildlife Sanctuary, Wellfleet. MAS.
Long Point Reservation, West Tisbury, Martha's Vineyard. The Trustees of Reservations."

"CONSERVATION STATUS

European colonists remarked on the distinctive presence of coastal heathlands and rapidly proceeded to decimate one of its endemic birds, the heath hen; the last individual of this subspecies of the greater prairie chicken was seen on the heath-lands and scrub oak barrens of Martha's Vineyard on March 11, 1932.

The new settlers were also responsible for increasing the acreage of New England heathland by converting the forests to cropland and pasture. Once farming and grazing ceased, areas with the poorest soils, especially along the coast, succeeded to heathland. Most of the Nantucket moors were used as sheep pounds until the mid-nineteenth century. By the late 1900s the Nantucket sheep commons were being referred to as moors—doubtless to appeal to the romantic tastes of the burgeoning numbers of tourists increasingly drawn to the island.

The Nantucket moors were also burned to attract the large flocks of American golden-plovers, whimbrels, and Eskimo curlews that stopped here in late summer and fall, especially in stormy weather, to feed on berries and insects en route from their Arctic breeding grounds to their South American wintering grounds. By midcentury a thriving business had developed around the killing of these birds for the market. Fred Bodsworth, the author of *The Last of the Curlews* writes: 'Often they alighted on Nantucket in such numbers that the shot supply of the island would become exhausted and the slaughter would have to stop until more shot could be obtained from the mainland.' By the turn of the century shorebird species that had once occurred by the tens of thousands were scarce or absent altogether.

"*Cultural Grasslands*

Field, pasture, meadow, lawn, plain, prairie, steppe, pampa are all terms that describe grasslands."

Nantucket Conservation Foundation

<http://www.nantucketconservation.org/index.php>

Head of the Plains Prescribed Fire Effects on Vegetation Community Composition and Rare Species Dynamics

The Foundation's Head of the Plains property represents one of the larger contiguous areas of **sandplain grassland and coastal heathland plant communities** remaining on Nantucket. These vegetation communities, besides being globally rare, also host a suite of plant and animal species of special concern in New England. For this reason, developing effective management strategies for this property is a high research priority.

Sandplain communities evolved in response to frequent disturbances, perpetuated on Nantucket primarily through fire and sheep grazing, and in some part through wind and salt spray. In order to prevent encroachment by woody species, disturbance of some form - **prescribed fire**, mowing, grazing, etc, is necessary. In 2005, the Science and Stewardship Department embarked upon a comprehensive research project to examine the effects of seasonal prescribed fire at the **Head of the Plains**. Research-oriented prescribed burns were initiated in September, 2005. The research design involves conducting three burns (10-15 acres per burn) during the late growing season (September), fall dormant season (November) and spring dormant season (March). During each burn, we place thermocouples (devices that measure temperature at one second intervals) at 30 permanent vegetation monitoring plots, where we have collected detailed plant species data prior to the burns. Seasonal monitoring of the vegetation response to prescribed fire characteristics (flame temperature and duration, seasonality of burns, drought index, and other environmental variables) will help us make educated decisions about when and under what conditions to employ this management tool on Nantucket.

In addition to studying plant community responses to prescribed fire, we also monitor rare plant populations found at Head of the Plains, including Nantucket shadbush (*Amelanchier nantucketensis*), **bushy rockrose (*Helianthemum dumosum*)**, **sandplain blue-eyed grass (*Sisyrinchium fuscatum*)**, **New England blazing star (*Liatris scariosa* var. *novae-angliae*)**, papillose nut sedge (*Scleria pauciflora* var. *caroliniana*), and sandplain flax (*Linum intercursum*). We annual monitor these populations within established rare species plots in order to document population changes and species demographics over time and in response to prescribed fire.

Comprehensive monitoring will help us fine-tune prescribed fire as a management tool to maintain and expand critical sandplain grassland and coastal heathland communities through documentation of short and long term effects of prescribed fire on vegetation community composition and rare species dynamics.

Effectiveness of Disk Harrowing as a Grassland Restoration Tool

The Nantucket Conservation Foundation is an active participant in the **Partnership for Harrier Habitat Preservation (PHHP)** which was initiated in 1996 to compensate for rare species habitat altered by the development of a golf course on Nantucket. The goal of the PHHP is to restore sandplain grassland and coastal heathland vegetation communities and associated rare species habitat within the shrub-dominated communities of Nantucket's Middle and Eastern Moors region. Consequently, approximately 500 acres in the Middle and Eastern Moors are currently being managed by annual mowing to limit the encroachment of woody vegetation, specifically scrub oak (*Quercus ilicifolia*), and to encourage the establishment of forb and graminoid species.

