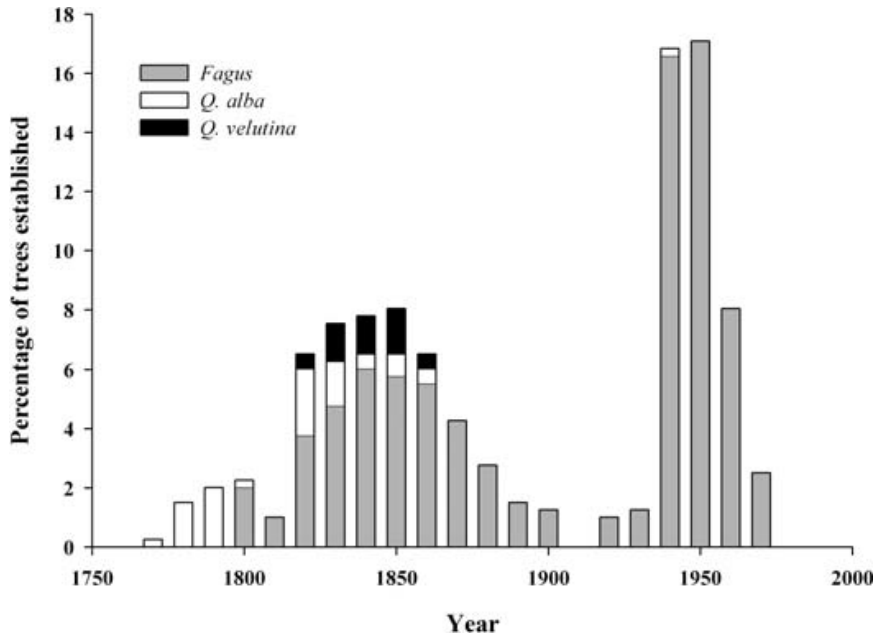
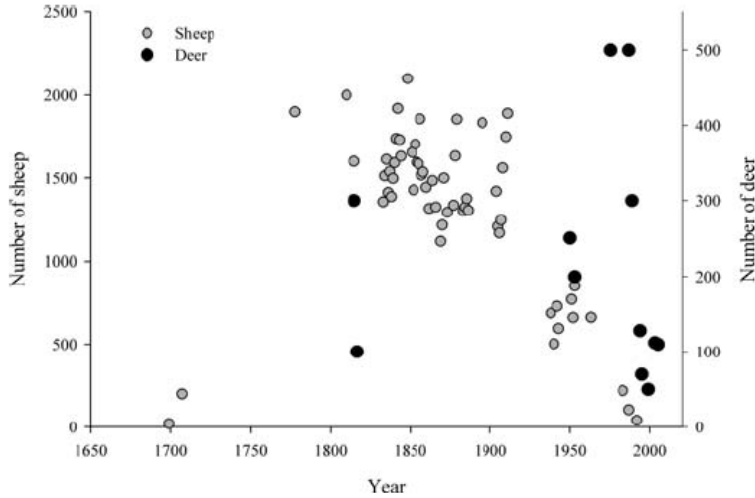


MV – More Notes for Cultural - Natural

NAUSHON

Busby et al. 2008



1602 “On the outside of this Island [Cuttyhunk] are many plane places of grass, abundance of strawberries and other berries...This Island is full of high timbered oaks, their leaves thrice as broad as ours, cedars, straight and tall; beech, elm, holly, walnut trees in abundance” (Brereton in Quinn and Quinn 1983). “[Cuttyhunk]...is overgrown with wood and rubbish, viz. oaks, ashes, beech, walnut, witch-hazel, sassafras and cedars...” (Archer in Quinn and Quinn 1983). Cedar and sassafras were harvested from the Elizabeth Islands by Bartholomew Gosnold’s crew (Emerson 1935).

1696 From the Captain’s Log, H.M.S. Falkland: “In this place [Naushon Island] is but one small

house in which live one family the Island affords wood and sum deare for other convenient very barren land but being obledged for severall reasons and necessities we are happy in our safe arrival” (Emerson 1935).

1699 Lease, Winthrop to tenant farmer: “And shall not cut or fell any the red cedar trees nor make any strip or waste of the white cedar trees upon the said land except such of the white cedars as shall be needful for the building and fences upon the said farme and the repairs thereof” (Emerson 1935).

1700 Letter from Matthew Mayhew to Wait Winthrop: “Sr. you may please call to mind you promised to let me have cedars [1,000] for inclosing my field, out of the swamps at Nashawna” (Emerson 1935).

1776 “The said Commissary, be and hereby is directed with the assistance, or the soldiers on said station, to build as many log houses with timber on said Island as will be sufficient for the reception of 70 or 80 men [rebels]” (Emerson 1935). British soldiers set fire to “everything that would burn, so that neither house, barn, hay nor Indian corn that could be met with escaped the Flames, nor did the live stock share a better fate for what could not be carried off was shot” (Emerson 1935).

1815 About 3/5 of trees are beech: the remainder of the wood is white and black oak, hickory, and a little pine. About K of the island is in wood and swamps; and in the swamps grow white cedar. Some fire wood is sold, and transported from the island. Very little ship timber remains, not more than 300 tons; but it is of a superior quality” (Winthrop in MHS 1815).

1824 “I have taken a partial view of the timber on Naushon Island. I find there is a tract of the best timber land I have seen in this part of the country, say, timber suitable for ships, from 300 to 400 tons...the timber is white oak and yellow bark oak” (Emerson 1935).

1841 Oct. 3 1841 “A gale from the north-east commenced in the morning and in the course of the afternoon and night blew most violently and undoubtedly was the heaviest storm which has occurred since the memorable one of 1815...Tuesday afternoon took a ride in the woods; sad havoc the storm has made there. The ground is covered with leaves torn from the trees; large limbs are wrenched and twisted off; many of the time honored and venerable old oaks and beech lie prostrate with an air of grandeur about them even in their lowly estate. The air is fragrant with the odor of bruised and crushed leaves: the roads and paths are blocked up in many places with trees uprooted and lying across them” (Forbes and Gregg 1979).

1869 “September...It was the greatest gale since the famous September gale of 1815. The “Apollo” tree in the amphitheatre was rooted up, and many other fine trees” (Hughes 1902).

1898 Winter gale: “probably wrecked 1,000 trees on Naushon...you would be surprised to see the tremendous number of trees that are down everywhere through the woods...that whole hillside sloping north looks like a battleground; it is so thick with the fallen bodies of trees” (Forbes and Gregg 1979).

1938 Sept. 21. “Terribly destructive hurricane hit the Island at extreme high tide. Pine Island was swept clean of its age-old cedars and all but washed away. At the Blue Hills Observatory the wind reached 186 mph” (Emerson and Leon 2003). “A great many of the noblest trees on the island were blown down...Most of the trees on Cedar Island were blown down” (Forbes 1964). “The storm, by far the worst in many years, blew down thousands of trees, some of magnitude and beauty, but fortunately most of those blown down showed that they had been defective in

sundry respects, and once they had fallen and were cleared away, there were enough fine trees left so that the grandeur of the forest will be in no way impaired” (Annual Report 1939).

1944 Sept. 14. “The hurricane hit Naushon with 134 mph winds. All bath houses were destroyed and wharves and bridges damaged but the greatest destruction was to the trees. In many places the woods were flattened down to the ground in tangled masses” (Forbes 1964). “A survey of the woods after the 1944 hurricane shows that although the damage was very severe in several of the most heavily wooded regions, about two thirds of the island woods containing many very fine trees have not been appreciably injured...The forests were not seriously damaged by the hurricane of 1938, but were hard hit by that of September 1944. The wind came across the island from the southeast and blew down a large proportion of the heaviest stands of timber. The wind was gusty, so that the damage is not entirely uniform, leaving some stands relatively untouched and destroying others almost completely. In general, however, most of the woods containing large trees were more or less affected” (Raup 1945). An estimated 1/5 of trees, or 30,000, blew down in the hurricane (Annual Report 1945). Post-hurricane timber salvage (1946–48): “So far the total amount removed is a little under 1,000 cords or less than 10% of the estimated total” (Annual Report, 1946). “To date Smith has sawed up about 330,000 feet of lumber, 90% of which is oak.” (Annual Report 1947) “H.D. Smith sawed over 200,000 board feet, chiefly oak, most of which remains unsold” (Annual Report 1948).

Jordan, Patterson, Windisch 2003

It is difficult to speculate on fire regimes that would form grassland or heathland, as most modern examples in Southern New England occur on formerly cultivated fields or pastures (Stevens, 1996; Motzkin and Foster, 2002).

Eberhard et al.

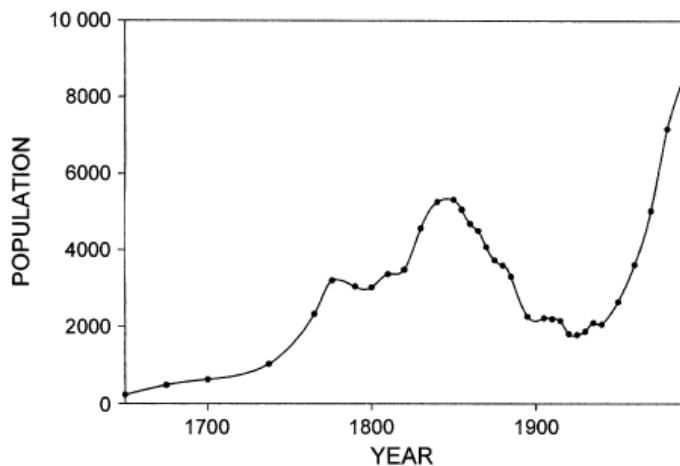


FIG. 2. European population trends in Eastham, Wellfleet, and Truro (1650–1990). Data for 1650–1765 are from Altpeter (1937), and state and federal census data are used for later time periods. Aboriginal populations are estimated to have been 450–500 as late as 1698 (Ruberstone 1985).

Mouw 2002

Although it is true that large fires were present on the Forest in the past, the lack of fire in the past 50 years has fundamentally changed fuel beds, stand structure and the role of fire on MFCSF. Without fire, 27% of the Forest’s vegetation has developed into mature oak woodlands. The closed canopies of these stands serve to limit the development of large, intense fires. Fuels sampling shows that the fine loads in these stands are less than in early developmental types such as scrub oak. The modification of the fire regime was due to human intervention but, even if fire

suppression were curtailed, it would be less likely today to result in the return of large, intense fires than in the past (Fig 4.2).

Foster et al. 2002

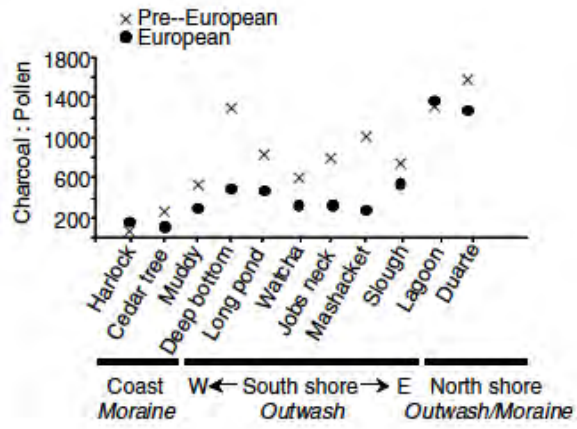
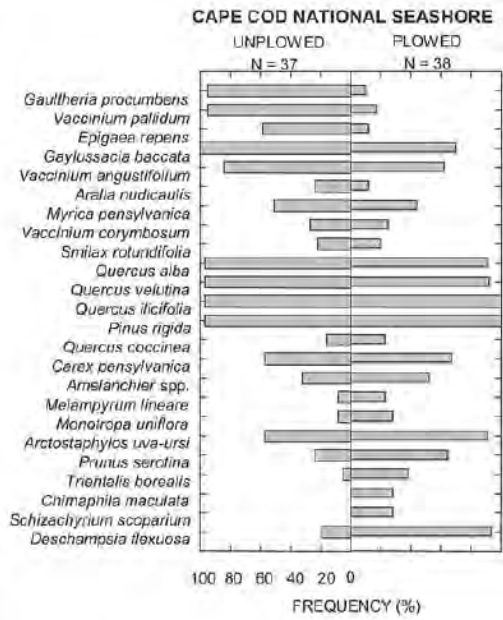
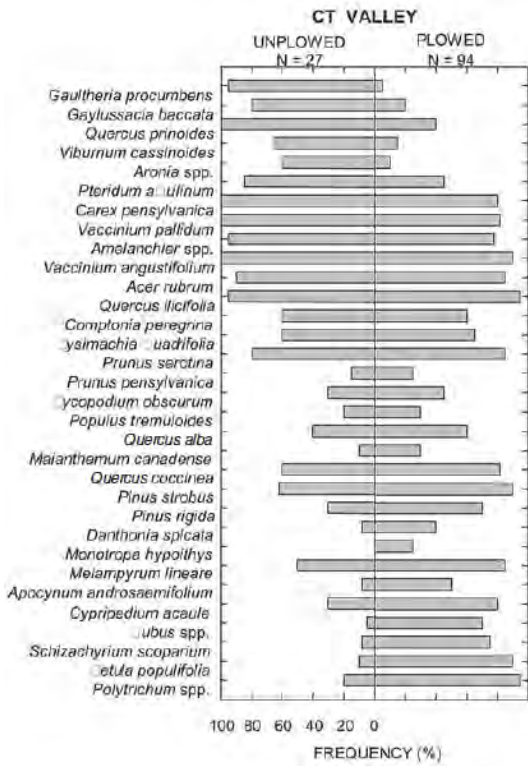


Table 1. Major fires on Martha's Vineyard from 1855 to 1990. Data compiled from the *Vineyard Gazette* (VG) newspaper, DEM (1994a,b), and unpublished data of Tom Chase (TC) and Steve VanCour (SV) as modified from Dunwiddie and Adams (1994). Fires <100 acres are generally excluded prior to 1950. After 1950, all fires >20 acres are listed.

Year	Date	Size (ac.)	Location - landform
1855	4/6	large	Willis Plain (Great Plains) (SV) — outwash
1867	4/26	4000	near Lagoon (SV)
1875	7/9	7-10,000	Quompacha Bottom (SV) — outwash
1883	8/11		Vineyard Haven town fire — moraine
1885	4/3	small	Gay Head-Chilmark boundary — moraine
1886	5/2	1000s	near Vineyard Haven, West Tisbury
1889	3/24	4000	Quampeche Bottom — outwash
1892	4/8	5-8000	near Middletown (VG), Lagoon Heights (SV)
1894	June	large	Location unknown (DEM 1994b; Gross 1928)
1900	4/26	5000	Scrubby Neck toward Edgartown — outwash (DEM 1994b)
1906	5/17		Innisfail Hotel (Oklahoma) burns in forest fire
1909	7/22	10000	on Plains (DEM 1994b)
1914	12/24	1200	western Great Plains to Katama — outwash
1916	5/18	12000	West Tisbury to Farm Neck, Ocean Heights, and Edgartown — outwash
1920	8/5		large Vineyard Haven fire
1926	5/13	6400	West Tisbury toward Ocean Heights — outwash
1927	4/29	6400	from Dr. Fisher Road to Edgartown — outwash
1927	5/23	6400	from Dr. Fisher Road toward Edgartown — outwash
1928	4/27	small	Indian Hill Road — moraine
1929	4/5	2500	Watcha to Tiah's Cove, Waldron's Bottom, to Oyster Pond — outwash
1929	5/3	2560	Waldron's Bottom — outwash
1929	7/2	small	Tashmoo/Herring Creek — moraine
1930	5/9	200	West Chop - moraine
1930	5/16	5000	between Edgartown and Oak Bluffs — outwash
1930	6/6	1000	North to Northeast through State Forest — outwash
1932			Two fires in State Forest (DEM 1994a)
1935	3/29	4000	Edgartown Great Pond to Katama — outwash
1936			8 Fires, none in State Forest (DEM 1994a)
1937			Chappaquiddick (DEM 1994a)
1939	3/31	4000	Quampacha Bottom on Dr. Fisher Road to Vineyard Haven Road (TC) — outwash
1940	5/17	1000	State Forest near Edgartown - Vineyard Haven Road — outwash
1942	5/26	350	Job's Neck Pond to Jayne's Cove, G. Flynn — outwash
1942		1200	near Edgartown Great Pond (DEM 1994b)
1944		240	in MFCSF (DEM 1994b)
1946	4/19	5120	Head of Tisbury Great Pond towards Edgartown/Oak Bluffs — outwash
1948	9/3	300	South & West towards Clevelandtown/Edgartown Airport — outwash
1951			10 fires on the Island (DEM 1994b)
1954	4/9	1000	between Bames Road, Wing Road and Edgartown-Vineyard Haven Road —outwash
1954	5/29	2500	Tiah's Cove, West Tisbury to Edgartown — outwash
1954	7/16	100	Chappaquiddick near four corners — eastern moraine
1957	4/19	35	near State Highway at Deep Bottom — outwash
1957	5/3	100	North of Chilmark cemetery, toward Chilmark Pond — western moraine
1958	6/13		east and north from State Forest — outwash
1959	4/24	25	between Old Courthouse Road and State Highway — outwash
1959	5/8	500	West Tisbury Road near Deep Bottom — outwash
1960	4/22	25	Katama — outwash
1963	10/25	300	Quampacha Bottom to West Tisbury Road — outwash
1965	12/18	1200	Great Plains to Katama (TC) — outwash
1971	5/14	20	Oklahoma, Tisbury
1975	4/25	50	Northeast from Edgartown dump
1976	12/31	85	Edgartown: Herring Creek Road Katama Airfield — outwash
1987	7/31	20	Oak Bluffs behind Crosslands Nursery (TC) — outwash
1987	July	~8	State Forest

Foster et al. 2003 Land Use Legacies



Foster et al. 2002 Wildlife

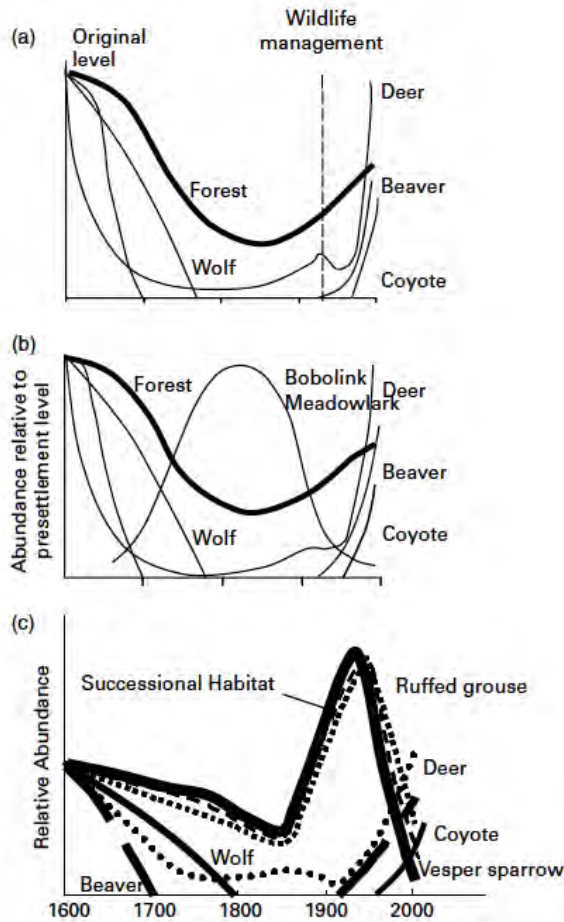


Figure 2 Three related but contrasting depictions of land cover and wildlife dynamics in New England that highlight the important role that historical research plays in the interpretation of modern conditions and the development of management approaches. The bottom figures (b, c) are 'modified' from the top figure (a). Bickford & Dymon (1990; a) and Foster (1995; b) emphasize the forested nature of New England at the time of European settlement and trajectories of forest dwelling species in response to deforestation and depredation. Bickford, commissioner of Massachusetts Fisheries and Wildlife, also highlights wildlife management in the recovery of some species. Foster adds openland species, typified by bobolink and meadowlark, and interprets them as increasing historically from low densities in response to deforestation and agriculture (cf. Motzkin & Foster 2002). In contrast, DeGraaf & Yamasaki (2001; c) interpret the pre-European landscape as 50% successional and open habitat and consequently de-emphasize the abundance of forest dwelling species. In this view successional species such as ruffed grouse and vesper sparrow are interpreted as declining with European settlement but then reaching a historical peak coincident with early twentieth century reforestation and succession. Whereas Foster (1995) interprets the declining abundance of openland and early successional species in the modern landscape as reversing the early historical trend, DeGraaf & Yamasaki (2001) depict these species as recently reaching their lowest abundance in the last 400 years. Consequently, the former argues that openland species require management simulating historical agricultural practices, whereas the latter suggest that management should simulate natural disturbance and Native American practice.