Mowing in the Middle and Eastern Moors reduces the height of woody species but does not significantly reduce woody cover. Furthermore, mowing produces only minimal increases in graminoid (grass-like) plants and fails to promote growth of herbaceous plants. Consequently, the Foundation initiated a research project exploring the use of disk harrowing (a form of tilling that breaks up topsoil and root masses) as a management technique to reduce woody cover and increase graminoid and herbaceous species. We conducted experimental harrowing at two locations in the Middle and Eastern Moors in 2007 to determine the ability of this management technique to decrease woody species cover and promote an increase in graminoid and herbaceous species cover, and have been annually monitoring the response.

Preliminary analysis of the Middle and Eastern Moors harrow research suggests a substantial decline in woody species cover by as much as 50% compared to pretreatment cover, at least in the short term. However, there has been no significant increase in graminoid or herbaceous cover. Another research project at these two sites examining the soil seed bank indicates that grassland seeds may not be present within the soils of these shrub-dominated sites. After analyzing data collected in 2009, the Foundation will determine the next direction for this research project.

Properties Maintenance

As more people visit our "spit of sand", as Melville called it, the responsibilities involved with being the island's largest landholder require us to take on varied and changing skills. Maintaining the many miles of walking trails, open pastures and roads open to the public means mowing and brush cutting cycles be planned out and executed. Using our heavier equipment to cut back the extensive road edges enable clearer sightlines for the safety of drivers, walkers and bikers, as well as mowing and cutting back the hundreds of acres in the Middle Moors "Serengeti" for a grassland restoration project in conjunction with our science department. Fence lines need repair, trail signage must be maintained and constant patrols of our properties are completed for any signs of misuse. Building repairs on our structures are ongoing and the skill sets we've developed allow us to do most work in house, which allows us to control the schedule and costs associated with the repairs. Participating in the prescribed burn program to restore our rare grassland and heathland habitat are examples of longer term efforts the group is involved with heavily.

http://www.vtfishandwildlife.com/books/Managing_Grasslands_Shrublands_and_Young_Forests_for_Wildlife/_Chapter%2003%20-%20Maintaining%20and%20Restoring%20Grasslands.pdf

Chapter 3. Maintaining and Restoring Grasslands

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Northeastern grasslands have provided habitat for grassland birds and other wildlife for many hundreds of years. Historically, most of northern New England was forested with grasslands generally restricted to scattered small openings along river floodplains, wetlands, and beaver meadows. Southern New England, on the other hand, was described by many early settlers as having some extensive openings and many smaller grasslands, usually in the form of coastal sandplain grasslands and heathlands, and openings maintained through Native Americans' use of fire. Further south, in areas such as Long Island and Virginia, large grasslands and savannahs were quite common. These openings were among the first areas settled and farmed by Europeans.

By the 1800s, grasslands were widespread throughout the region and grassland birds including grasshopper sparrows, savannah sparrows, vesper sparrows, upland sandpipers, eastern meadowlarks, and bobolinks benefited. During the late 1800s and the early 1900s, grassland quality and quantity declined due to changes in agricultural technology, a reduction in the use of fire, the loss of farm acreage in New England, and an increase in the human population. Wildlife species adapted to grassland landscapes are now diminishing as farmlands are left idle and revert to forests or are replaced by housing and commercial development. Remnant stands of native warm-season grasses still remain throughout the Northeast along railroad grades, rivers, roadsides, cemeteries, pastures, old fields, and reverting farmlands. Although cooler temperatures in parts of the Northeast do not allow warm-season grasses to produce as much biomass as they do in the warmer climates, a variety of species have proven useful for reclamation projects, wildlife habitat improvements, and forage production throughout the region.

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<http://www.yesterdaysisland.com/2008/features/grasslands.php>

In 2007, over on Martha's Vineyard, scientists from the Marine Biological Laboratory

and the Nature Conservancy started work to restore Bamford Preserve from its use as an agricultural area back to a diverse sandplain grassland capable of sustaining harriers and hawks. Sandplain grasslands are characterized as having nutrient poor soil and the addition of fertilizers to agricultural fields tends to favor non-native plants instead of the tough plants that thrive in salty, less fertile maritime soils. Converting a fertilized and heavily tilled field back to sandplain grassland can take several years.