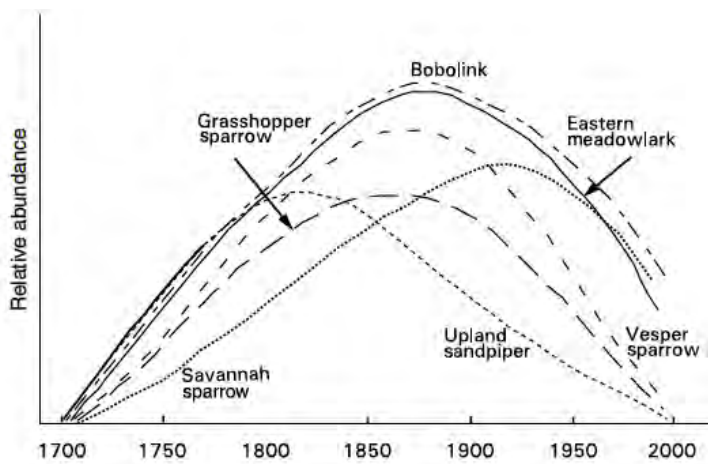
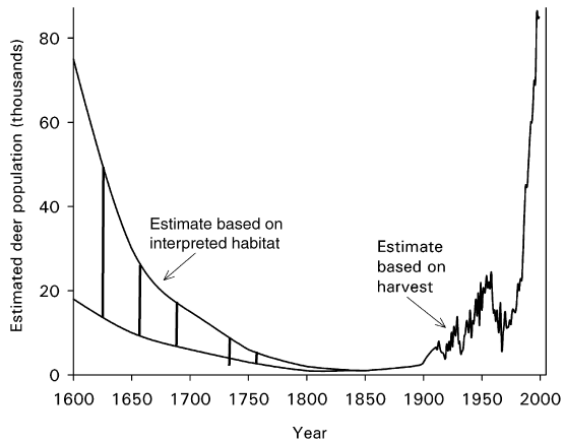


Figure 6 Relative changes in the population size of important grassland bird species in Massachusetts through time. Data from Massachusetts Division of Fisheries and Wildlife, and Jones & Vickery, 1997).

DFW 2013

In an effort to slow these unsustainable declines, DFW uses [active management](#) to provide a range of grassland, shrubland, and forested habitats that are no longer provided frequently enough by natural processes to help support both common and declining species. Open habitats such as grasslands, shrublands, and young forest have been a part of the New England landscape for millennia.

Peabody 1839 Ornithology of Massachusetts

The **MOCKING-BIRD**, *Turdus polyglottus*, is rarely seen in **Massachusetts**. The brown thrush is sometimes mistaken for it by careless observers, and that fine bird, though not an imitator, at least to any great extent, has a depth, sweetness and variety of song which even the far-famed mocking-bird cannot exceed.

The **SAVANNAH SPARROW**, *Fringilla Savanna*, is rare, compared with the preceding, and is most common near the sea. Its song is animated, though far inferior to that of the song-sparrow. Though it is very hardy, it proceeds to the south

The FIELD SPARROW, *Fringilla pusilla*, resembles the species last described, but is brighter in color and has a longer tail. With us, after the first of April, it is found in open fields and pastures, where it lives on insects and seeds. The song

is peculiar and likely to attract attention, not so much from its sweetness, as its canary-like trill. Its nest is built on the ground, after the fashion of most other sparrows, and made of hay, with a lining of fine grass or horse-hair. The eggs are so thickly sprinkled with rusty brown as to appear almost wholly of that color. It usually raises two broods in a season.

The PILEATED WOODPECKER, *Picus pileatus*, is a large and powerful bird, not uncommon in the woodlands of Massachusetts, but seldom found in the vicinity of large towns. It does not leave us in winter, like the preceding, but remains throughout the year in our wild forests; and almost every wood-cutter can describe the rapid and angry manner in which he strips the bark from a hemlock or spruce, throwing it in long flakes around him. Should any one pursue him, he keeps far out of his reach, laughing, as one would think from his loud cackle, at his enemy's vain endeavors. He never, under any circumstances, relents from his natural wildness. If wounded, he makes fierce resistance to all attempts to seize him; and if overpowered and carried captive, spends all his time in trying to escape from his prison. This he can easily do, unless the materials are very hard and strong; and if he does not succeed, he can make an impression in an hour on the walls of his house of bondage, which the carpenter cannot repair in a day.

This bird excavates a gallery with its bill, for a nest, in

The CLIFF SWALLOW, *Hirundo fulva*, was hardly known to naturalists till within a quarter of a century. The first account of its habits was derived from Long's expedition to the Rocky Mountains. Since that time the whole body have commenced a great system of emigration, moving gradually on towards the Atlantic, till now it is become quite common in many parts of New England. A peculiar sagacity is manifested by this and the chimney swallow. Its wild practice was to build against the sides of cliffs; but when it comes into civilized life, it builds under eaves and cornices, where its nest is partially sheltered from the rain. The first emigrants who came informed the rest of their discovery, and induced the whole tribe to make a radical change in some of the most important habits of their lives. The nest is a large patch of clay mixed with sand, having an entrance near the top, rounded, projecting, and bent downward; the whole resembling a coarse earthen retort, with the neck broken off, stuck and flattened against the side of the building. The nest has a lining of dry grass and straw, on which are generally four eggs, white, with dusky

The WHIPPOORWILL, *caprimulgus vociferus*, is not often seen, because compelled by its delicate sense of vision, to retreat into the forests, to escape the blaze of day ; but every one knows its wild and melancholy song, which, when it first arrives, is heard from the distant woods, but comes nearer as the season advances, and at last is heard very near the dwellings of men. The song of birds is always expressive of happiness ; but the complaining notes of the whippoorwill seem to indicate suffering, and create a sympathy in the hearer, which the case of the bird does not call for ; since all this while, it is collecting moths, beetles, ants and grasshoppers ; and instead of foreboding change and disaster, it is employed advantageously for us, and no doubt to its own satisfaction, in destroying insects that trouble the repose of the cattle. The barn-yard affords it a foraging ground, which it often visits ; sometimes it takes its station on the step of the house door, not chasing its prey on the wing, like the night hawk, but waiting till insects pass by ; when they appear, it rises to snatch them, and then resumes its position, and proceeds with its song.

The nest of the whippoorwill, if it can be said to have any, is a mere hollow place in the ground, in some retired part of the woods. The eggs, bluish white, with blotches of dark

olive, are laid directly on the ground. The young are soon able to run about, and until they can fly, are sufficiently protected by their resemblance to the ground. This bird is very susceptible of cold; during the severe season of 1832, many of them were found dead in New England in the month of June. It would be no subject of regret if they were more common in Massachusetts, for their note is pleasant, heard in the silence of evening, and their services in destroying insects are not balanced by any injuries whatever.

The NIGHT HAWK, *Caprimulgus Virginianus*, notwithstanding its popular name, is much less properly called a bird of night than the former. It flies in the day, even when the sun is shining, and retires to rest before it is late in the evening, about at the time when the whippoorwill begins his song. Its wings are very large in proportion to its weight, and its flight is firm and graceful; it sweeps in circles, sometimes rising high in the air, then shooting suddenly downward, with a sharp squeak, which seems to say that it has caught sight of its victim. In the evening, it flies lower than by day, often striking off wildly from its line of flight, doubtless to pursue some insect which its sharp eye has discovered. It can hardly walk on the ground, nor even stand erect without resting on its breast. When it grows dark, it alights on the earth, or on fences, where it passes the night, giving a squeak now and then, as if it were still following its prey in dreams.

In May, the female deposits her muddy colored and freckled eggs on the naked ground, without any sort of preparation. The young, like those of the preceding species, are sufficiently guarded, by the resemblance of the down, which covers them, to the ground, in which they nestle. The food of the night hawk consists of insects, which it secures and swallows while flying. It is strange that Wilson was obliged to take so much pains to show that this and the whippoorwill are different birds, when, beside that one flies by day and the other by night, the whippoorwill is so formed, that he can walk firmly and fast, while the night hawk can hardly support itself on the ground,

The PASSENGER PIGEON, *Columba migratoria*, is a hardy wayfarer, which cares very little for climate, and is governed in its migrations, not by the desire to escape a cold climate, or to build its nest in a mild one, but simply by the necessity of going where food abounds, because no small supply will satisfy the appetite of such immense numbers. Having powers of vision equal to their power of flight, they can easily take a survey of the country over which they are passing; if they determine to descend, they break the force of their motion by repeated flappings of their wings, to keep themselves from being injured by dashing upon the ground. So swiftly do they move over an immense extent of country, that they have been killed near New York, with their crops full of rice from South Carolina plantations. In the Atlantic states, their numbers are nothing compared to the countless multitudes which assemble in the west, where, as they pass over, the rush and roar seem like those of a tornado, darkening all the sky. But their numbers, though reduced from those of former times, are still considerable, and as soon as it is known in a neighborhood, that the pigeons are flying over, it is the signal for assembling all the arts and instruments of destruction. Many are shot with the gun; many are taken with nets; and others are decoyed by pigeons with their eyes blinded, which are stationed on a roost, provided for the purpose; the roost being shaken with a string, these pigeons open their wings to balance themselves; and the wayfarers, supposing that they have just alighted, after examining the region, think it safe to come down and join them without farther investigation.

The accounts of the breeding places of the pigeons at the west are almost incredible. Some of them extend several miles, covering thousands of acres; the grass and underwood is all destroyed; the ground overspread with limbs, broken down with the weight of the birds clustering upon them, and the trees killed as completely as if girdled with the axe. When the young are fully grown, but have not yet left the nest, a general invasion is made upon the spot. Hawks and eagles snatch them from above; hogs devour the thousands that fall

to the ground; the axe-men cut down the trees most loaded with nests, and the crash of falling timber mingles with the thundering roar of the wings of ten thousand pigeons. One large tree, as it descends, often brings down several others, and two hundred squabs have been gathered by means of a single fall. The multitudes of birds are continually breaking down large branches with their weight, so that it is dangerous to walk below.

There is some disagreement in the accounts given of their breeding. Wilson maintained that there was but a single young one in a nest; while Audubon asserts that there are two. The prodigious numbers of the birds would seem to confirm the statement of the latter. The young come to maturity in six months. Every year they, at least, double their numbers.

One office of the pigeon seems to be to protect the oak forests. It is stated, on excellent authority, that for some years after they have occupied a particular spot as their breeding place, the oaks, for many miles around, are remarkably free from the green caterpillars, by which they are apt to be infested.

The WILD TURKEY, *Meleagris gallopavo*, was formerly common in all parts of the United States, but has gradually disappeared before the encroachments of civilization, and is rare, except in the unsettled regions of the west. It is still found occasionally in our western mountains, and also on the Holyoke range, where some are taken almost every year. Its migrations, like those of the pigeon, are irregular, having nothing to do with seasons, and are governed wholly by the supply of food. This fine bird is so uncommon in Massachusetts that it does not seem necessary to describe it at large; in a few years it will doubtless leave us forever.

The AMERICAN QUAIL, or PARTRIDGE, *Perdix Virginiana*, is quite common in Massachusetts, where it bears the former name; in the southern and western states, it is always known by the name of Partridge. It remains with us throughout the year, and sometimes suffers so much from the deep snows, that it may be seen in the sheds and near the houses of our largest villages, in search of shelter and food. A party will sometimes resist the cold by collecting in a circle, pressing close, with their heads outward, borrowing warmth from each other; but in our fiercest winter storms they sometimes perish under the drifted snow.

The quail is a gentle bird, and fond of associating with its own race, though not in large numbers. It generally resorts to open fields in search of food, such as grain, buck wheat and Indian corn. It sometimes joins the parties of domestic fowls and scratches the ground after their example. Though it is fond of grain, it requires something more for its support; and the demand of the young quails for insects makes the chief difficulty in the way of its domestication. The female prepares a nest of various grasses, arranged in an oven-like form, under the protection of a tuft, and partly sunk in the ground. The eggs are from ten to eighteen, of a pure white. The male takes part in sitting, and as soon as the young are hatched, they are able to leave the nest. Wilson believed that the quail might be domesticated. Its eggs have sometimes been hatched by the common hen, and the chickens are sufficiently tame; but though kept through the season and the succeeding winter, they go away in the spring. Two that were brought up by a hen, as soon as they were turned off, associated with the cows, going with them to the pasture in the morning, returning at night, and standing by them when they were milked, waiting to share their lodgings in the barn. These, however, contented as they appeared, deserted, like all the rest, in the spring. This wildness might after a time be overcome; but there would be more difficulty in supplying all the food they require, and after all it would be doubtful whether success would repay the care and attention which it would demand.

The note of the quail is well known, being generally interpreted into the prediction, *more wet, more wet*; the sounds are continued for a long time. This note of the male is most frequent and loud in the month of September. Sometimes there is an introductory whistle preceding the clear and emphatic *more wet*, or *bob white*. This call may be easily imitated so as to deceive the bird. When a covey are about to take wing, they make a sound resembling that of young chickens; when they separate, the parent assembles them by a plaintive and expressive call.

The AMERICAN OYSTER-CATCHER, *Hæmatopus palliatus*, is found along our whole Atlantic coast, but more rarely in New England than in other parts of the country. It spends the winter in the south, and returns to the north in spring. Its breeding places extend from the middle states to Labrador, where it was found breeding in July. Dr. Brewer informs me that he has once found this bird in Massachusetts. We learn from Audubon, that he has never found the *Hæmatopus ostralegus*, described by Wilson, in any part of this country, and, though he does not say it is not to be found, it is more likely that this species has been mistaken for it, than that it should have escaped his searching observation. This bird is exceedingly difficult to approach, flying off the moment it perceives that any one is watching it ; so that it was only with a telescope that he could observe its motions, as it probed the sand with its bill, tore off the limpets by inserting its bill as a wedge between the fish and the rock, or beat a shell-fish against the sand, for the purpose of breaking the shell. These birds return to the south early in October.

The PIPING PLOVER, *Charadrius melodus*, so called from its pleasant, though plaintive note, is found along our whole coast in summer. They spend the winter on the shores of the southern states. In the spring they proceed to the eastward in pairs ; if they find a suitable breeding place on the way, they alight and take possession, and as they are soon joined by others, they soon form a considerable party. In autumn, they move in flocks of twenty or thirty, always keeping near the shore. Its flight is strong and rapid, but it is more remarkable for its swiftness in running, which is so great, that it eludes the eye, and reposes quietly on the sand, which it so much resembles that it has no fear of being detected. I have no information of its nest having been found in our State, but it can hardly be that it should breed so far on each side of us, and yet pass us by. The piping plover is valued as game, but the sportsman generally gives his attention to birds of larger size.

THE KILDEER PLOVER, *Charadrius vociferus*, is a common bird, which spends the winter at the south, but returns early in the spring, leaving the coast and spreading over the inland country, where it is found in open fields, and on the banks of streams, and known by the name of *kill-dee*. It seems to have great sagacity in suspecting danger. In the presence of horses, cows and sheep, it is perfectly indifferent ; but if a man or dog appears, it betrays extreme uneasiness and distrust. When they move in small flocks, they appoint one as sentinel, who stands on tiptoe, watching all the objects around ; when anything appears, in the least suspicious, it sounds the alarm, and the place is at once deserted.

The kildeer plover makes its nest on the ground of a field, or the sand of the downs, sometimes lining it with grass, at others laying the eggs on the naked earth ; they are four in number, of a cream color, blotched with black ; the young run about as soon as they are hatched, and the parents are kept in perpetual agitation by fears for their safety.

The food of the kildeer consists of grasshoppers, crickets, snails and earth worms. They often strike their bill into the ground, in search of their prey. In the meadow, they pat the ground, to force out the worms, and sometimes follow the ploughman, to seize those which he has turned out from the ground. They have a peculiar motion of the body, when about to pick up their food, in order to bring their bills to the earth to reach their prey. The flesh of this plover is often eaten in the fall, but at other seasons it is poor and ill flavored ; indeed, there is hardly any time when it is worth the trouble of shooting.

BARTRAM'S TATTLER, *Totanus Bartramius*, is a bird first described by Wilson, who found it on the banks of the Schuylkill, and named it in honor of his friend. It is common on the sea coasts, but not confined to them ; it extends into the country, where it is called the upland plover, and is seen running through the grass in search of insects ; grasshoppers being its favorite food. Its breeding range extends from the middle states to the fur countries ; to these it returns in the month of May, when its nests are made in various parts of the State. They keep in small parties, and are always suspicious of danger ; when alarmed, they run fast, and make a sharp whistle as they take wing to fly. Fearful as they are of man, they are great friends to the cattle. They commonly find food in such abundance, that they grow very fat, and their flesh is considered a great luxury.

The AMERICAN WOODCOCK, *Rusticola minor*, is a very common bird, but not often seen in the fields, except by sportsmen, because of their nocturnal habits, in which they exceed the snipe, hardly ever flying in the day time, and travelling and feeding almost exclusively by night. They remain in woods and thickets till evening, when they proceed to the broken soil in search of worms and insects, and leave perforations made by their bills in the soft ground, showing where they have been. They have such delicacy of perception, by means of the bill, that they make but little use of the eyes in feeding; they plunge their bills up to the nostrils, and suck up their prey. The eyes of this bird are placed high, and far back in the head, probably for the purpose of seeing enemies at a distance, and watching their motions, without betraying the place where it lies, by any movement on its own part.

The woodcock returns from the south very early in the spring, and soon after selects a breeding place in the woods, where the nest is set on the ground, and formed of dry grass and leaves. The eggs are four, of a yellowish clay color, and marked with blotches of purple and dark brown. The young leave the nest as soon as hatched, but three or four weeks elapse, before they are able to fly. During the time of incubation, the male rises in a spiral flight, after the manner of the snipe, making a hurried sound as he ascends, which increases as he descends, when it becomes loud and sweet. When he touches the ground, he makes a bleating sound with a forward

The CANADA GOOSE, *Anser Canadensis*, is well known in Massachusetts, as one of the heralds of spring. Their spring migration appears always determined by the advance of the season, and the melting of the snow, which discloses a supply of grass and berries, uninjured by the frost, and ready as a resource for food. Their arrival is most welcome in the fur countries, where the aborigines depend upon them for their subsistence in summer. The hunter sets up stuffed birds as a decoy, and imitates their call; thus bringing them within his reach, he destroys them in great numbers. But while the great proportion go to the north to breed, Audubon assures us, that many remain and breed; some, he says, in pools in the eastern parts of Maine and Massachusetts, so that he thinks it entitled to be set down as a permanent resident within the Union. Farther north, they become more numerous, and in Labrador, their nests abound in every marshy plain.

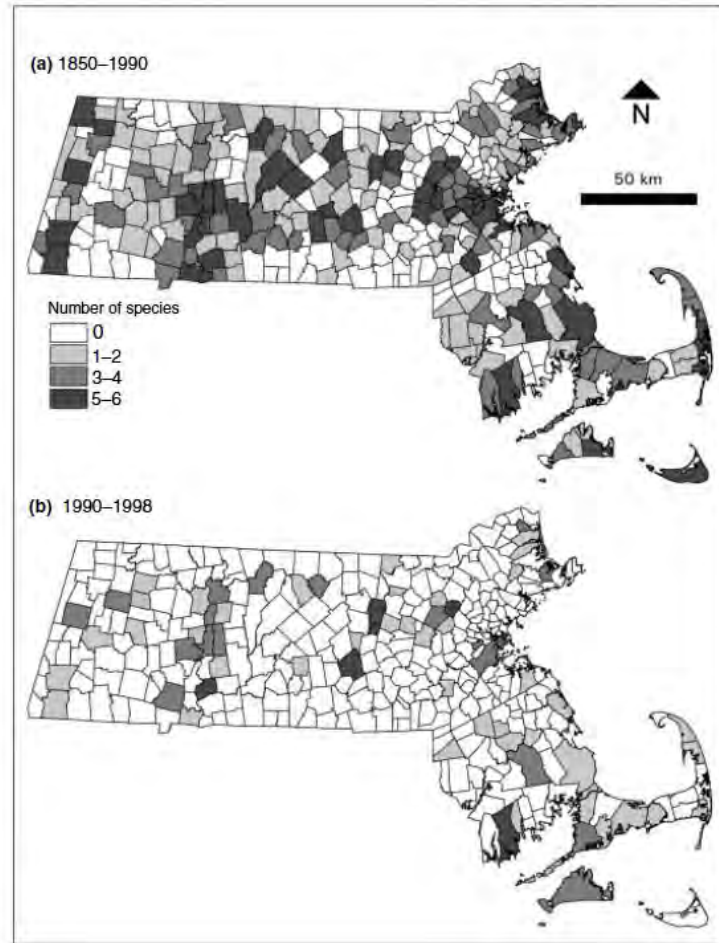


Figure 7 Historical changes in the relative abundance of important grassland bird species in Massachusetts. The six species include bobolink, eastern meadowlark, savanna sparrow, vesper sparrow, grasshopper sparrow and upland sandpiper. Data from Massachusetts Division of Fisheries and Wildlife, and Jones & Vickery, 1997).

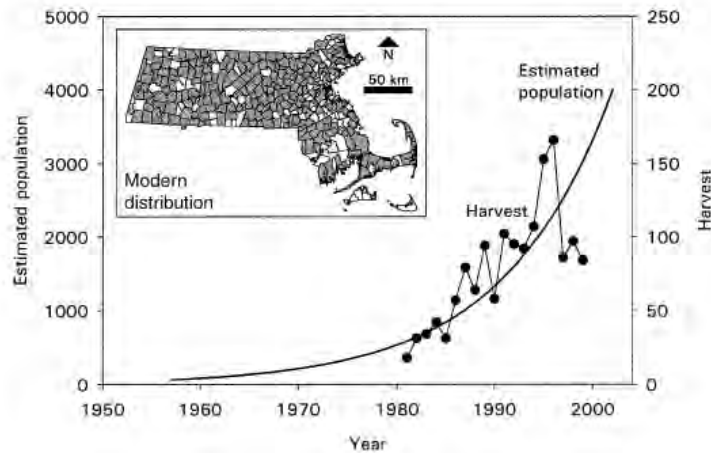
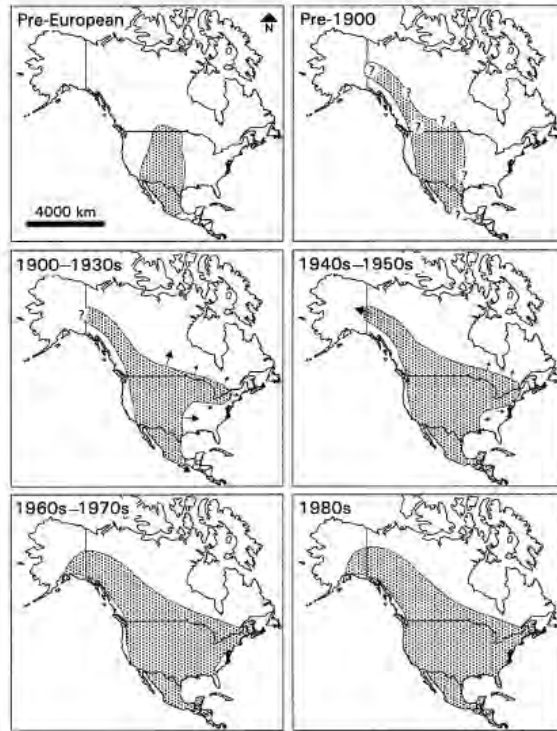


Figure 9 Range extension of the coyote and its local increase in population in Massachusetts. From Moore and Parker (1992) and J. Cardoza (unpubl. data).

Hunting very effective at controlling populations when low. Indeed, the historical perspective underscores the fact that wildlife assemblages at any given time are comprised of species undergoing strikingly different trajectories (Fig. 2). Many animals that can thrive in the newly reforested and maturing forest landscape are well-established or expanding; some are just arriving, becoming established and are poised to flourish; and others are yet to arrive but may eventually appear naturally or through human intervention, and may yield unforeseen impacts. In contrast, species that were common in our agricultural past are in the process of a long decline that is an inevitable consequence of ongoing landscape and habitat changes. Therefore, in any particular historical sample, the assemblage of animals on the landscape includes diverse species, each of which is on a different ecological trajectory in response to past and ongoing changes: some are increasing, some declining, others are exhibiting few changes. In order for ecologists to evaluate species' roles and futures or for conservationists to develop effective management strategies, it is critical to be able to identify the specific

trajectory associated with each species.

Ecologically, there remain many questions and challenges to our understanding of the consequences of the wildlife dynamics that we have highlighted (Foster, 2000). Currently, at least twenty large or important forest species that were present at the time of European settlement are absent from New England. It is challenging enough to determine the role and influence of some of the new species that have recently arrived such as coyote, but how do we evaluate the consequences of the absence of historically important species on the function of modern ecosystems? What role did passenger pigeons play in the dispersal of trees and the dynamics of New England forests and how would our landscape differ in the presence of several million-bird flocks and their dense and extensive roosts?

The Martha's Vineyard Byways Study. VOLF. 1976. All kinds of travel and access.

Captain Hartson H. Bodfish. Chasing the Bowhead. 1936. Harvard University Press. Recorded by Joseph C. Allen

Grew up in WT. Father was a blacksmith.

The old folk used to say "the wake of a sailor ashore is a long time smoothing over."

Squibnocket – Old Bass Club – for fishing. Long planks off of rocks to fish for bass. Elihu Root, Louis Agassiz, ex-President Chester Athur.

1880 first voyage. Gone 6 years.

Motkin et al. Frost Pockets

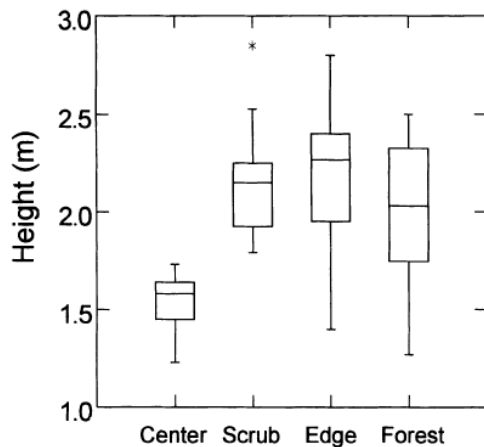


FIG. 6. Median height of scrub oak stems at the 'center', 'scrub', 'scrub edge', and 'forest' stations. Medians are indicated as the central line within each box, and boxes indicate the central 50% of the height data. Asterisks represent outliers.

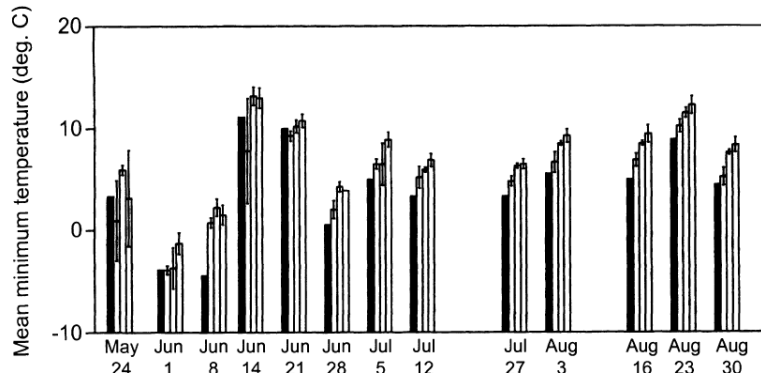


Fig. 2. Weekly mean minimum temperatures for May–August 1996. For each date, sampling stations are arranged from left to right as follows: 'center' (solid bar), 'scrub', 'scrub edge', and 'forest'.

Interestingly, because many modern scrub oak stands developed as a result of historical cutting and burning of previously forested areas, some areas that currently are of great conservation interest support species assemblages and vegetation structure that have apparently been highly modified by human activity and are of relatively recent origin.

Rackham. 1986. The Woods of South-east Essex. Ancient Woodlands of England.

Earliest map all SE Essex – Chapman & Andre. 1772-4.

Ancient Woods = primary woods and secondary woods established before 1772.

Woodbanks – massive banks and ditches with bank on wood side. Pollards on banks. Short pollards = stubs.

Forests were grubbed out. Ancient woods = wildwoods least worth grubbing out.

Main use of wood – renewable source of energy not timber;

Almost no relationship between isolation and number of species; no systematic effect on how many species; size makes more difference – 1.8 x species in 40 acre vs 4 acre – not much; 55 ancient forest species in E England

Giant stool of chestnut; stools >300 years; hornbeam to 10 feet or more;

Coppicing plants – species that flourish when wood is cut; not necessarily visible all of the time; broom survives as buried seed; many show up excellently in strips under electricity cables in areas coppiced frequently to keep growth low;

Need to restore woodland grasslands; “place for emptying dogs”

Woods long neglected with too many timber trees, too long between coppices; excessive shade; plants destroyed by horses, cattle; loss of plants due to shade;

Threat of agriculture and housing; Gradually learning how to manage these – knowledge came slowly; public amenity’ avoided the “Curse of Too Much Money” – over restoration and excessive tidiness;

“Woods have a life of their own; men have been given the power to preserve or destroy them, but have little control over how they develop.”

Gotmark 2013

“There is thus surprisingly little information about the effects of conservation activity.”

(Rackham, 2006, p. 512)

“... although science and history may inform management, the ultimate driver of policy is human values and perceptions.” (Foster et al., 2003, p. 85)

“And those experts who make the strongest arguments, even if wrong, tend to be the most influential. . .” (Doak et al., 2008, p. 958).

Askins et al. 2013?

Although appropriate management of airfields and protected natural areas is important for the future of grassland birds in the Northeast, farmland remains the greatest potential source of habitat for many of these species. Providing farmers with economic incentives to manage their land for conservation as well as agricultural production could help sustain grassland bird populations while preserving historically important rural landscapes.

North Americans could develop incentives for conservation by emulating European programs that make birds (and other elements of biological diversity) a “farm product” (Musters et al. 2001). Such programs not only could sustain natural diversity and protect rural landscapes, but also could directly help support farmers and ranchers. In the European Economic Community they have become an integral part of the agricultural support system (Kleijn et al. 2004).

The semi-natural grasslands of Europe are the product of millennia of deforestation and livestock grazing, and in most cases we have little basis for reconstructing the natural ecological processes that sustained the original habitats of grassland species. In North America there is a better (if still imperfect) opportunity to restore natural grassland systems.

Smith, C. R. 1997. Use of public grazing lands by Henslow’s Sparrows, Grasshopper Sparrows, and associated grassland birds in New York state. Pages 171-186 in Grasslands of Northeastern North America (P. D. Vickery and P. W. Dunwiddie, Eds.). Massachusetts Audubon Society, Lincoln, Massachusetts.

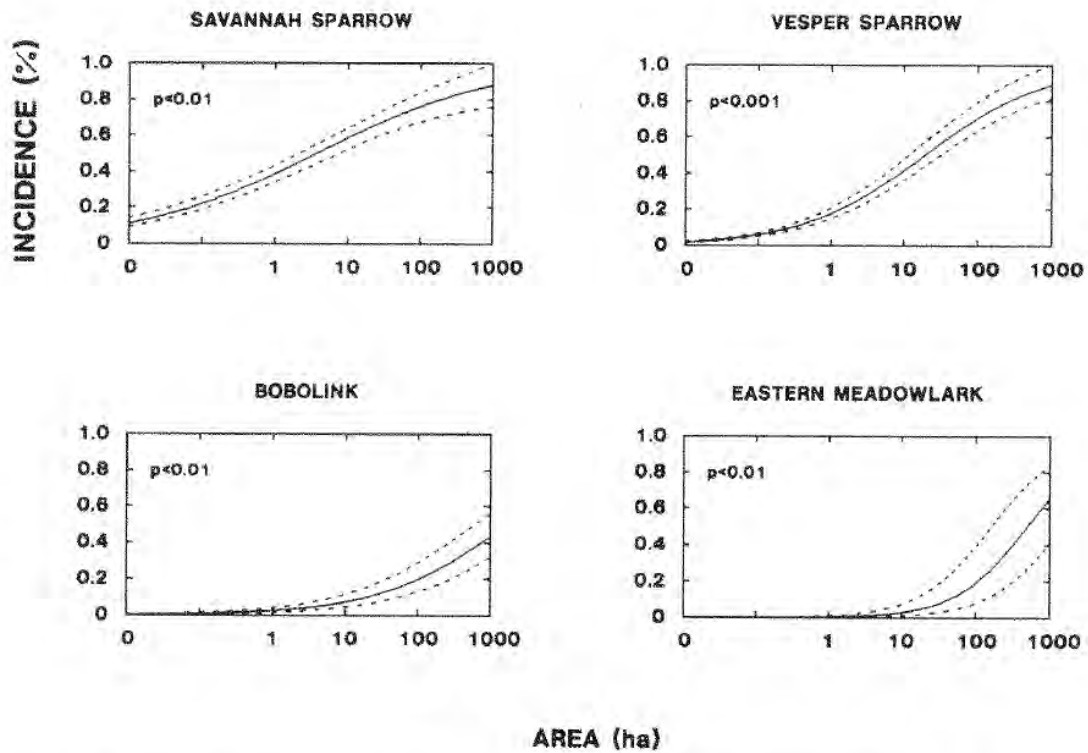


FIG. 1. Frequency of occurrence of six species of grassland birds in grasslands of different sizes in coastal Maine (Vickery et al. 1994; reprinted with permission from Blackwell Publishing).

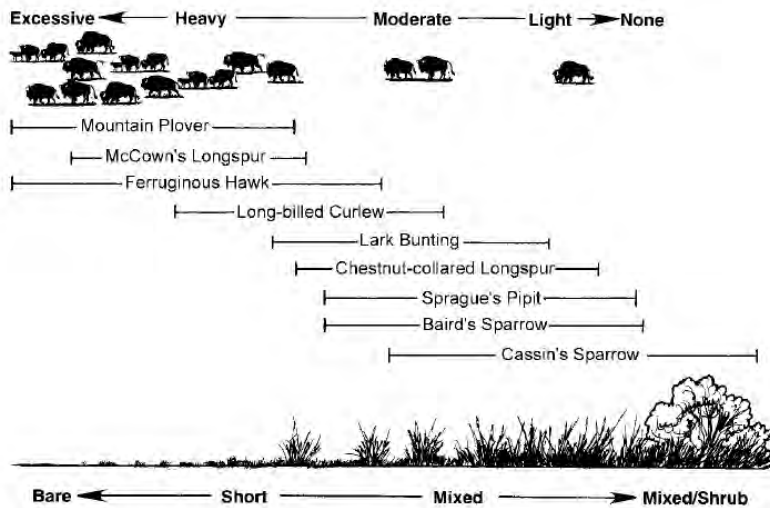
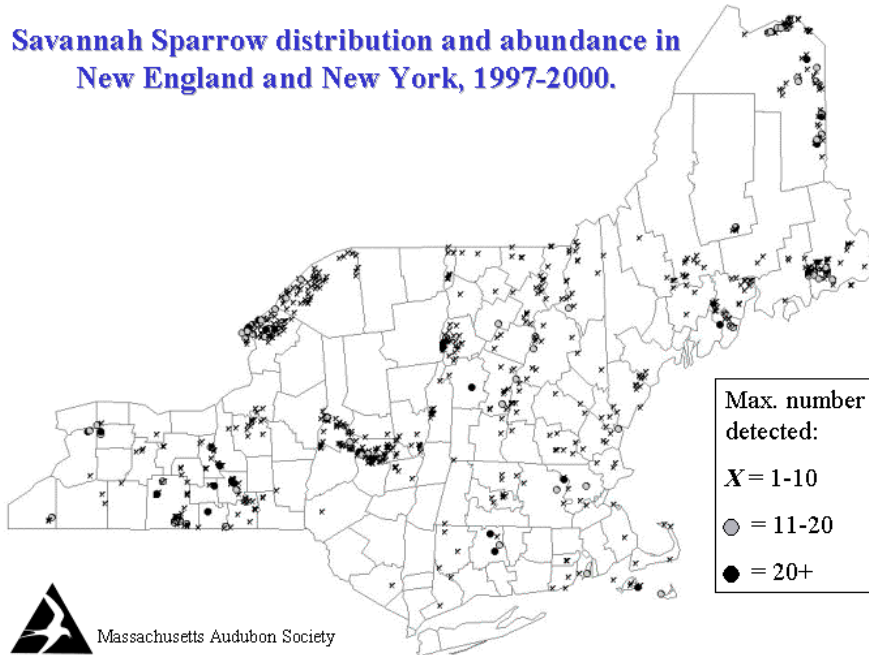


FIG. 8. Distribution of endemic birds of prairie uplands in relation to grassland type and historical grazing pressure across the central plains. (Reprinted from Knopf 1996b.)

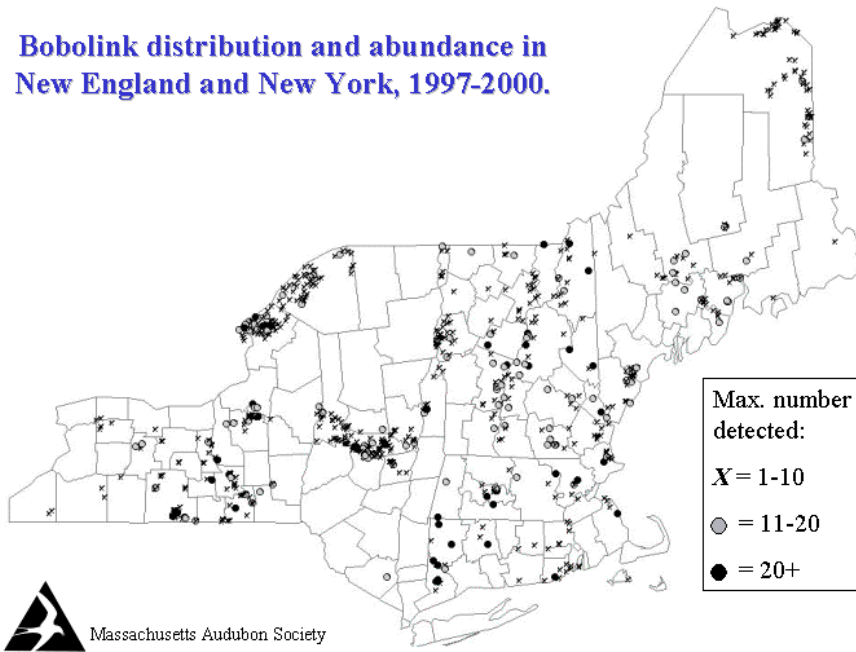
MAS www Grassland Birds

By the 1800s, grasslands were widespread in the Northeast, as land was cleared for pastures and hayfields, and grassland birds undoubtedly benefited from this expanded habitat. Historically, the large grasslands in the Northeast provided habitat for many grassland birds, particularly the grasshopper sparrow, savannah sparrow, vesper sparrow, upland sandpiper, eastern meadowlark, and bobolink.

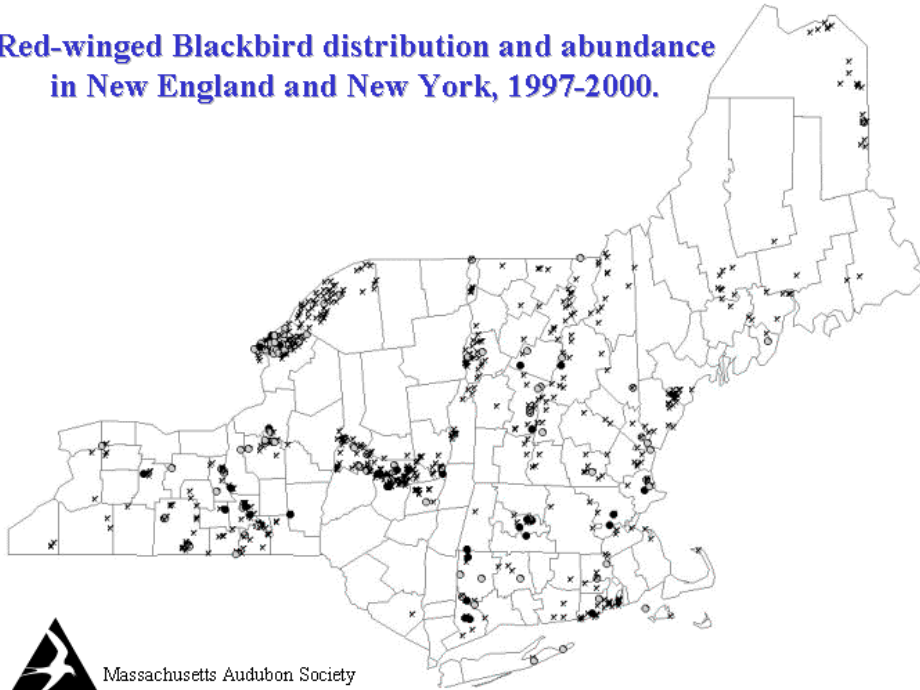
**Savannah Sparrow distribution and abundance in
New England and New York, 1997-2000.**



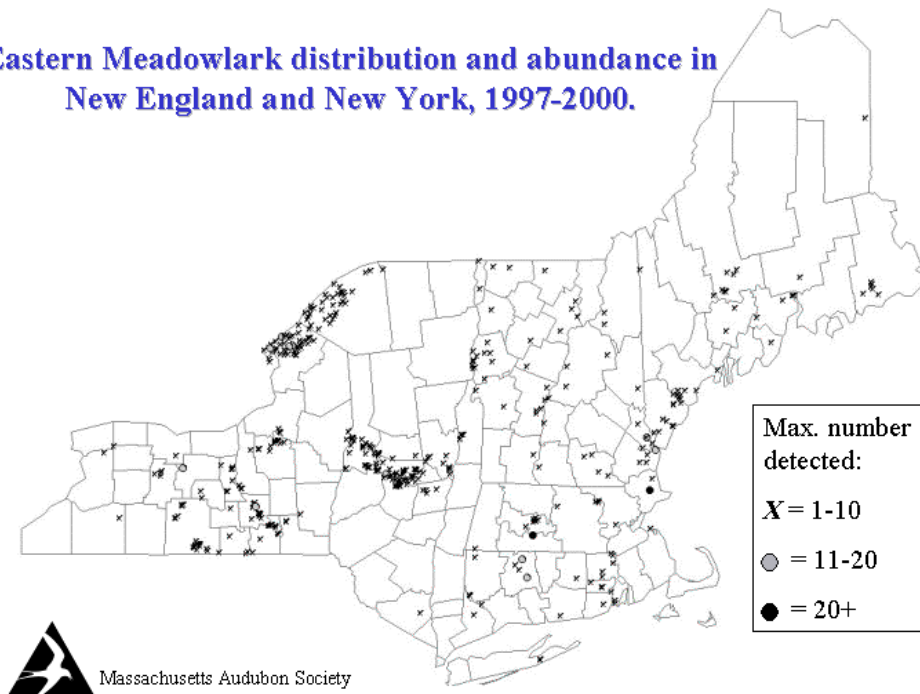
**Bobolink distribution and abundance in
New England and New York, 1997-2000.**



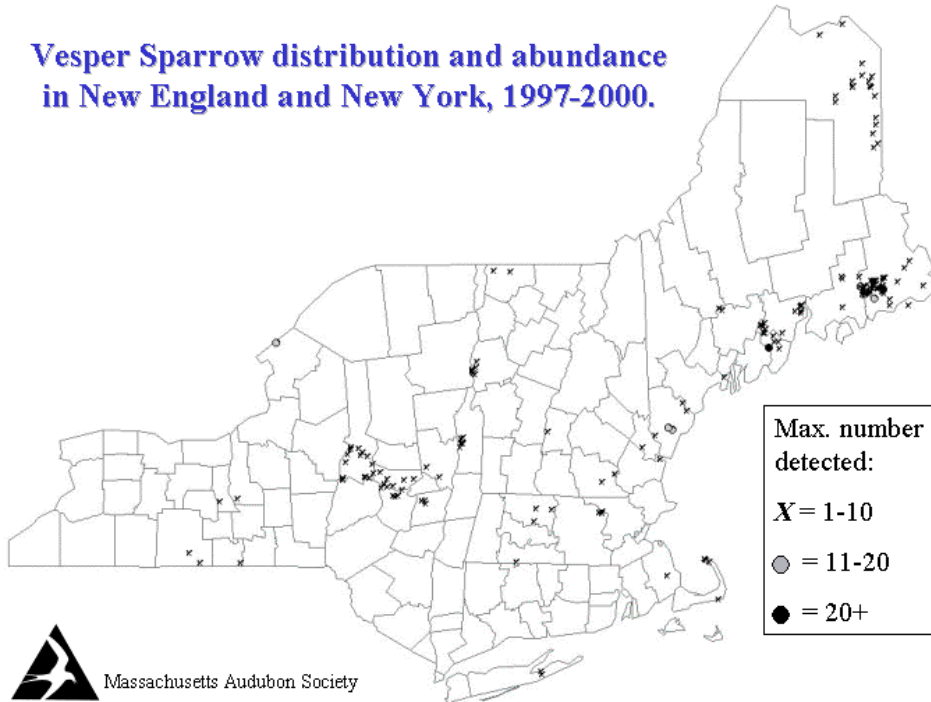
**Red-winged Blackbird distribution and abundance
in New England and New York, 1997-2000.**