Interestingly, a dissertation by Andrea Stevens (“The paleoecology of coastal sandplain grasslands on Martha’s Vineyard, Massachusetts - UMass Amherst”) in 1996 discovered that the sandplain grasslands had existed before Europeans arrived and began farming, and grazing sheep, which indicated that burning from Native Americans played a large part in the creation of the vegetation. Paleoecology delves into the vegetation history of an area through the use of soil cores which are sifted for pollen, charcoal and seeds and dated using a variety of radionuclide dating and forensic dating techniques. Deeper cores would indicate if the habitat existed prior to any anthropogenic (man-made) intervention, which is certainly plausible considering natural fire occurrences.

Livestock grazing by the early settlers also kept down the growth of woody plants, and helped the survival of sandplain species. Close to 15,000 sheep were spread across Nantucket by 1845; their grazing created a cultural landscape that favored the preservation of the rare plants and animals associated with sandplain grasslands. In 2005, the NCF reintroduced sheep grazing to their repertoire of habitat conservation practices to control the expansion of woody species. In addition to the consumption of above-ground plant material, sheep disturb the roots and soil with their hooves, creating ideal sites for the germination of grassland-associated species. These effects, along with variations in grazing patterns over time, are hard to reproduce with brushcutting and/or prescribed burning treatments. The scientists and interns at the NCF, led by the Manager of the Department of Science and Stewardship, Karen Beattie, established several research plots to monitor pre and post treatment of vegetation by mowing, prescribed burns and grazing to establish how each plot surveyed changes vegetatively. The NCF conducts a total of 6-8 research projects each year to evaluate the success of land management techniques and the current populations and distribution of endangered harriers and plants associated with the sandplain grasslands (<http://www.nantucketconservation.com/> click on Science and Stewardship – Current Research). But it doesn’t take a scientist to appreciate the natural beauty of these habitats or the incredible opportunity we have to see them. Make sure when you are visiting these areas not to disturb any of the vegetation plots and to tread lightly and stay on the trails.

Controlled Burns Aid New England Forests

John Roach

National Geographic Review

January 25, 2005

For at least 5,000 years before Europeans arrived in North America, Native Americans

periodically set vast swaths of New England on fire. Settlers brought the practice to a halt by the mid-18th century. But today conservationists are again burning the forest to restore the ecosystem and dampen the fire risk to some towns.

Tim Simmons is a restoration ecologist with the Massachusetts Natural Heritage and Endangered Species Program in Westborough. Speaking of the early Native Americans, Simmons said fire "was sort of a Leatherman [or multi-tool] of their time. They used it for everything."

Burning thinned forests, enabling Native Americans to see game, to grow blueberries, and to have elbow room when setting up camps. Fires also served to spur new plant growth and to control insect pests, Simmons said.

Since the landscape burned with such periodic frequency, many of the plants and animals became fire-adapted, according to Simmons, who noted that such species now depend on periodic fires for their survival.

After more than two centuries of fire suppression, some species are headed towards extinction. To save the plants and animals, Simmons and his colleagues are engaged in a long-term program of prescribed burns, each year intentionally setting about 1,000 acres (400 hectares) on fire.

"We started very small, and we're still going very small," he said. "One thousand acres a year is a big year for us, but it's enough to sustain populations of rare plants and animals."

A Hierarchical tree classifiers to find suitable sites for sandplain grasslands and heathlands on Martha's Vineyard Island, Massachusetts

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[Biological Conservation](#)

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The grasslands and heathlands of Martha's Vineyard Island, Massachusetts provide habitat for unusual, rare, and endangered species. Currently, these globally rare ecosystems exist as fragments on the southern coast of the island within a matrix of wooded, agricultural, and developed land. We used existing land cover patterns to train a hierarchical tree classifier model according to 10 biogeoclimatic and positional variables. This model was then used to predict suitable sites where grasslands and heathlands do not presently occur but could be efficiently established. The tree classifier model indicates that many sites compatible with sandplain grasslands currently contain agricultural lands, residential development, mowed grassland, and commercial development. Efficient establishment could be undertaken at locations buffering existing grasslands to increase their extent by 67% relative to current conditions and join isolated fragments. Sites compatible with heathlands also currently contain agriculture and residential development as well as later successional vegetation including maritime forests and pitch pine. Conversion of these sites to heathlands, as indicated by the model, would increase

the current extent by 25% and increase average patch size. An adaptive management approach to grassland and heathland supplementation could be employed to validate the causal mechanisms between the predictor variables and the vegetative communities. Testing of the predictive accuracy of the Martha's Vineyard Island tree classifier models at other coastal sites would also provide information on the true mechanisms responsible for distribution patterns.