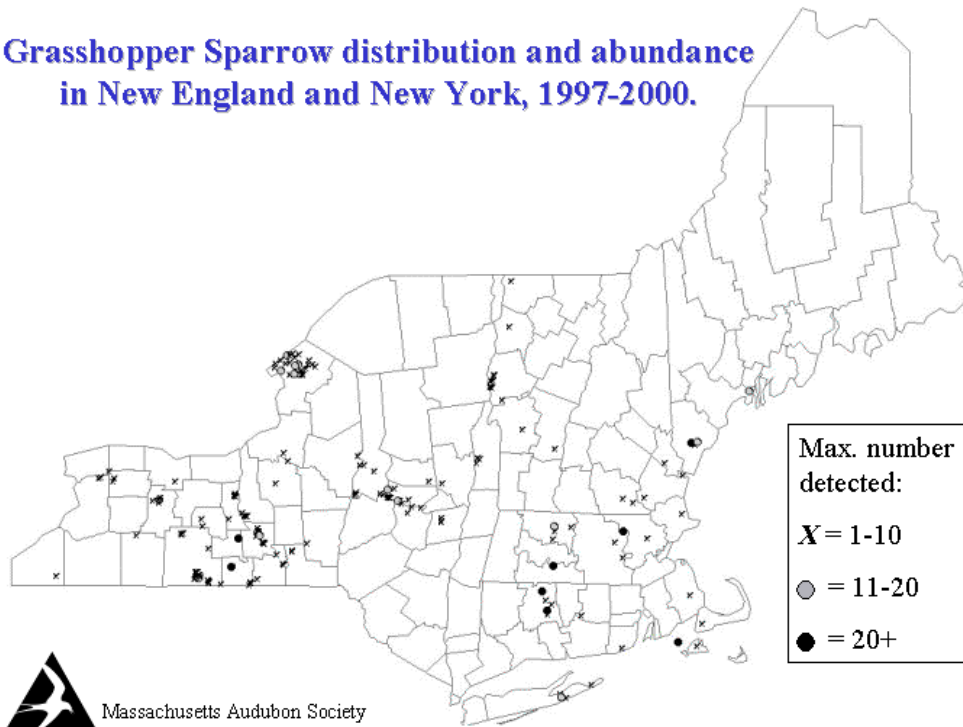
**Eastern Meadowlark distribution and abundance in
New England and New York, 1997-2000.**



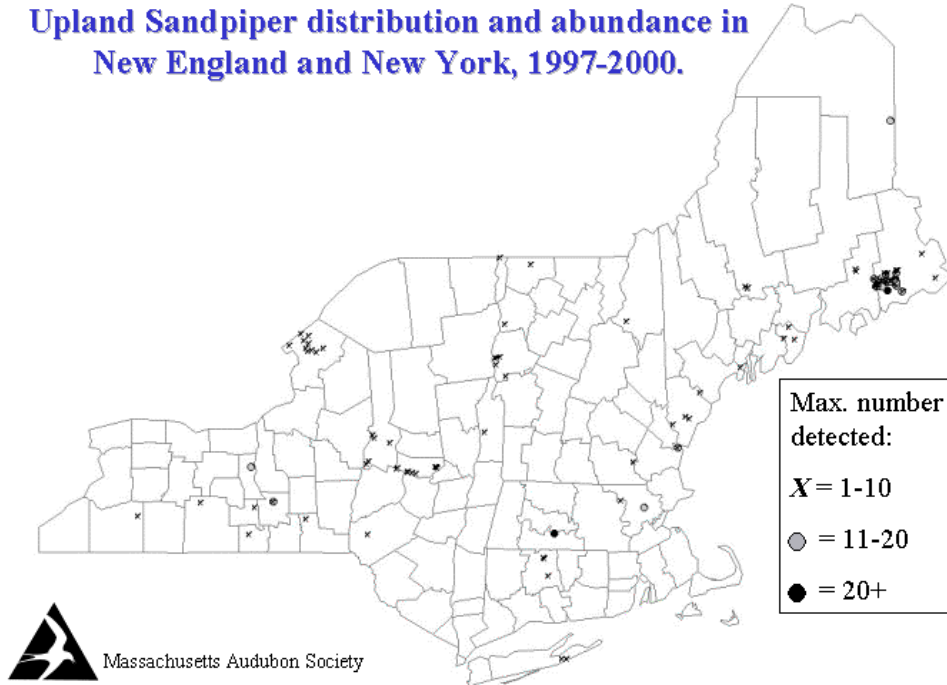
**Vesper Sparrow distribution and abundance
in New England and New York, 1997-2000.**



**Grasshopper Sparrow distribution and abundance
in New England and New York, 1997-2000.**



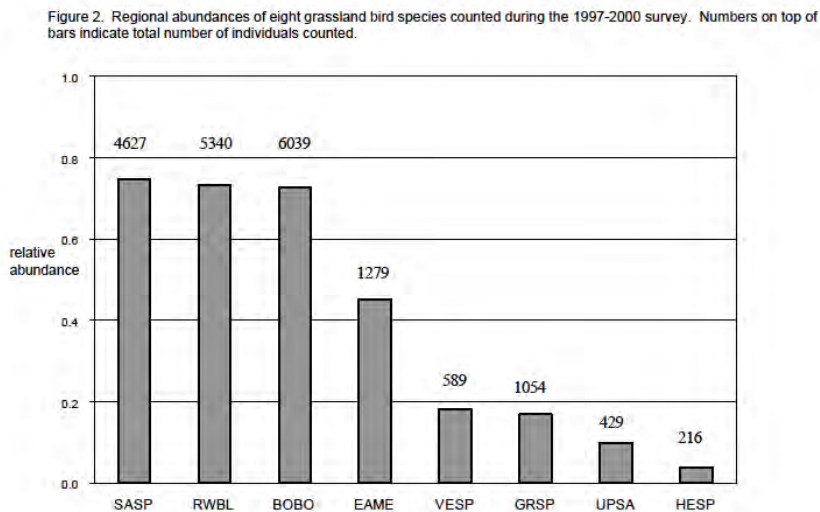
Upland Sandpiper distribution and abundance in New England and New York, 1997-2000.



Massachusetts Audubon Society and Agriculture

Massachusetts Audubon has consistently supported agriculture as a land use that is necessary for the production of food for human consumption. The Society recognizes that farms provide habitat for wildlife, and has supported federal and state laws and programs aimed at maintaining land in agricultural production and avoiding conversion of farmland to development. Massachusetts Audubon acknowledges the valid role of agriculture within the state's economy, its historic place as land use consistent with maintaining rural character, and its value in maintaining open space.

Jones Shriver, Vickery 2001



Massachusetts

We surveyed 76 sites, inside 40 towns, within 12 counties in Massachusetts (Table 1). Savannah Sparrow, Bobolink, and Red-winged Blackbird were most common across this state with all three species occurring on >35% of the sites surveyed (Fig. 3). We found 265 male Grasshopper Sparrows in Massachusetts, which is the second highest total for this species in the seven-state survey region. However, 73% of the population occurs on two sites in Massachusetts in Hampden and Dukes County (Table 2, Fig. 8). Eastern Meadowlarks and Vesper Sparrows were less common, occurring on 23% and 20% of the sites respectively. Of the seven states surveyed, we found the highest numbers of Upland Sandpipers in Massachusetts. A total of 155 adult Upland Sandpipers were counted during our surveys, but 88% of these occurred at one site in Hampden county (Scott Melvin, Massachusetts Division of Fish and Wildlife) (Table 2, Fig. 10).

In Maine, the important grassland bird habitat occurs on native sand -plain grasslands in the southern portion of the state (“Downeast”), on the blueberry barrens, and in Aroostook County on old agricultural lands. In New Hampshire and Vermont, grassland habitat is primarily limited to river valleys. The Connecticut River watershed is an important area between the two states. The Champlain Valley and the Memphramagog Valleys also important agricultural areas in Vermont that still provide habitat for grassland birds, particularly Upland Sandpipers. We surveyed three regions in New York: the St. Lawrence Plains, the Mohawk-Hudson Valley, and the Finger Lakes. These regions are dominated by old field, pasture, and agricultural habitat. In Massachusetts, the Connecticut River Valley is the most important area for breeding grassland bird as this area has historically been in some form of agriculture since European settlement. Sandy deposits as a result of glacial outwash have created sandplains that, when managed accordingly, provide ideal habitat for some of our rare grassland birds (Westover Air Reserve Base and Turners Falls Airport, for example). Also important in Massachusetts are the airports and coastal sand-plains located on Cape Cod and the associated islands. Rhode Island and Connecticut are both dependent on agricultural areas, airports, and capped landfills for grassland bird habitat.

With these data, a clear understanding of which areas are important for each species is gained. For example, Maine had the most Vesper Sparrows; they occurred on more points in Maine than in any other state. We determined which regions in New York are most important for the rare Henslow’s Sparrow. Massachusetts is important regionally for both Grasshopper Sparrows and Upland Sandpipers. This information can assist in the prioritization of conservation actions that will benefit focal species within each state. These data also provide evidence for state agencies to use in the consideration of listing species with low population levels.

Mowing Small Hayfields (10 - 75 acres)

Hayfields support a rich diversity of grasses, wildflowers, and invertebrates that are important for breeding grassland birds. Old hayfields, not replanted for at least eight years, are favored by some birds (particularly bobolinks) because of the developed ground cover and a greater variety of grasses and other plants. Mow every one to three years to maintain fields in grasses and prevent growth of woody vegetation. Timing of mowing is crucial to the survival of nesting grassland birds. Early

mowing in June and frequent mowing destroy nests and young. Therefore, mowing after August 1 is recommended if increasing grassland bird habitat is a management goal.

Recommendations

Avoid mowing areas with ground-nesting birds before August 1. Early cutting usually destroys ground nests. It is common to see young birds in the fields by late June, but cutting should be avoided because some species, such as savannah sparrows and eastern meadowlarks, raise a second brood later in the season, and the young fledge in late July.

Be aware of where grassland birds are nesting in fields. If mowing is essential prior to August 1 (such as in fields leased to farmers for hay), try to avoid areas where birds are frequently seen or to leave small patches such as edges or strips unmowed as nesting areas. Even when young birds appear to have left the nest, small unmowed patches are still needed to provide cover and feeding areas for the remainder of the summer until they migrate south.

Limit mowing to every one to three years in fields not harvested for high-quality hay. It is not necessary to mow every year for grassland birds. Not mowing a field one year or delaying mowing until late August will allow development of late-blooming wildflowers and butterflies.

Grazing Small Pastures (10 - 75 acres)

Grazing can benefit grassland wildlife by creating a mosaic of grass heights and structure. Many birds respond favorably to limited grazing, including killdeers and meadowlarks. However, intensive grazing leads to a loss of plant diversity and cover for wildlife. In the Northeast, the majority of grazed pastures are small and intensively grazed during the summer months, making them unsuitable for most nesting birds.

Recommendations

In grazed pastures with nesting birds, keep approximately 40 percent of the vegetation cover at a minimum height of 8 to 12 inches or at "knee height," with scattered forbs until August 1. This can be achieved by rotating grazing animals through several fields during the growing season. Keeping some areas ungrazed during the nesting season usually improves nest success.

Avoid overgrazing fields. Overgrazing creates excessive bare ground, which can cause erosion, reduce plant and invertebrate diversity, and lead to trampling of bird nests.

Burning Large Grasslands

Burning reduces buildup of dead vegetation, adds nutrients to the soil, rejuvenates plant growth, and helps prevent the spread of woody vegetation. Hayfields that develop a thick layer of thatch are usually not used by nesting birds because they cannot effectively run on the ground to escape predators or forage for food. Although burning is not always feasible on small grasslands, when possible it can benefit grassland bird populations within one or two years following a burn.

Recommendations

Burning every two to six years provides the best habitat for birds nesting in small grasslands. If possible, provide adjacent unburned grassland habitat for nesting birds during the burn year.

Burning in early spring (before the arrival of birds in mid-May) is most beneficial to vegetation and nesting birds.

Large Grasslands

Grazed Grasslands

Cattle, sheep, and horses have different food preferences; their grazing has effects on the different vegetation structure of pastures. Many grassland birds in the Northeast tolerate and benefit from light grazing because it creates a mosaic of grass heights and structures, removes ground litter, and benefits bunch grasses. Light grazing also allows the development of wildflowers and scattered shrubs. However, intensive grazing leads to a loss of plant diversity and cover for wildlife. Large grasslands can be managed in a rotational system to benefit breeding birds.

Recommendations

In grazed pastures with nesting birds, keep approximately 40 percent of the vegetation cover at a minimum height of 8 to 12 inches or at "knee height" with scattered forbs until August 1. This can be achieved by rotational grazing. During the most critical nesting period (June 1 to July 15), keep cattle off fields with dense populations of grassland birds. Leave some pastures undisturbed in May and June when birds are arriving and setting up territories.

Avoid overgrazing fields. Overgrazing creates excessive bare ground that can cause erosion, reduce plant and invertebrate diversity, and lead to trampling of ground-nesting birds.

Mowing Large Grasslands

Hayfields and meadows support a rich diversity of grasses, wildflowers, and invertebrates that are important for breeding grassland birds. Old hayfields, not replanted for at least eight years, are favored by some birds (such as bobolinks) because of the developed ground cover and a greater variety of grasses and other plants. Mow every one to three years to maintain fields in grasses and prevent growth of woody vegetation.

Timing of mowing is crucial to the survival of nesting grassland birds. Early and frequent mowing destroys nests and young. Therefore, mowing after August 1 is recommended if increasing grassland bird habitat is a management goal.

Recently, many grasses native to the Northeast have been replaced by fast-growing grasses that can be harvested several times during the summer to provide high-quality hay for livestock. This increased production, plus the use of fertilizers and modern machinery, has created grasslands with

little diversity. Switching grass varieties or altering mowing practices can benefit breeding grassland birds.

Recommendations

Avoid mowing areas with ground-nesting birds before August 1. It is common to see young birds in fields by late June, but cutting should be avoided because some species, such as eastern meadowlarks and grasshopper sparrows, raise a second brood later in the season, and the young fledge in late July.

Management of Grasslands at Airfields for Grassland Birds

Management of Capped Landfills for Grassland Birds

Grassland Restoration

Managing Agricultural Lands for Grassland Birds

Value of Farms to Birds

Value of Birds to Farms

Foster & Motzkin 2003

Department of Environmental Management (DEM— the agency responsible for forests and parks) Project in Ecosystem Management operates on “ assumptions that grasslands, heathlands, shrublands and savannah’ s are natural vegetation types with significant rare species assemblages . . . in presettlement times” (Rivers, 1997)

Ecological Restoration Program of the Massachusetts Department of Fisheries and Wildlife (DFW; the state agency responsible for wildlife and biodiversity) manages for open and early successional habitat based on the interpretation that “ many of our dry forests, shrublands and grasslands were managed with fire for thousands of years by Native Americans. Now, lack of occasional fire has caused significant changes in those communities, decreasing habitat for many of our rare plants and animals.” (<http://www.state.ma.us/dfwele/dfw/nhosp/nhrest.htm>)

Biodiversity Initiative of the Natural Heritage and Endangered Species Program of DFW cites that “ Fires were not only used [by Native Americans] to create and maintain agricultural fields but also to drive game. In using fire, many fire-adapted natural communities, such as grasslands and scrub oak barrens were created and maintained.” (<http://www.state.-ma.us/dfwele/dfw/bdi/Landuse3.htm>).

TNC - Katama grassland because “ this reserve is the largest example of native sandplain grassland left on Martha’ s Vineyard” (<http://nature.org/wherework/northamerica/states/massachusetts/preserves/art5320.html>).

few miles away, TNC and DEM are collaborating to burn oak forest as “ restoration of the property’ s original grassland and woodland habitat” (<http://nature.org/wherework/northamerica/states/massachusetts/preserves/art5334.html>).

One classic example is the heath hen (*Tympanuchus cupido cupido*), a subspecies of the prairie chicken that formerly occurred in coastal New England, New York and New Jersey and beyond but that declined in the 19th century and went extinct in the 1930s (Gross, 1928). Protection of the species in the early 20th century prompted intensive research and the establishment of a state reservation on Martha’ s Vineyard. The last population collapsed following harsh winters and predation by goshawks and feral cats on what

is now the Manuel F. Correllus State Forest (Gross, 1928, 1932; Foster and Motzkin, 1999). The heath hen is widely cited as having been grassland dependent and, therefore, proof of the existence of extensive grasslands in the pre-Columbian landscape (Jones, 1995; Askins, 2000). Some early colonial descriptions suggest an abundance of the bird and later descriptions are even more striking (albeit describing a bird of shrubby or wooded habitat).

Heath hen . . . was formerly so common on the ancient bushy site of the city of Boston that laboring people or servants stipulated with their employers not to have the Heath Hen brought to table oftener than a few times in the week. (Townsend, 1905 ; Birds of Essex County, Massachusetts) The dual interpretation of the heath hen as abundant and a prairie species has prompted the assertion that grassland was extensive and widespread. Nonetheless, there are major questions regarding this interpretation. Gross (1928) , the preeminent expert on the species, is joined by other authorities in contrasting the heath hen to prairie chicken as preferring open sandy woods and scrub oak barrens rather than grassland: “ [Heath Hen] will be much more likely to succeed [in the coastal landscape], on account of its woodland habits and narrow range, than the Prairie Hen [chicken], which requires a more open country, and usually does not take refuge in the woods.” (Biological Survey Bulletin No. 24, cited in Gross, 1928). Supporting data for the claims of heath hen abundance is also weak. For example, Gross (1928) indicates that although the species was widely distributed along the coast, its abundance in the early historical period is uncertain. Meanwhile, the repeated quote that heath hen was shunned by laborers is totally unsubstantiated. Identical language was applied to the Atlantic Salmon, another species that was most likely uncommon (if present) in southern New England before European settlement (Carlson, 1988, 1992).

According to one account, the fish [Atlantic Salmon] was so common that indentured servants who worked in lumbering camps of the day had written into their contracts a limitation on the number of times per week they would be served Salmon. (US House of Representatives, 1981; HR 2062. Bill to Establish the Connecticut River Atlantic Salmon Compact) No original documents containing such proscriptions for either species have ever been located (Carlson, 1988).

Perhaps more compelling than the heath hen example is the occurrence of several openland plant taxa that are endemic to the Northeast suggesting that habitats capable of supporting these species may have occurred prior to widespread land clearing by Europeans. However, the nature, abundance, and extent of such habitats are largely conjectural. Although it is likely that many of the uncommon plant species that are characteristic of openlands occurred in the region prior to European settlement (Dunwiddie et al., 1996), there is no evidence to suggest that they occurred on the same sites or in similar abundances and assemblages as those in which they occur today.

Olmsted (1937) characterized the area as native grassland based on his interpretation of soil structure. In areas that he interpreted as undisturbed by human activity, he described the soils as having developed under “ a persistent grassland cover prior to white colonization” with a profile consisting of a 20 cm dark brown A (upper) horizon terminating in a sharp, lighter colored lower boundary. Olmsted likened this to tall-grass prairie soils, in which a dark and deep A horizon arises from the decomposition of grass roots over millennia. Interestingly, he also speculated that Indian fires had maintained the grassy growth.

Katama Plains, the large grassland on the southeastern corner of Martha’ s Vineyard jointly managed by The Nature Conservancy, State of Massachusetts, and Town of Edgartown. The area has been variously described as “ native sandplain habitat” and “ one of New England’ s largest and best sandplain grasslands” (Scott, 1989; Liptak, 1998 ; TNC, <http://nature.org/wherewework/northamerica/states/massachusetts/preserves/art5320.html>) and its dark soil profile has been interpreted as indicating grassland continuity for thousands of years (Scott, 1989). The area supports an array of uncommon species, including more than 18 birds, invertebrates and plants that are rare and declining. In order to reverse a trend of habitat deterioration, including shrub and tree invasion, the area has been managed through fire, mowing, and stem cutting in recent decades. According to site managers, the use of fire is preferred due to its perceived congruence with the site’ s native status and history. Nonetheless, despite ongoing management, many species have declined or disappeared over the past two decades, including a wide range of plant, bird, and invertebrate taxa. Historical review provides an alternative interpretation of the site’ s origins. Located adjacent to

Edgartown, Martha's Vineyard's oldest and most prosperous town, the Katama Plain was one of the first sites to be settled by Europeans on the island and was probably originally wooded (Herbster and Cherau, 2000). By 1642, the area was divided into 40 acre lots that were cleared for agriculture. Maps from 1776 onwards depict the area in fields; it was mapped as "sheep pasture" by Crevecoeur in 1784; supported dairy cows in the 1880s; and, currently is comprised of varied fields and a grass airfield. As in the case of the North Haven sand plains, the dark soils are Ap horizons that developed through deep plowing of the sandy soils. The site and its assemblage of interesting species are clearly the recent products of human history. Encroachment of woody species is therefore a consequence of historical shifts in management. Whereas the current management regime appears to be largely ineffective in maintaining the habitat and eliminating woody plants, the site might well respond favorably to management that mimics the agricultural practices that gave rise to its historical condition over past centuries.

The insights arising from historical perspectives force us to address quite fundamental questions. What landscapes do we value, and why? Should we attempt to maintain cultural sites and assemblages? Are we seeking to maintain or recreate landscapes and assemblages from specific time periods? Should we use any and all means to support as much of our local biodiversity as possible? Once we have addressed these and related questions we can return to historical information for further insights into management with some expectation of success. While we may open new policy and ethical discussions through historical-ecological studies, we also learn much about ecological process and options for conservation.

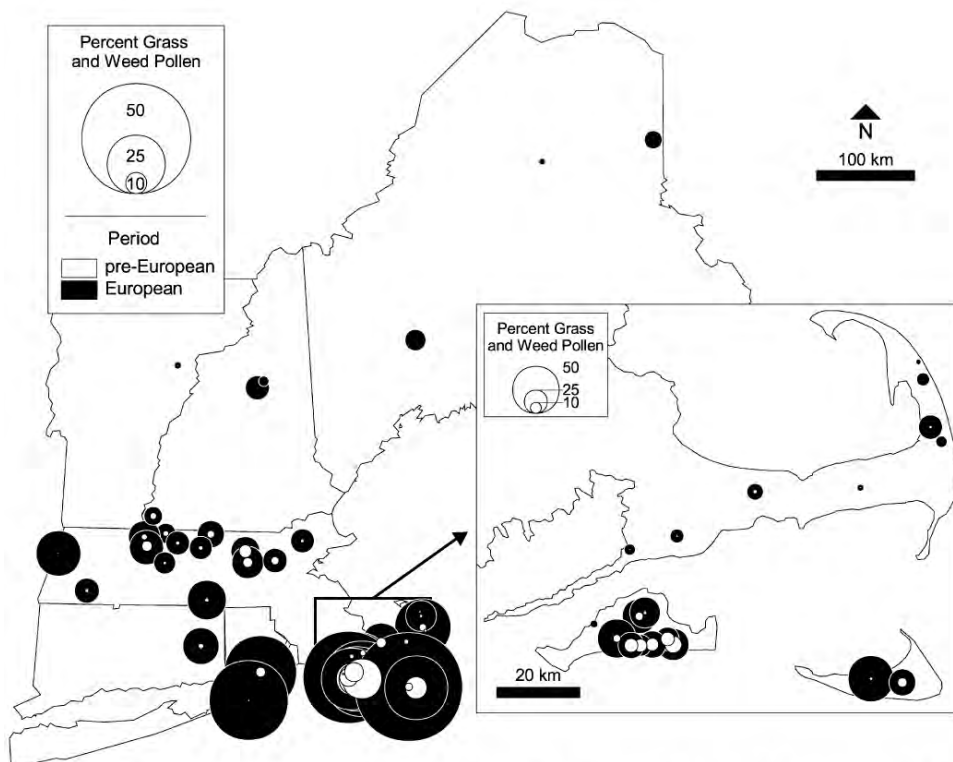


Fig. 5. Maps of paleoecological data depicting the relative abundance of grass (Gramineae) and weed (*Ambrosia*, *Plantago*, *Rumex*) vegetation in the pre-European (white, open symbols) and European (closed, black symbols) agricultural periods. For the pre-European period values represent the average of the five samples immediately preceding settlement as identified by the author of the study. For the European period values represent the maximum levels observed, typically in the mid- to late 19th century. Values are much higher in the European period due to the widespread development of extensive openland vegetation. During pre-European times values were consistently low (ca. <5%) with the exception of sites on the outwash plain of Martha's Vineyard. Data are from Parshall et al. (2003), Fuller et al. (1998), Foster et al. (2002b), Stevens (1996), Dunwiddie (1990a), Harvard Forest (unpublished) and the North American Pollen Data Base.

Clarke 2006 However, initial conclusions appear to suggest that plowing followed by repeated mowing has been as successful, if not more so, than other management strategies conducted in grasslands and heathlands throughout New England (including grazing and prescribed fire), at least in supporting the five rare species investigated.

Although fire can presumably create and maintain rare plant habitat in forests and shrublands of the central plain, it is unclear whether it could do so over a spatial and temporal scale to permit the occurrence of rare plant populations.

Motzkin et al. Cape Cod

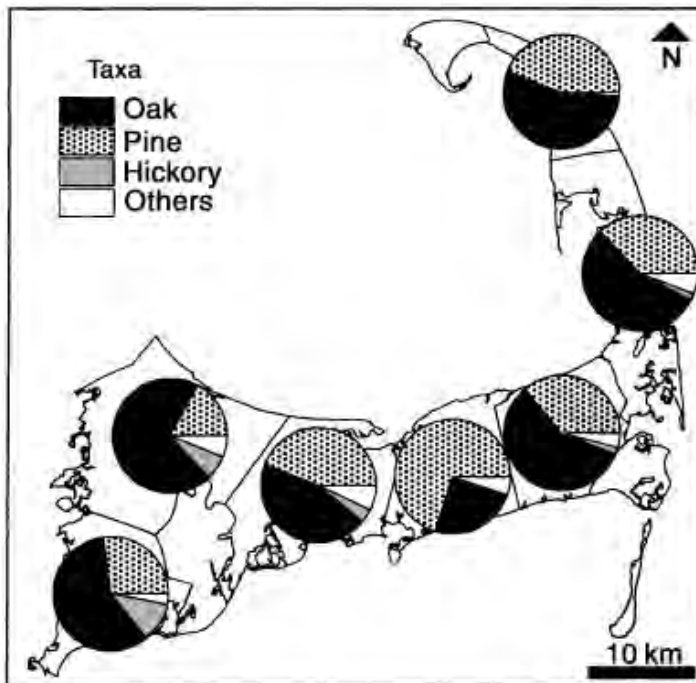
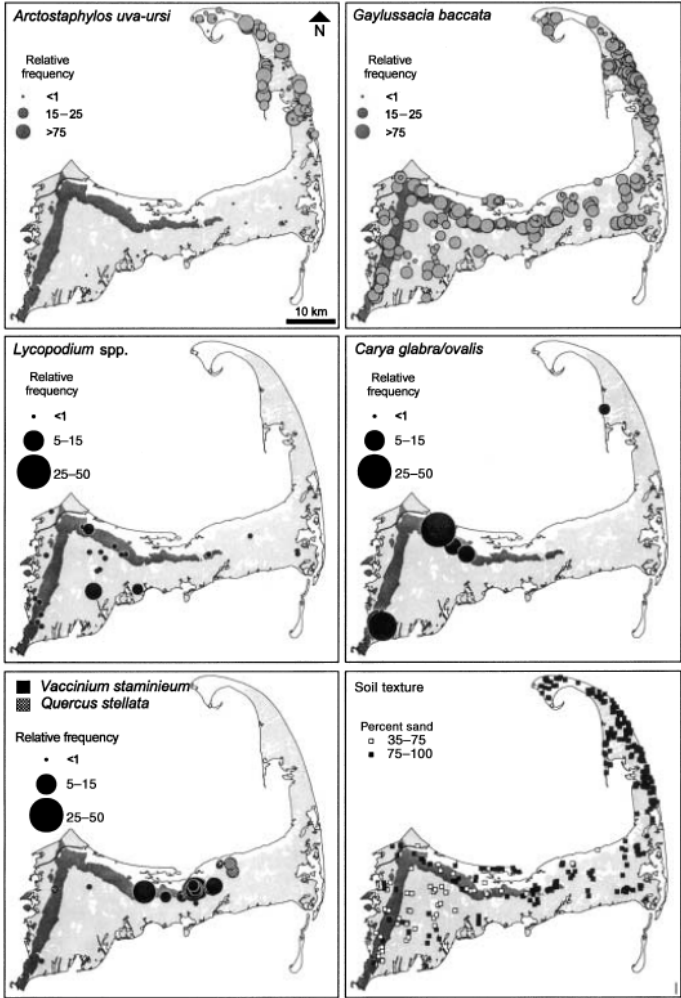


Figure 2 Early historical vegetation composition on Cape Cod, based on 'witness trees' from seventeenth–eighteenth century lotting surveys.



MCSF Fuels Treatment 2010



Pohogonot Tract

- Burn Unit totals 795 acres
- Divided into 5 sub-units
• 83 – 111 acres
- Mowing
 - 100 ft to 300 ft variable width buffer
 - Two pockets of scrub oak
 - 20 ft backline
- To be burned in fall 2011 and spring and fall of 2012



Haaggerty 2006

The overstory vegetation is dominated by combinations of tree oak species (*Q. alba*, *Q. stellata*, and *Q. velutina*) and pitch pine (*Pinus rigida*)... The shrub layer is dominated by scrub oak (*Q. ilicifolia*), young tree oak (*Quercus* spp.) and white pine (*Pinus strobus*), as

well as dwarf Chinquapin oak (*Q. prinoides*), black huckleberry (*Gaylussacia baccata*), blueberry species (*Vaccinium* spp.), sweet fern (*Comptonia peregrina*), and sheep laurel (*Kalmia angustifolia*). The herb layer contains a number of species including Pennsylvania sedge (*Carex pennsylvanica*), wintergreen (*Gaultheria procumbens*), pink lady's slipper (*Cypripedium acaule*), mayflower (*Epigaea repens*), and bracken fern (*Pteridium aquilinum*).

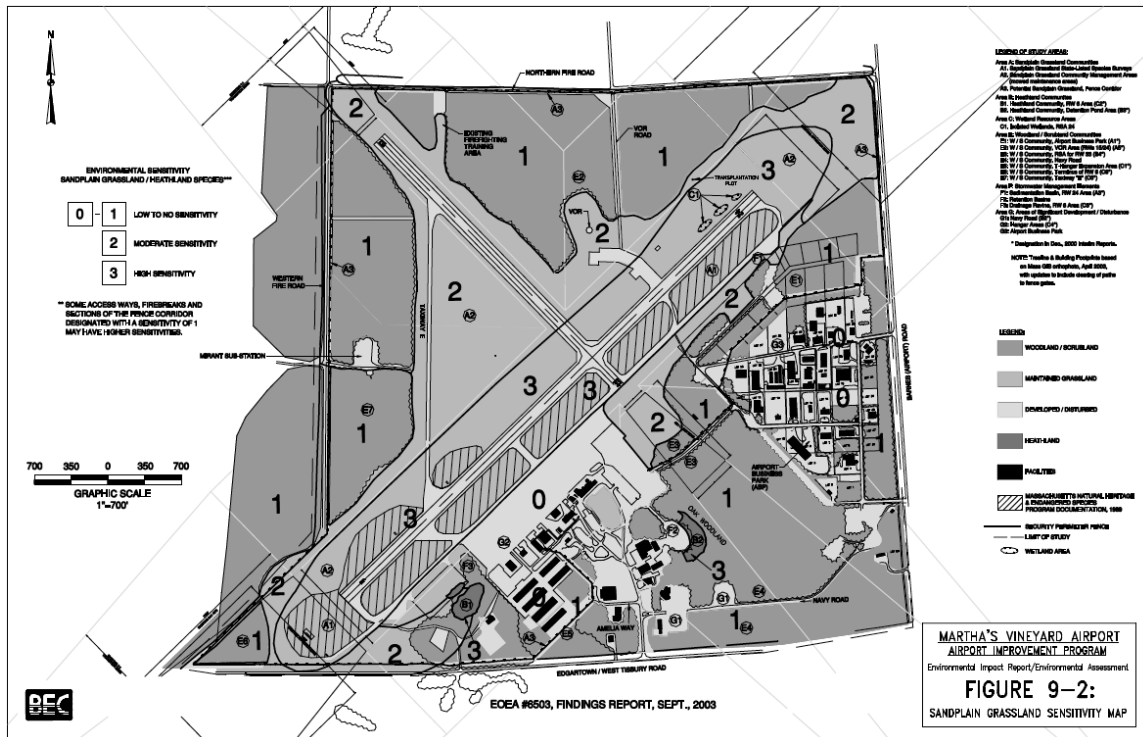
Myles Standish

- **Fulfill management approaches for Reserves as directed by the Forest Futures Visioning Process (2010) and subsequent Management Guidelines (2012). From page 20 of the Guidelines "... some situations may call for ecological restoration and vegetation management. Situations where some management may be appropriate include the removal of invasive species or for the protection of existing rare species. Fire adapted Reserves in Southeastern Massachusetts may require active restoration and management to maintain habitat for rare species and reduce the risk of catastrophic wildfire that can threaten human health and safety."**

MV Airport Sandplain Grassland Rare Plants - Watch List – all except E, SC, T

Scleria paucifolia Papillose Nut Sedge (E), Spiranthes vernalis Grass-leaved Ladies Tresses (T), Linum intercursum Sandplain Flax (SC), Sisyrinchium arenicola Sandplain Blue-eyed Grass (SC), Asclepias tuberosa Butterfly Weed, Lactuca hirsuta var sanguinea Hairy Wild Lettuce, Lechea minor Lesser Pinweed, Paspalum setaceum var setaceum Sand Paspalum, Polygala nuttallii Nuttall's Milkwort, Quercus stellata Post Oak, Spiranthes tuberosa Little Ladies Tresses,

Also Barrens Buckmoth and Purple Tiger Beetle,



Foster Motzkin 1998

“[The land had] a weather-beaten face, and the whole country, full of woods and thickets, represented a wild and savage hue.” ... William Bradford, 1620 describing eastern Massachusetts

“[The land is] full of rocky Hills ... and cloathed with infinite thick Woods.” ... John Josselyn, 1672 writing about central New Hampshire

“The forests are not only cut down, but there appears little reason to hope that they will ever grow again.” ... Timothy Dwight, 1804 reflecting on southern New Hampshire

“Our woods are now so reduced that the chopping of this winter has been a cutting to the quick...There is hardly a woodlot of any consequence left but the chopper’s axe has been heard in it this season.” ... Henry David Thoreau, 1855 in Concord, Massachusetts

“In many ways the forest landscape of the Appalachians, as well as many parts of the East and South, has come full circle. By the 1960’s and 1970s...its appearance is much like it must have been before the American revolution.” ... Doug MacCleery, 1992, *American Forests - A History of Resiliency and Recovery*

“This unintentional and mostly unnoticed renewal of the rural and mountainous east — not the spotted owl, not the salvation of Alaska’s pristine ranges — represents the great environmental story of the United States, and in some ways of the whole world.” ... Bill McKibben, 1995, *An Explosion of Green*, The Atlantic Monthly

NSF Proposal

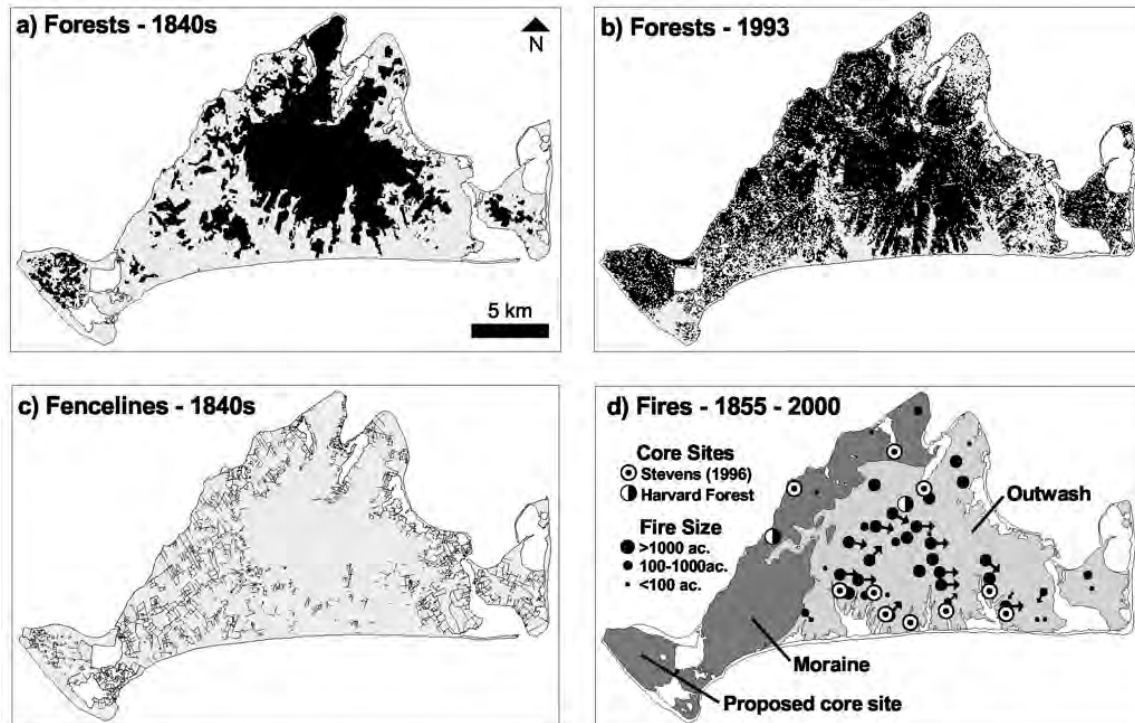


Figure 4. Historical maps of Martha's Vineyard, Massachusetts indicating changes in forest cover from the mid-19th century (a) to the present (b), the abundance of historical fencelines and agricultural land around the perimeter of the Island (c), and the importance of numerous large fires on the central outwash plain (d). Paleoecological core sites are also indicated in (d).

MAS State of Birds 2013

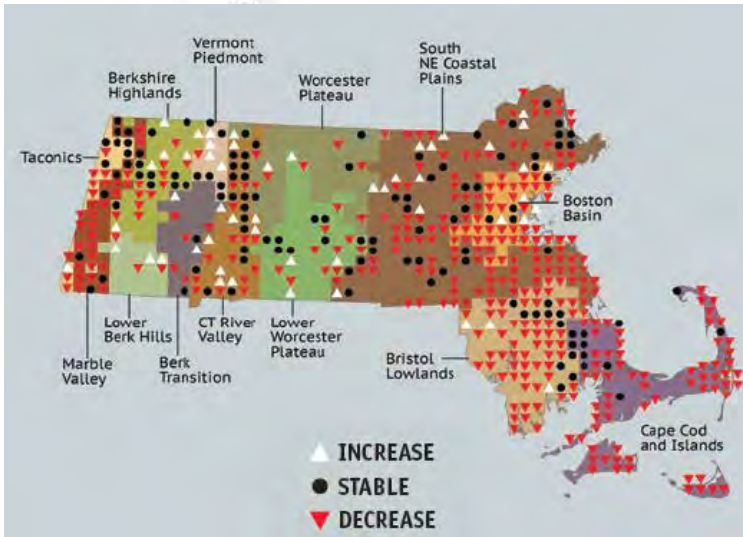
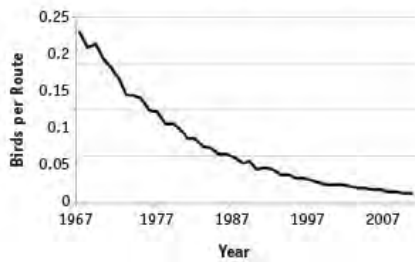
Recommendations in this document stress our need to:

- Support a net gain of land in agriculture in Massachusetts
- Encourage everyone to embrace Massachusetts-based agricultural products
- Develop tools for both foresters and farmers to encourage bird-friendly management options on their lands
- Develop plans to increase shrubland maintenance and creation in sustainable locations

Listed below are the habitats and behaviors of breeding species that are declining and the species we have chosen to represent those habitats or behaviors.

- Grassland birds and birds of agricultural landscapes — Eastern Meadowlark, Brown Thrasher, Cliff Swallow
- Coastal-nesting species — Roseate Tern, Saltmarsh Sparrow
- Birds of shrublands and young forests — Brown Thrasher
- Ground-nesting birds — Wood Thrush, Brown Thrasher, Killdeer
- Aerial insectivores (species that eat insects that are in the air) — Cliff Swallow
- Freshwater marsh-nesting birds — American Bittern
- Long-distance migrants — Roseate Tern, Cliff Swallow, Wood Thrush

Breeding Bird Survey estimate of the trend for American Kestrel in Massachusetts from 1966-2008.



LOST WITH THE LAND: AGRICULTURAL LANDS

The loss of agricultural lands, including the iconic barns that used to dot the New England landscape, is contributing to the decline of many species, including:

- Short-eared Owl
- Eastern Meadowlark
- Northern Bobwhite
- Vesper Sparrow
- Barn Owl
- American Kestrel
- Cliff Swallow
- Upland Sandpiper
- Horned Lark
- Bank Swallow
- Grasshopper Sparrow
- Song Sparrow
- Barn Swallow
- Red-winged Blackbird
- Eastern Kingbird
- Savannah Sparrow

GRASSLANDS, AGRICULTURE, AND OPEN FIELDS



Wild Turkey
Eastern Bluebird
Brown-headed Cowbird
Bobolink

Decrease

<i>Savannah Sparrow</i>	Vesper Sparrow
<i>Song Sparrow</i>	Barn Owl
<i>Eastern Kingbird</i>	Cliff Swallow
<i>Red-winged Blackbird</i>	American Kestrel
Grasshopper Sparrow	Eastern Meadowlark
<i>Barn Swallow</i>	Short-eared Owl
Bank Swallow	Northern Bobwhite
Horned Lark	Ring-necked Pheasant (INTRODUCED)
Sedge Wren	Henslow's Sparrow
Upland Sandpiper	

SHRUBLANDS, EDGE, AND EARLY SUCCESSIONAL



- | | |
|---------------------------|--------------------------|
| Carolina Wren | Yellow Warbler |
| Wild Turkey | Great Crested Flycatcher |
| Eastern Bluebird | Cedar Waxwing |
| Willow Flycatcher | Northern Cardinal |
| Yellow-throated Vireo | Yellow-billed Cuckoo |
| Warbling Vireo | Eastern Phoebe |
| Ruby-throated Hummingbird | Indigo Bunting |
| Alder Flycatcher | American Goldfinch |
| Brown-headed Cowbird | Mourning Dove |

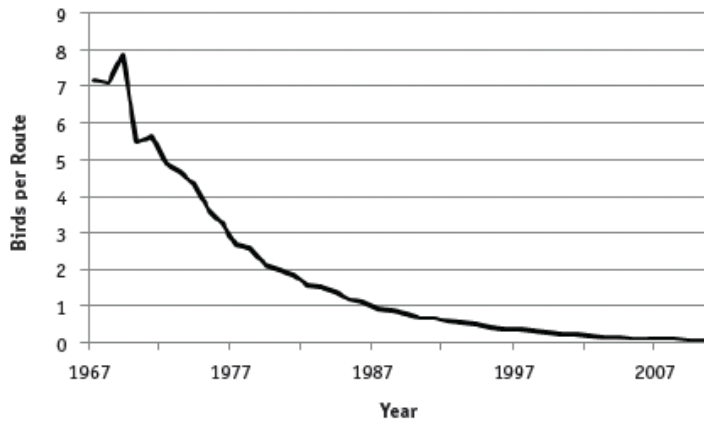
Increase

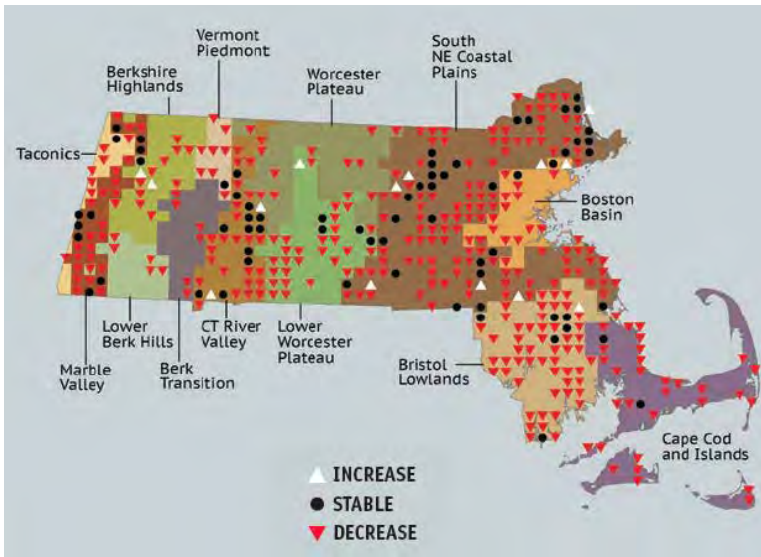
Decrease

- | | |
|------------------------|-----------------------------------|
| Northern Harrier | Eastern Towhee |
| Prairie Warbler | Brown Thrasher |
| Song Sparrow | White-eyed Vireo |
| Eastern Kingbird | Nashville Warbler |
| House Wren | Golden-winged Warbler |
| Common Yellowthroat | Eastern Whip-poor-will |
| American Robin | White-throated Sparrow |
| Blue Jay | Common Nighthawk |
| Chestnut-sided Warbler | Northern Bobwhite |
| Least Flycatcher | Ring-necked Pheasant (INTRODUCED) |
| Field Sparrow | |
| Ruffed Grouse | |
| Black-billed Cuckoo | |

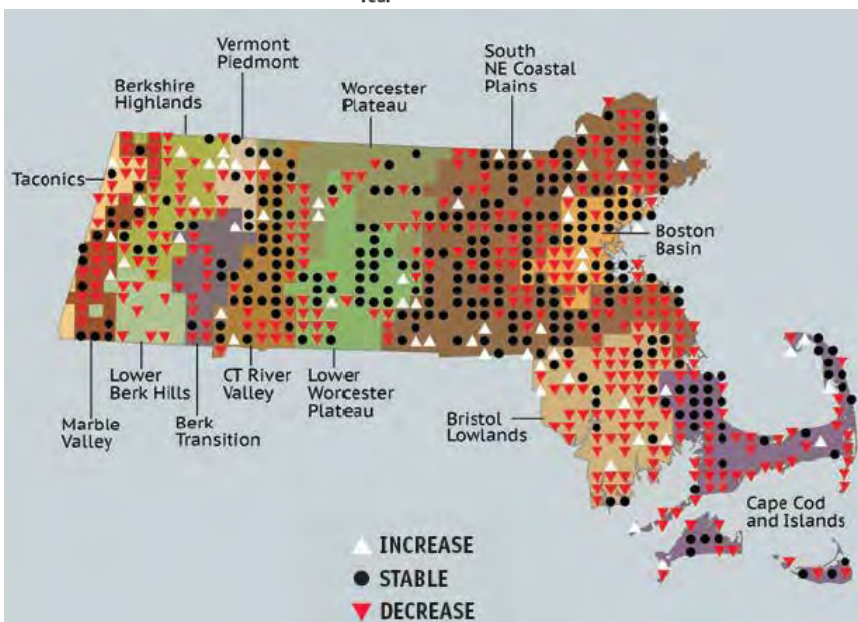
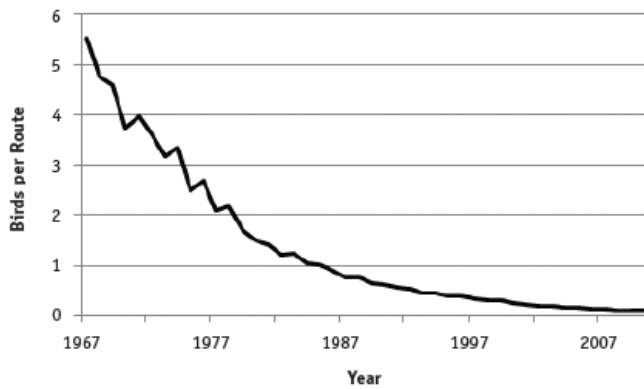


Breeding Bird Survey estimate of the trend for Eastern Meadowlark in Massachusetts from 1966-2008.

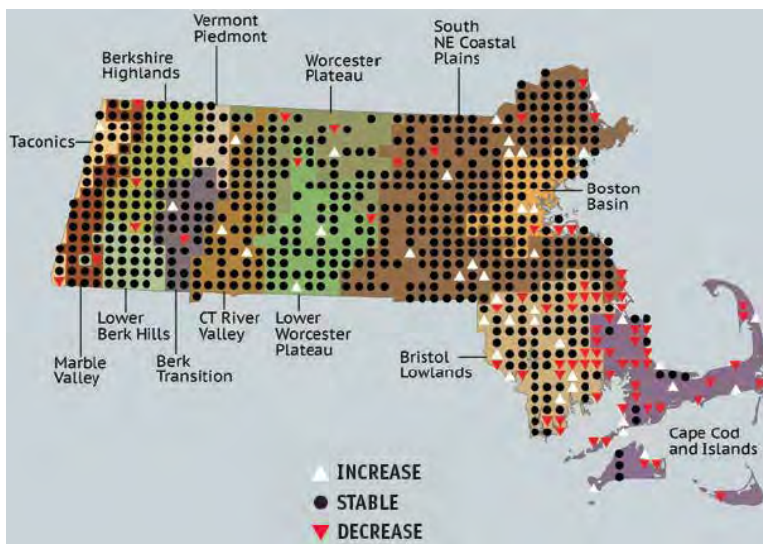
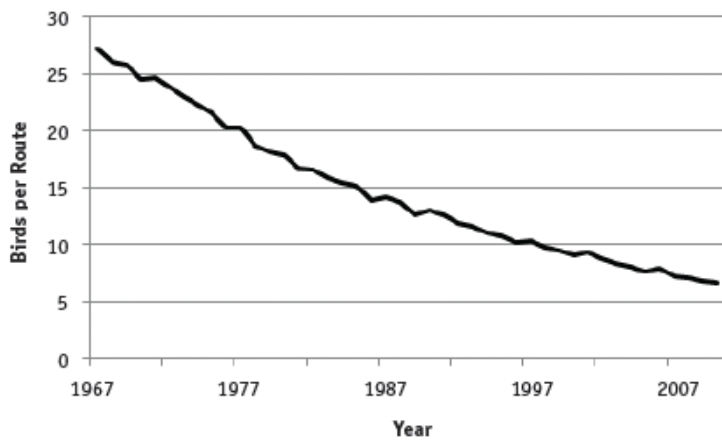




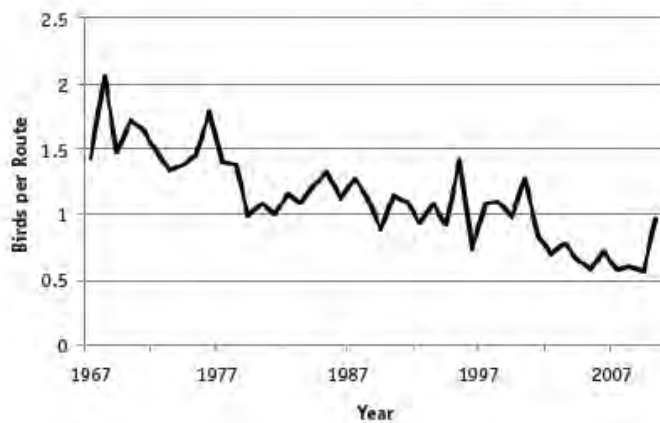
Breeding Bird Survey estimate of the trend for Brown Thrasher in Massachusetts from 1966-2008.

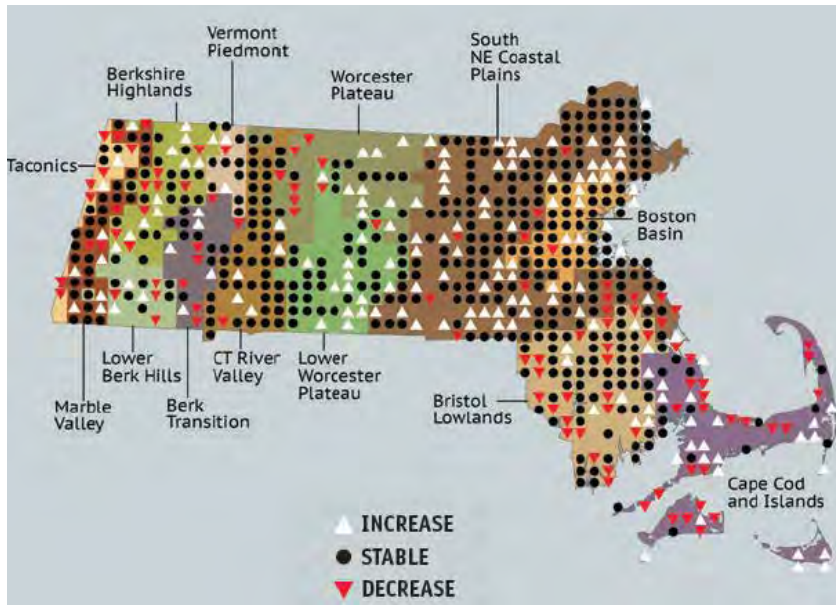


Breeding Bird Survey estimate of the trend for Wood Thrush in Massachusetts from 1966-2008.



Breeding Bird Survey estimate of the trend for Killdeer in Massachusetts from 1966-2008.





TTOR Cape Poge Management Plan

The Native Americans inhabiting Martha's Vineyard - known as the Wampanoag - have lived on the island for an estimated 12,000 to 13,000 years, and had profound effects on species composition and landscape structure. The Wampanoag imposed drastic changes on their surroundings, predominantly through the deliberate setting of large-scale fires. Setting these fires assisted the Wampanoag with hunting game, maintaining berry patches, and creating fertile soils for cultivation... Because of Wampanoag land-use practices, many explorers that traveled the waters surrounding the Vineyard in the 17th century found an "open" (unforested) landscape. Because a substantial proportion of Martha's Vineyard was open at this time, the Europeans reasoned that this land would be well-suited for agriculture and pasture.

Info on various spp popns over time

Over 12.5 miles of road at Cape Poge and 2 miles at Wasque access; direct and indirect impacts; kill seals, crush plovers, dune erosion, damage to nesting habitat, reduction SPG and H habitat; Multiple roads dissect.

Figure 6.1: Permit Sales 1991 - 2002

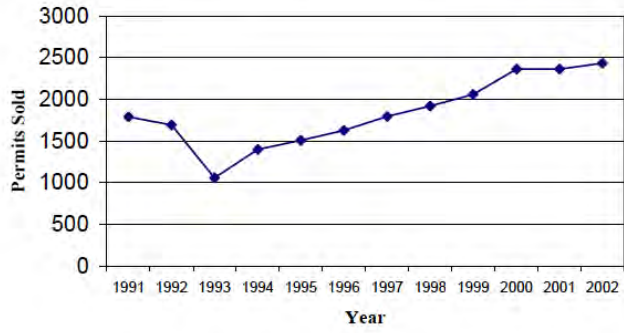
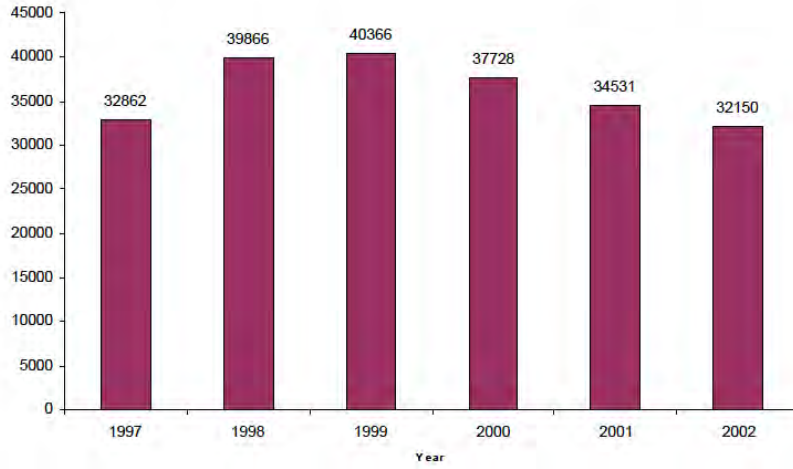
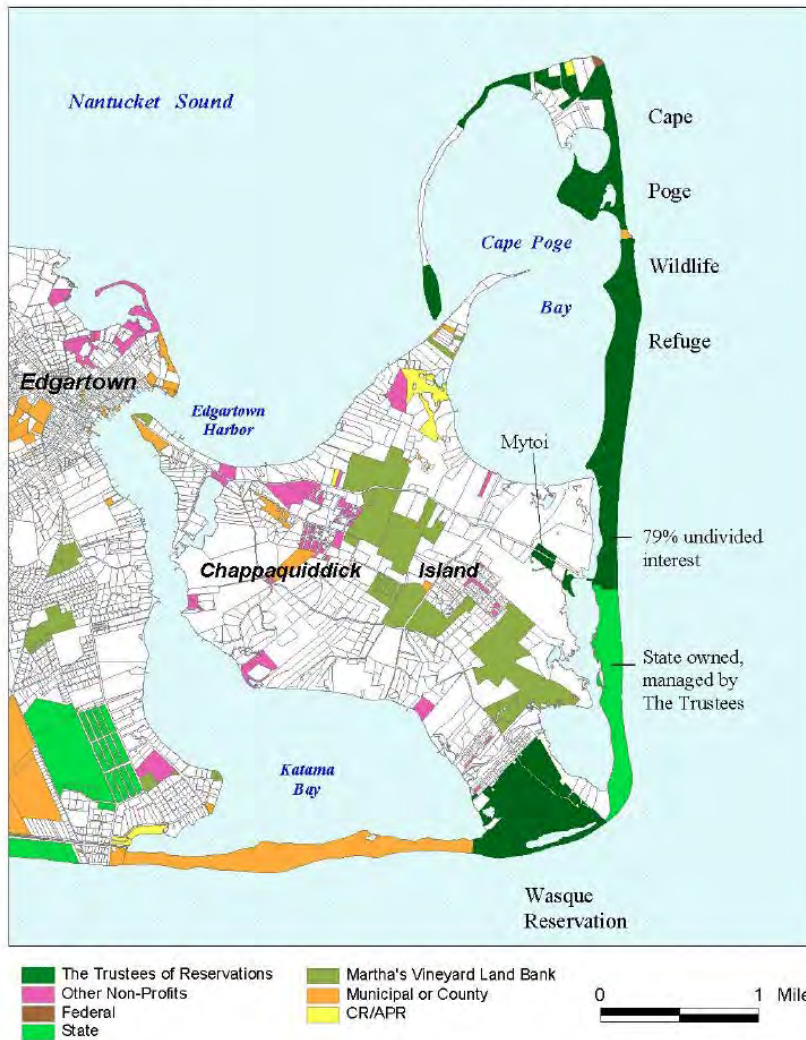


Figure 6.2: Vehicles Crossing Dyke Bridge 1997 - 2002



Map 9.1 Protected Open Space



Long Point Mgt
Indicators of Quality

- Presence of rare or uncommon plant species: Sandplain Flax, Smooth False-foxglove (*Aureolaria flava*)¹, Sandplain Blue-eyed Grass, Colicroot (*Aletris farinosa*), Bushy Rockrose.
- Presence of rare moth species: Gerhard's Underwing Moth (*Catocala herodias gerhardi*), Barrens Lycia (*Lycia ypsilon*), Chain-dot Geometer (*Cingilia catenaria*), Barrens Metarranthis (*Metarranthis apiciaria*), Melsheimer's Sack-bearer (*Cicinnus melsheimeri*), Snowberry Clearwing (*Hemaris gracilis*), and Coastal Heathland Cutworm (*Abagrotis crumbi benjamini*), among others.
- Species richness above 15, on average.
Presence of indicator bird species: Whip-poor-will, Northern Bobwhite (*Colinus virginianus*), Northern Harrier, and Field Sparrow (*Spizella pusilla*), Chuck-will's-widow (*Caprimulgus carolinensis*), and Eastern Bluebird (*Sialia sialis*).

¹ Smooth False-foxglove only occurs in a few small populations on the island; it is uncommon elsewhere, typically where fire is a component of the system.

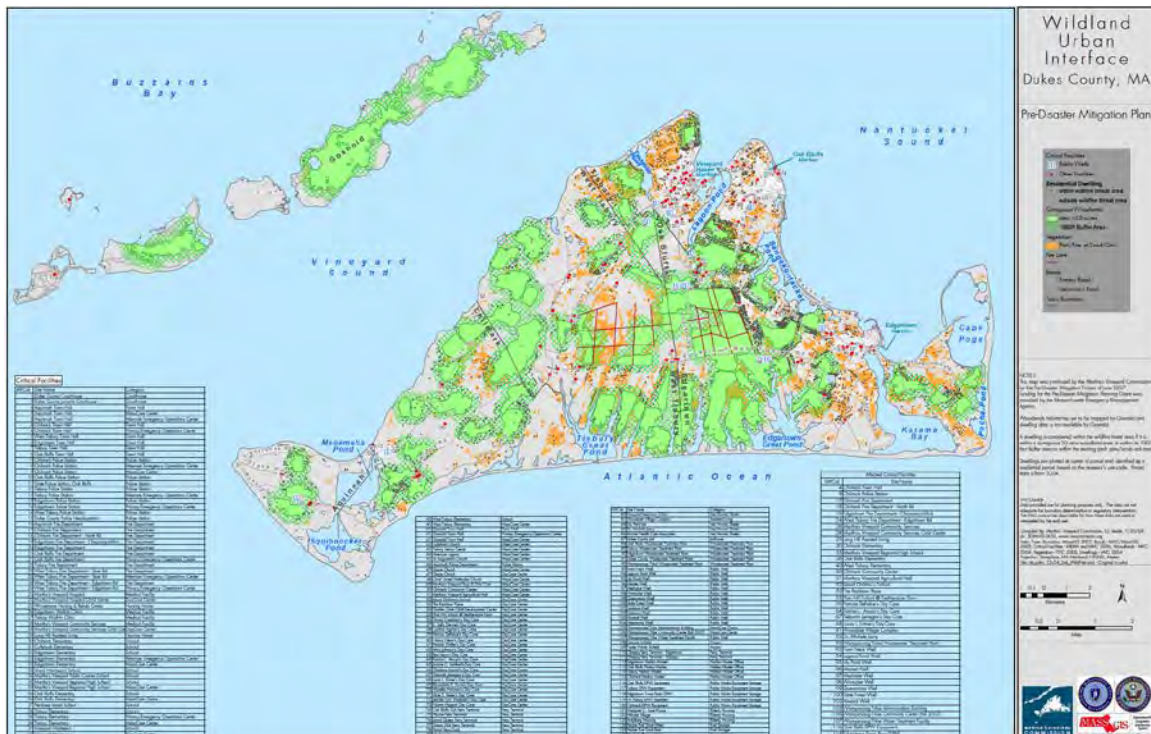
Menemsha mgt plan

Rare natural communities include maritime erosional cliff community (S2), sandplain heathlands (S1), maritime shrubland community (S3), scrub oak shrubland (S1), and woodland vernal pools (S3). **Rare at-risk animals** include the spiny oakworm moth (*Anisota stigma*) and Gerhard's underwing moth (*Catocala herodias gerhardi*), chocolate renia moth (*Renia nemoralis*), a watch list moth, white m hairstreak (*Parrhasius m-album*), a butterfly species on the watch list, and eastern box turtle (*Terrapene carolina*), a declining species of special concern in Massachusetts. Will provide habitat for **at-risk bird species** such as Northern Harrier (*Circus cyaneus*), Whip-poor-will (*Caprimulgus vociferous*), Prairie Warbler (*Dendroica discolor*), Eastern Towhee (*Pipilo erythrophthalmus*), and Gray Catbird (*Dumetella carolinensis*). One rare plant species, broom crowberry (*Corema conradii*), a G4 (global rank), S3 (state rank) plant species of special concern, is the major focus of this proposed management plan.

Landowner Incentive Program project is one phase of a multi-year and multi-phase project that will consist of clearing woodland habitat, strip-mowing areas to create optimal habitat for broom crowberry, expanding the current population, and monitoring the population and its habitat for specific changes.

Habitat *Corema conradii*

Anthropogenic (man-made or disturbed habitats), grassland, sandplains and barrens, shrublands or thickets, woodlands



WAP Fuel Mgt on Greta Plains 2005

Sandplain vegetation can be highly flammable, and under dry, windy conditions it can support extreme fire behavior. In addition to its flammability, high fuel loading contributes to fire hazard in barrens vegetation. Scrub Oak stands, in particular, are highly flammable and support high litter and shrub fuel loads (1-hr plus 10-hr fuels = 14.3 t/acre (32 mt/ha) and fuel depths of 4-5 ft (1.3-1.5 m). Pitch Pine and Oak Woodland stands support lower surface fuel loads (10.9 and 10.2 t/acre; 24 and 23 mt/ha, respectively) and fuel depths of only 1.6 and 1.9 ft (0.5 and 0.6 m). Scrub Oak and Pitch Pine stands can support canopy fires with extreme fire behavior, whereas Oak Woodlands are inherently less flammable. Most rare plant species on MFCSF occur in culturally maintained grasslands. Previous work suggests that Scrub Oak is most important for rare Lepidoptera species.

Treatments we evaluated reduced slash and shrub loads and heights in the first growing season after treatments. Scrub Oak plots showed the most pronounced change from pretreatment conditions (shrub heights were less than a quarter and loads were well under half their pretreatment values). Mowing in Pitch Pine and Scrub Oak reduced shrub loads to well under 50% of pretreatment values. Sheep will graze new woody shoots following mowing, effectively reducing shrub loads however the expense of this treatment (which is more than four times that of mowing) may be prohibitive. In mow/graze Scrub Oak plots post-treatment loads were <10% of pretreatment values. Effects of treatments in Oak Woodlands were less pronounced as they were more heterogeneously applied. Pile burning and mowing are comparable in cost, and both effectively remove slash in thinned Pitch Pine stands. Creating lanes using alternative techniques can be comparable in cost to harrowing (although grazing is more expensive). However, long-term maintenance costs may be more expensive in the Experimental Fuel Break (relative to the cost of mowing harrowed lanes).

The longevity of treatment effects is unclear. Fuel loads will probably take somewhat longer to recover in Scrub Oak plots. However, it may take less than five years without further treatments. Growing season treatments could deplete shrub root reserves and slow fuel load recovery. Patterson (unpublished data) found that five annual treatments virtually eliminated Huckleberry from Oak Woodlands on Cape Cod that are similar to those on MFCSF. Litter layer compaction may have a more lasting effect, especially in Scrub Oak and Pitch Pine mow plots where increases in litter load were greatest. Thinning of Pitch Pine stands increased the estimated wind speed at which crowning would occur from 21 to 62 mph, and this change will be long-lasting, especially where seedling recruitment is likely to be dominated by Oaks.

The unique coppice structure appears to be common in Oak-dominated stands at MFCSF. Areas burned in fires in the 1930's and 1940's have more coppice Oak stems than stands not burned in the early 20th century. Management to preserve Oak stools will require either cutting followed by prescribed burning or cutting of stems near their base, because most Oak stems are >2.5 inches (6 cm) dbh and will not be topkilled by burning alone.

Repeated mowing of existing fuelbreaks has facilitated the development of large populations of several rare plant species. Harrowing can provide immediate habitat for rare plants. Colonization by grassland species (both common and rare) of newly harrowed areas is improved by the availability of nearby seed sources.

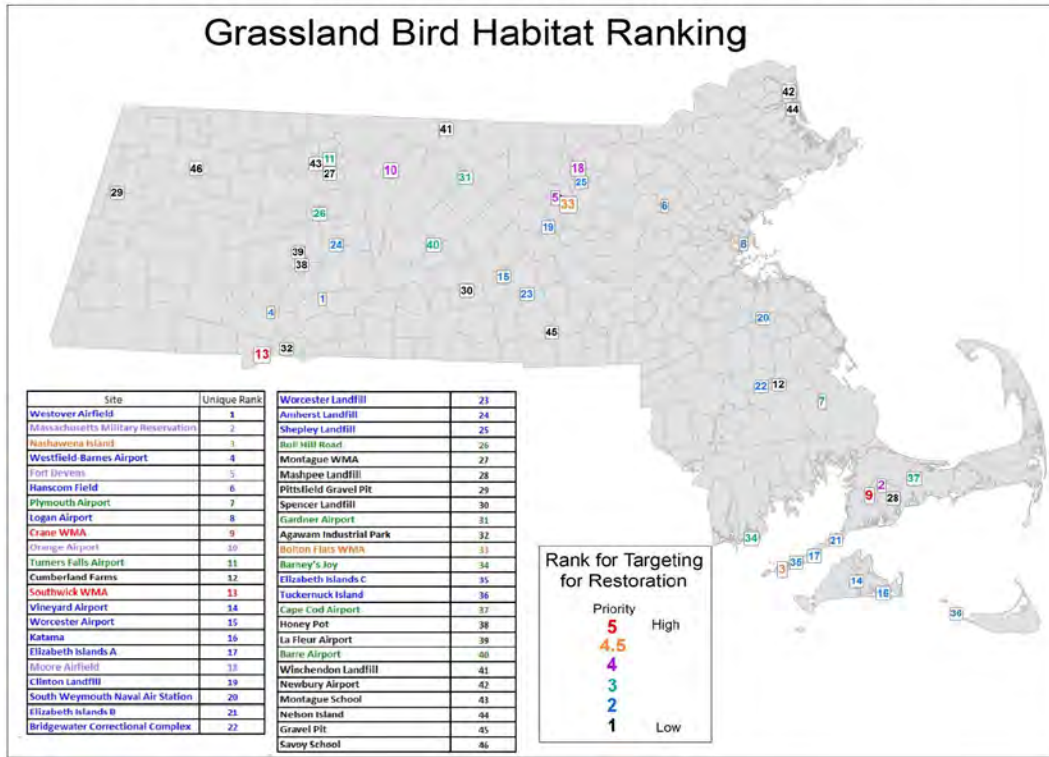
Based on information currently available for the other 21 rare insect species reported for MFCSF, these fuel reduction techniques could also be used to maintain or enhance the habitat of other rare insects. Nearly all of the 22 rare species at MFCSF are specialists of Pitch Pine-Scrub Oak barrens in the Northeast; and thinning, mowing, grazing and burning are all techniques that could be used to retain the open characteristics of sandplains ecosystems. Treatments, however, must be applied across the landscape in a mosaic pattern with respect to both space and time, as each of the 22 species has different natural history requirements, and no one treatment would directly benefit every species at any given time of the year. All species are vulnerable to direct mortality from these treatments at some time during the year, so untreated patches should be left as refugia for recolonization post treatment.



Figure 6. Photos showing tools used in creating experimental fuel break: A) Brushhog (photo by J. Varkonda), B) sheep grazing in plot (photo by D. Brennan), C) fellerbuncher (photo by J. Varkonda), D) brush pile burning (photo by J. Carlson), E) prescribed burning in early spring around the outside of research plot (photo by G. Clarke).

Statewide Action Plan 2013 MA

Figure 1. Locations and rankings of all sites in Massachusetts known to have Upland Sandpipers or Grasshopper Sparrows since 1990.



Askins 1998

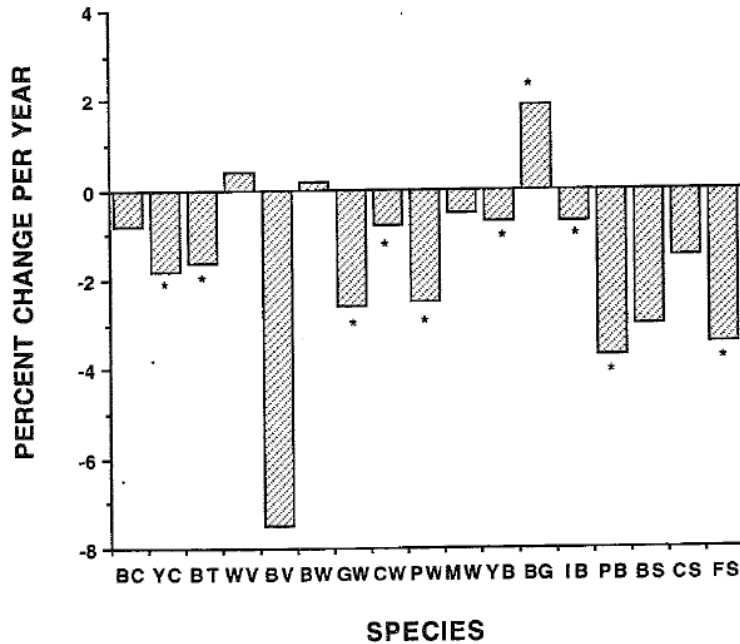


Figure 1. Population trends of shrubland specialists in North America east of the Mississippi River between 1966 and 1994. Data from Sauer et al., 1995. Classification of the following species as shrubland specialists is based on information in DeGraaf and Rudis (1986): BC: black-billed cuckoo (*Coccyzus erythrophthalmus*), YC: yellow-billed cuckoo (*C. americanus*), BT: brown thrasher (*Toxostoma rufum*), WV: white-eyed vireo (*Vireo griseus*), BV: Bell's vireo (*V. bellii*), BW: blue-winged warbler (*Vermivora pinus*), GW: golden-winged warbler (*V. chrysoptera*), CW: chestnut-sided warbler (*Dendroica pensylvanica*), PW: prairie warbler (*D. discolor*), MW: mourning warbler (*Oporornis philadelphia*), YB: yellow-breasted chat (*Icteria virens*), BG: blue grosbeak (*Guiraca caerulea*), IB: indigo bunting (*Passerina cyanea*), PB: painted bunting (*P. ciris*), BS: Bachman's sparrow (*Aimophila aestivalis*), CS: clay-colored sparrow (*Spizella pallida*), and FS: field sparrow (*S. pusilla*). Asterisks indicate statistically significant population changes.

From Steve Hurley – Wild Brook Trout Populations: Blackwater Brook, Fulling Mill Brook, Mill Brook-Chilmark, Paint Mill Brook, Roaring Brook, Tiasquam River, Mill Brook- West Tisbury, Witch Brook and UT- Priesters Pond, there may be a few more very tiny streams in the moraine area as well. Even within the listed streams the brook trout habitat can be limited, we resurveyed Blackwater brook recently and did not find wild trout. The most comprehensive survey of vineyard waters was the 1988 surveys (see attached summaries).

MVT 3.19.2014 Dr Jerome Smith 1833 Mill Brook

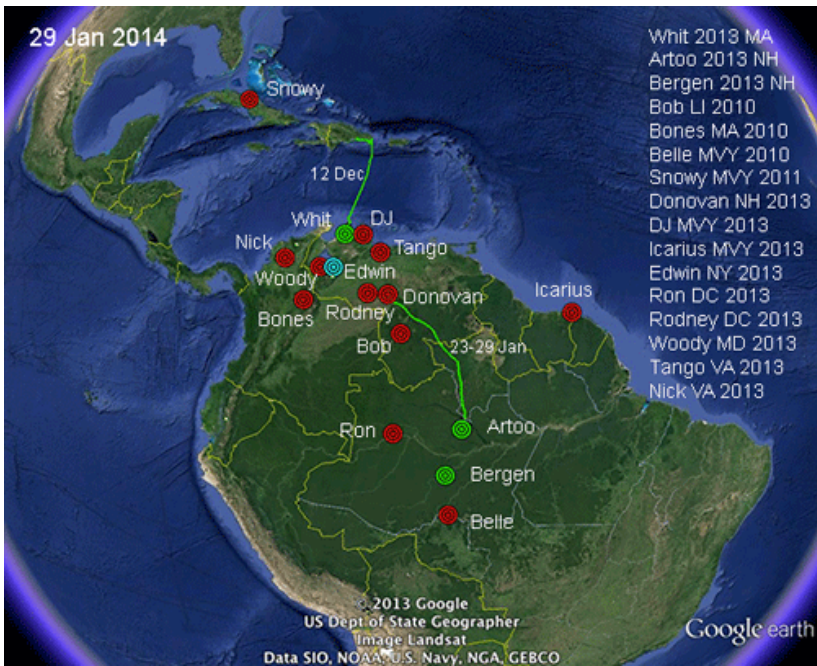
“In no place, however, do we remember to have seen them in such abundance as in Dukes County, upon Martha’s Vineyard... It was here in the month of November last, and of course in their spawning time; while returning home from a ramble among the heaths and hills of Chilmark and Tisbury, that crossing the principal brook of the island, our attention was attracted towards the agitated state of the water, and never do we recollect so fully to have realized the expression of its being ‘alive with fish’ as on this occasion.”

Sticher on butterflies

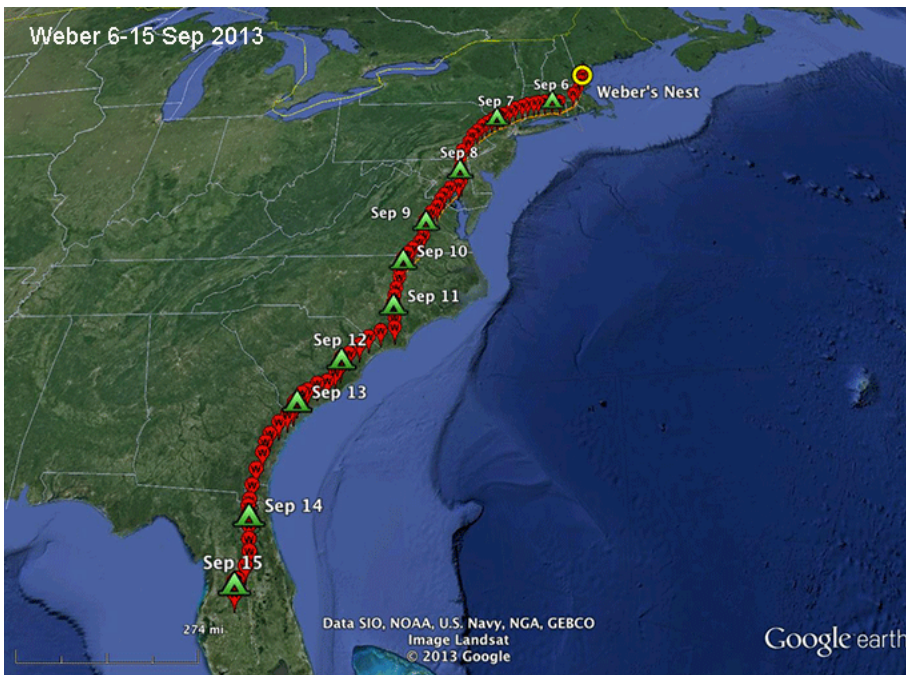
HDT: July 29, 1853 “Butterflies of various colors are now more abundant than I have seen them before, especially the small reddish or coppery ones. I counted ten yesterday on a single *Sericocarpus conyzoides* [american coppers on aster].” July 19, 1851: “Here is the Canada thistle in bloom, visited by butterflies and bees. The butterflies have swarmed within these few days, especially about the milkweeds.” July 18, 1853: “Meadow haying has commenced. There is no pause between the English and meadow haying. There are thousands of yellow butterflies on the pontederia flowers [pickerel weed], and of various colors on the buttonbush”

Scudder: “walking along the breezy, upland road, lined with a continuous row of milk weed blossoms and white flowering alder, all ablaze with butterflies. I might have picked off hundreds of aphrodites by hand, so absorbed were they in their pretty pursuit, and all the interspaces between their broader wings seemed filled with little skippers and pretty painted ladies and an occasional comma”, tiger swallowtails- “throng about lilac-blossoms, and become so intoxicated that on one occasion a friend of mine caught sixty of them at once between his two hands.” monarch: “The Monarch or Milkweed butterfly, for example, may be seen quite by himself, sailing majestically over the fields, until late in the season, when, having multiplied to excess, vast swarms are found together; together they mount in the air to lofty heights, as no other butterfly appears to do, and play about in ceaseless gyrations; and sometimes they crowd so thickly upon a tree or bush, as by their color to change its whole appearance.” Mr. W. Edwards “relates how, from the top of Pegan Hill, in Natick, Massachusetts, he saw such a moving swarm flying steadily for hours in a single direction”; “Summer, with its blazing sun and diversified blossoms, brings us the hot-looking coppers, and all that dappled band of fritillaries and angle-wings, blocked in red and black above, and often variegated by odd dashes and spots of burnished silver, or by peacock eyes beneath. How they crowd about the spreading thistle blossoms, or on the many-flowered umbels of the milk weed, and fan themselves with content at their sweet lot!” Samuel H. Scudder, *Frail Children of the Air: Excursions into the World of Butterflies* (Cambridge, Mass.: The Riverside Library for Young People, 1879), 184, 185; Scudder, *Butterflies of New England*, 493.

Bierregard Ospreys



Red dots are adults, who will be heading north in February or March. (It's going to be busy here at Map Central). Green dots are juveniles, who will remain in South America for another 15 months or so. The blue dot is a cell-tower bird currently off the grid, probably hiding somewhere in S.A. not near a cell tower.

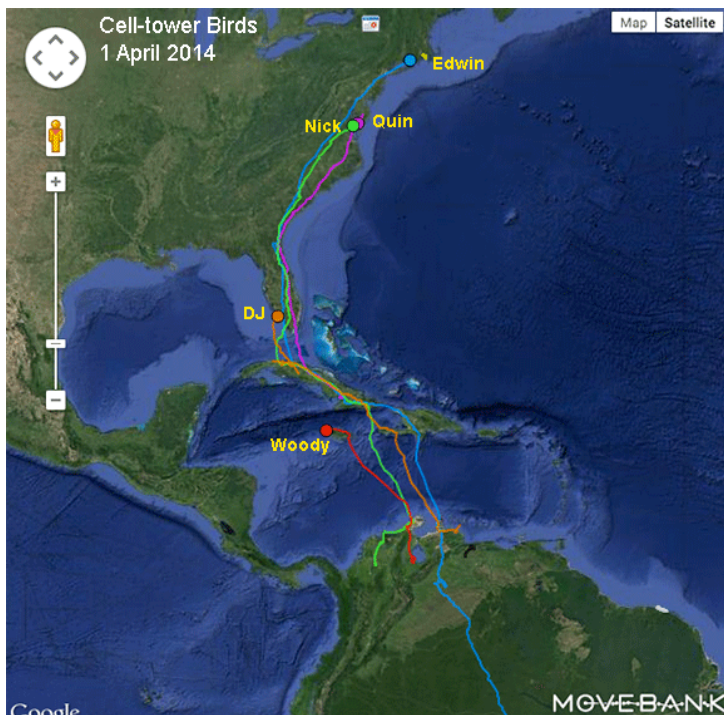


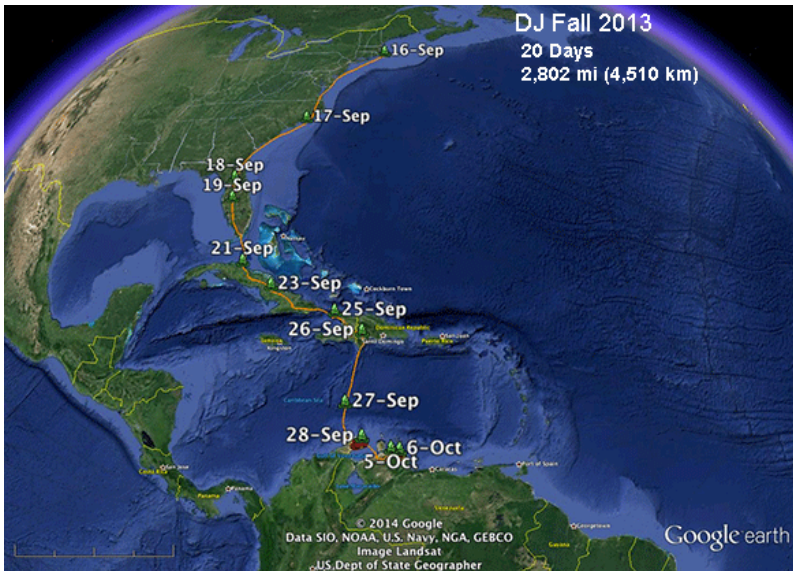
Weber – Juvenile male

Snowy a recent fledgling on Snow Point Chappaquiddick. first migration took him to the seasonally flooded grasslands of central Venezuela. He spent the typical 18 months down there, returning in

the spring of 2012. On his first trip north, he stopped at a big marshy area in northern Cuba. spent three weeks, leading us to wonder if he would finish his first migration north (some young do not). spent the early summer between the Vineyard and Cape Cod. early July moved down to the southwest corner of Connecticut, where he spent about five weeks. mid August, he got moving on his second migration. as moving through Cuba, he retreated to the marsh where he spent the three weeks in the spring. He has been there ever since (as of mid-Feb 2014), and is clearly not heading back to Venezuela.

DJ is an adult male nesting on ground on sand dune on Chappaquiddick. upgraded their housing to a short pole out on the marsh near the dune. Too many skunks patrolling the beaches to nest on the ground. he hasn't raised young in the two nesting seasons since upgrading to a platform nest. Tagged on 1 May 2013. he's not a very good provider. prolonged absences from the nest, which failed again this spring, are just what we saw from him in the past two years. wintering in northwestern Venezuela.

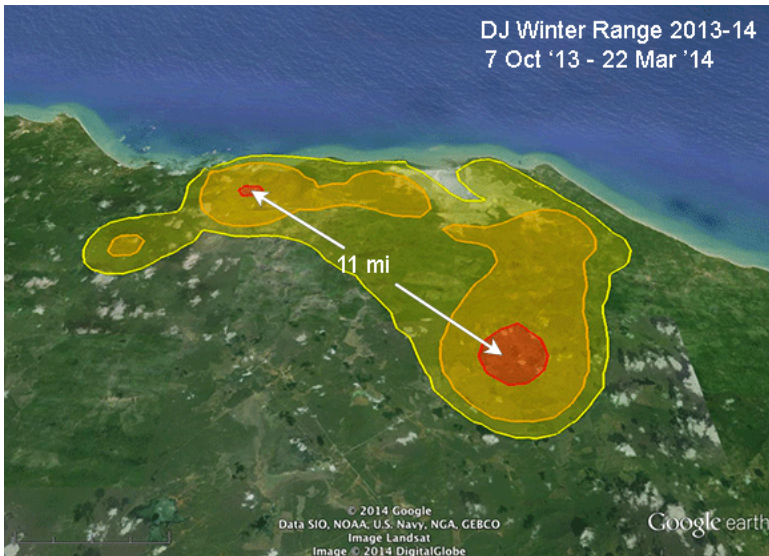




DJ's Fall 2013 Migration

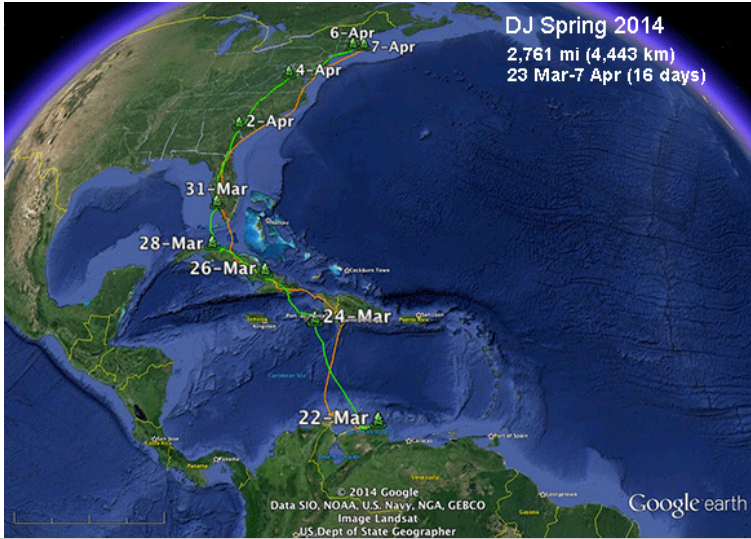
DJ and his Martha's Vineyard neighbor Icarus took off like rockets on Sept 17th with a wicked northeast wind at their backs. They both shot down the coast, making it to Florida in just two days!

After that, the pace was a bit more leisurely. DJ made an uneventful crossing of the Caribbean on the 27th and 28th and then settled down on the Guajira Peninsula for six days. We had not followed him before, so we didn't know if this was his winter spot or not. Turns out it wasn't. On the 5th of October he crossed the Gulf of Venezuela and settled down for the winter in northwestern Venezuela.



DJ's Winter Range

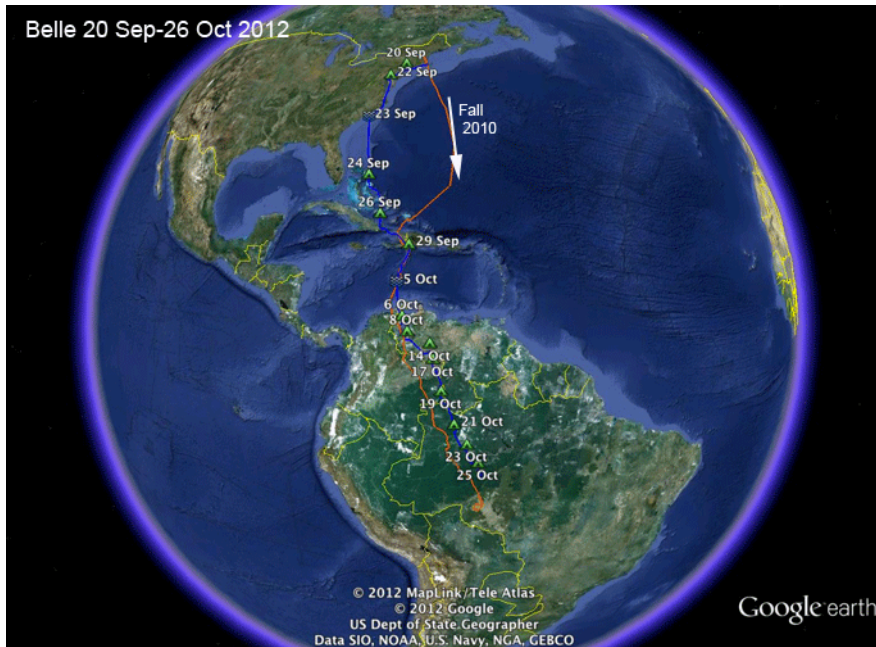
This map shows the results of a "kernel" analysis of all of DJ's winter locations. 50% of the time he was in one of the darker orange areas. Most of his tracks show that he commuted very frequently between the two areas. The lighter orange areas show where 95% of his locations were found, and the yellow area is 98%.



DJ Comes Home
 DJ made a rather quick trip home--only 16 days to cover almost 2,800 miles. (The distance reported in the map is his "roost-to-roost" track and so underestimates the actual distance he flew.)
 The orange track is his path south in the fall of 2013.



Here's Belle's track in Fall 2013 along with her first track south as a juvenile back in 2010.



20 Sep-26 Oct 2012.

Belle does nothing small time. Her first trip south was the farthest east of any bird we've tracked (she was just a couple hundred miles west of Bermuda, where Ospreys have been recorded--(obviously juveniles), she went the farthest south of any bird we've tracked, and here she just pops down from Delaware to the Bahamas in 2 days!

Belle pushed south but stayed on Cabo Beata for a week before heading across the Caribbean to Colombia.

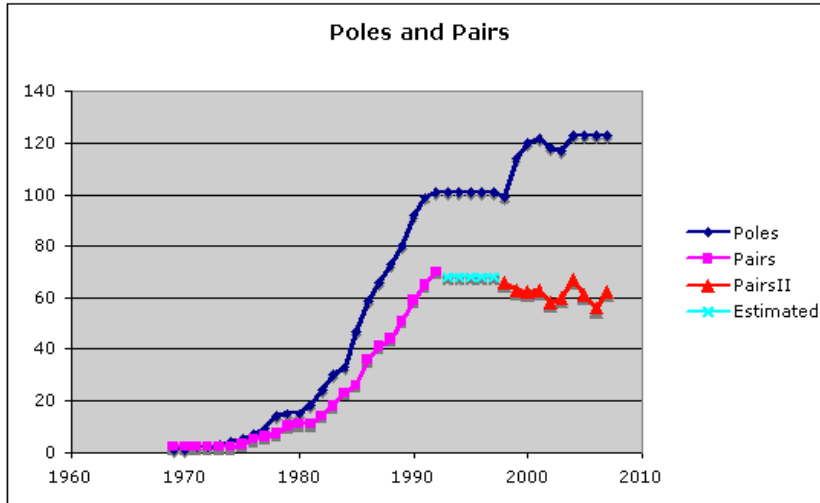
She returned to her wintering area on the Rio Madeira and survived another winter.

June 6, 2012.

Belle is back on Martha's Vineyard and spending a lot of time around Deep Bottom Cove. Mark Alan Lovewell got this great shot of Belle flying over the cove. This is the first time anyone has photographed one of our juveniles after the return from the 18 months they spend on the wintering grounds (waters?).

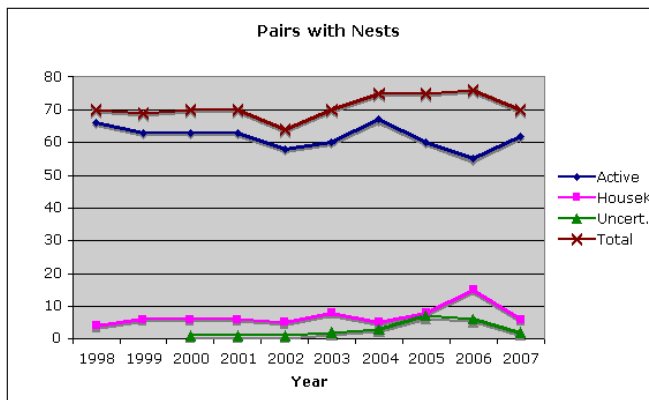
She is hanging around with a gang of birds--at least 4 others--they're probably all young birds that haven't set up territories. They will spend most of the summer on Martha's Vineyard, although they may wander off to the mainland. They're learning where the good fishing is and prospecting for a nest site and mate.

Belle was trapped as a fledgling at a nest on Lake Tashmoo on 28 July 2010. She is the first young we have had complete three fall migrations. She winters in Brazil near the Madeira River at the southern edge of the Amazon rainforest. She spends a lot of time at Deep Bottom as well as at a couple of ponds over on Cape Cod. We're hoping that she will find a mate in the spring of 2014. (No news on whether she came back).



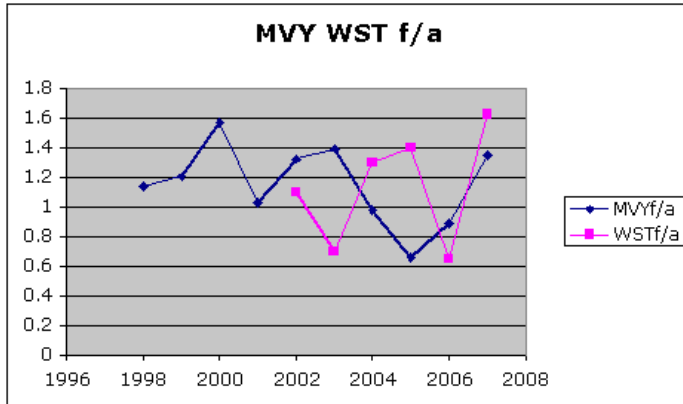
This graph charts the increase in the Vineyard population in response to an increased availability of nest sites. "Poles" are mostly poles erected specifically for Osprey nests, but a few are old abandoned power lines. The pink line represents data collected by Gus Ben David from 1969 through 1992. No data were collected from 1993-1997, so I estimated the number of pairs during that time. "Pairs II" show the data I and a number of students and volunteers have collected during the past 10 years.

Something other than nest site availability appears to be limiting the Island population.



NEST

NEST	TOTAL FLEDGED
Stonewall Pond/Couch Cottage	21
Lobsterville/Batzer	20
Farm Neck	17
Mink Meadows/Lukes	17
O.B. Harbor Pole	17
Wasque/Trustees of Reservations	16
Dyke Bridge	16
Long Point/Middle Pt. Cove	16
Cedar Tree Neck	16
North Shore/Dr. Ganz	16

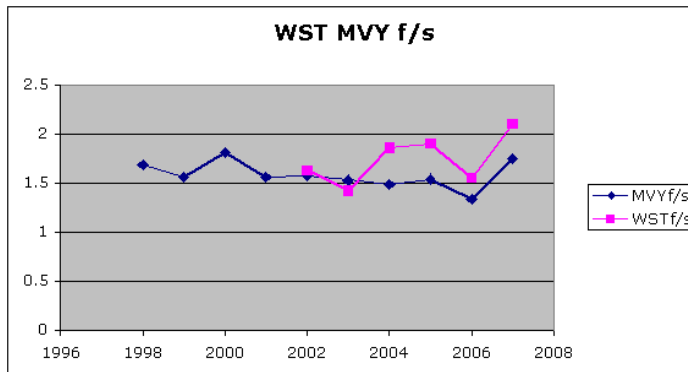


Average # per active nest: MV and Westport. 15 mi away. Often not in synch

http://www.osprey-watch.org/monitoring_groups/5

Summary Statistics

	Total Number of Nests	Number of Occupied Territories	Number of Active Nests	Number of Successful Nests	Number of Failed Nests	Number of Young Produced	Number of Young Produced per Active Nests	Number of Young Produced per Successful Nests
2012	146		129	74	59	112	1.5	1.9
2013	82		58	48	48	88	1.8	1.8
2014	7		7	2	0	0	0.0	0.0



Ave per successful nest. So, weather during incubation is huge effect.

Peabody 1839 Ornithology of Massachusetts

The PINNATED GROUS, *Tetrao cupido*, was once very common in New England, but, being more shy than the preceding species, it has already been driven from all but a very few places, where it is comparatively free from intrusion. Audubon says, that when he first went to Kentucky, they were so abundant, that they could hardly be given away ; now, hardly one can be found in the State, and they are, in like manner, fast disappearing from all the settled parts of the west. In Massachusetts, laws have been enacted to preserve the heath-hen, as it is commonly called ; but it is impossible to withstand the operation of the law of nature by legislative enactments, and the same causes which have removed the greater proportion will soon deprive us of all. The better way is to try the experiment of domestication ; the bird is easily tamed, and breeds in confinement. Some which Audubon kept for the purpose, soon became familiar, and would eat from the hand as readily as common fowls. Unfortunately, they became so destructive to the vegetables of the garden, that he was obliged to have them killed ; but the experiment proceeded far enough to show,

that neither the natural wildness of the bird, nor the want of proper food, would prevent their being reared by any one who is willing to take the trouble.

The grouse feeds on berries of various kinds, in their season, the acorns of dwarf oaks, and the buds and leaves of trees. In summer, they pick whortleberries and cranberries, and sometimes venture into a field to pick the leaves of clover. It is said, that, sometimes in winter, when they are hard pressed with hunger, they will feed on the buds of the pine. They are also known, under those circumstances, to join the domestic poultry.

The *tooting*, for which these birds are remarkable, is produced by means of the air bags at the side. When these, resembling a small orange, are inflated, the bird lowers its head, opens its bill, and sends forth the air contained in these receptacles, in a succession of rolling notes, like those of a muffled drum. In parts of the country where the birds are become few and wild, this sound is seldom made after sun-rise, and sometimes the battles of the rival males are carried on in silence, and the *scratching grounds* carefully concealed.

The nest is built in May, with dry leaves and grasses, interwoven, and is carefully placed amidst the tall grass of a large tuft, where it is not often discovered. The eggs, from eight to twelve in number, resemble those of the preceding species, though somewhat larger in size. The female sits nearly three weeks, and as soon as the young are hatched, leads them away from the nest. When surprised, they conceal themselves, like young partridges, and one may search for them in vain, though perhaps he is treading them under his feet. In autumn, the different families associate together, sometimes in very large parties. Their most dangerous enemies are the hawk, the skunk, and the greatest of all destroyers, man.

The only place where they are now found in Massachusetts, is in Martha's Vineyard, and one small island near it ; and there, though pains are taken to protect them, they are said to diminish fast, the high price which they command in the market, being a strong temptation to shoot them. Cats, also, which

run wild in the island, do their part in the work of extermination. The wonder is, that with all their timidity, they have remained so long, but their patience and their attachment to their old haunts will be wearied out, and other means must be found to gratify the epicure's taste, and the sportsman's love of pleasure. The order of nature supplies such game, as a resource for the pioneers of civilization, while the process of clearing the soil goes on; till the earth is subdued, the deer, the birds, and the fish, supply means of sustaining life. But when agriculture, and the other arts of life, begin to be pursued with profit and success, these resources cease to be needed; the habits of the hunter are inconsistent with regular industry; and as the game would only serve to tempt men away from their cares and duties, the forests and streams are deserted, and their wild tenants go where there are other adventurers who need them. If the gallinaceous tribes can be preserved, it is by domestication, not by law. Experiments should be made for several years in succession, and if these fail, we must make up our minds to lose them.

Heath Hen - Grinnell

William Brewster 1885 visit. Written up in *Auk* and repeated the trip in 1890 and wrote in *Forest and Stream*: "Its range extends, practically, over the entire wooded portion of the island, but the bird is not found regularly or at all numerous outside an area of about forty square miles. This area comprises most of the elevated central portions of the island, although it also touches the sea at not a few points on the north and south shores. In places it rolls into great rounded hills and long, irregular ridges, over which are scattered stretches of second-growth woods, often miles in extent, and composed chiefly of scarlet, black, white and post oaks, from fifteen to forty feet in height. Here and there, where the valleys spread out broad and level, are fields which were cleared by the early settlers more than a hundred years ago, and which still retain sufficient fertility to yield very good crops of English hay, corn, potatoes and other vegetables. Again, this undulating surface gives way to wide, level, sandy plains, covered with a growth of bear, chinquapin and post-oak scrub, from knee to waist high, so stiff and matted as to be almost impenetrable; or to rocky pastures, dotted with thickets of sweet fern, bayberry, huckleberry, dwarf sumac and other low-growing shrubs,

"Clear, rapid trout brooks wind their way to the sea through open meadows, or long, narrow swamps, wooded with red maples, black alders, high huckleberry bushes, andromeda and poison dogwood, and overrun with tangled skeins of green briars.

"At all seasons the heath hens live almost exclusively in the oak woods, where the acorns furnish them abundant food, although, like our ruffed grouse, they occasionally at early morning and just after sunset venture out a little way in the open to pick up scattered grains of corn or to pluck a few clover leaves, of which they are extremely fond. They also wander to some extent over the scrub-oak plains, especially when blueberries are ripe and abundant. In winter, during long-continued snows, they sometimes approach buildings, to feed upon the grain which the farmers throw out to them. A man living near West Tisbury told me that last winter a flock visited his barn at about the same hour each day. One cold, snowy morning he counted sixteen perched in a row on the top rail of a fence near the barnyard. It is unusual to see so many together now, the number in a covey rarely exceeding six or eight, but in former times packs containing from one to two hundred birds

each were occasionally met with late in the autumn.”

“As already stated, the total present range of the heath hen covers about forty square miles. The estimates of the average number of birds per mile varied from three to five, giving from 120 to 200 birds for the total number. These estimates, it should be stated, relate to the number of birds believed to have been left over from last winter. If these breed freely and at all successfully, there should be a total of fully 500, young and old together, at the beginning of the present autumn. When one considers the limited area to which these birds are confined, it is evident that within this area they must be reasonably abundant. I was assured that with the aid of a good dog it was not at all difficult to start twenty-five or thirty in a day, and on one occasion eight were killed by two guns. This, however, can be done only by those familiar with the country and the habits of the birds.”

May 1906 (?) destructive fires – over most of breeding grounds- few birds reared
Oct 1906 – May 1907 - <100
December 1907 - 75

First protective law 1831 – closed season March 1 – September 1.
1837 – closed season for four years, extended for five more
But permitted towns to suspend law: Tisbury did suspend for ten days on a couple of occasions beginning 1842.
No real effort to enforce until 1905.

“The inhabitants of Martha’s Vineyard felt a local pride in having there a bird found nowhere else in the world, but this local pride was not strong enough to protect the species.”

VG 10.07.2011 Soo Whiting Changes in birds.
Differences in MV habitats vs SE MA

Until 1960 – MV did not have three mammalian predators: skunks, raccoons, chipmunks that are common elsewhere. And no predators of these three – coyotes, fox, bear, cougar (weasel)

Towhees used to ~10,000 pairs; nest on ground so easy prey and drop sharply last 30 years.
Other ground nesters dropping due to predation: bobwhite, brown thrasher, ovenbirds, B+W warblers, terns, black-crowned night herons, green herons, snowy egrets, piping plovers, spotted sandpiper.

Bobwhite have depended in past on restocking by F+G. but plummeted since predators.
Ruffed grouse introduced 1800s and likely reintroduced 1960s. Last sighting 1997. Pheasant introduced 1900s and decreased immensely with predators.

Wild turkey = domestic turkey gone feral.

Plus habitat changes. Lost all meadowlarks, upland sandpipers, grasshopper sparrows, short-eared owls, many N harriers, most whippoorwills, popns of boblinks.

Kestrels. Many boxes built 1971-74. 30 nesting pairs. Small mammals and grasshoppers; as fields decrease, decrease kestrels.

Coopers Hawks – arrived around 2000; nest in forest and now have 10 pairs; will hunt kestrels and mourning dove.

Recent S invaders: N cardinals; N mockingbirds; red-bellied woodpeckers; Carolina wrens; tufted titmice; rose-breasted grosbeaks; great egrets; turkey vultures. Five benefit from more forest. Other forest spp increasing: Baltimore oriole; scarlet tanagers, great-crested flycatchers; eastern wood pewees; red-eyed vireos.

Other factors: decrease great open space (more like SE MA now), increase people, houses, pets.

Gus, Rob/Wendy Culbert, Allan Keith, Matt Pelikan, Scott Stephens, Penn Uhlendorf, Eleanor Waldron

VG 9.23.2011 State of Birds

Confirms Lanny McDowell observations since 1970. Decrease: groundnesters; transitional and grassland habitats; no bobwhite; ruffed grouse; kestrels don't nest (Grassland, Cooper's hawks; West Nile-MAS); declines grasshopper sparrows, black ducks, whippoorwill; skunks, cats, raccoons; increase S spp; increase PPlover, GBH, wild turkey, osprey;

VG 3.23.2014 Coyotes

Washed up 1996 (N shore), 2004 (N shore), 2014 (Lamberts Cove)

2014 – female, 35 lbs. Possible swam from Elizabeths and drowned (Suzann Belecampi).

2010 scat – 97% coyote match. Gus – at least one; credible sightings; sounds;

VG Suzann Bellincampi 3.26.2014 Coyotes

Elizabeth Islands – 1986 coyotes arrived.

VG 8.5.2011 Coyote

Richard Andre – Vineyard Power and Cleaveland Farm – saw one 3x; heard it;

Seven Gates scat – 97%

Gus – singular threat to livestock so should be eliminated; highly invasive; this is insular; “When you introduce a top-order predator like that you cause irreparable harm to your native wildlife, but agriculturally for people with sheep or free-range chickens it's a disaster. They'll also grab your cat, they'll grab your small dog, any small mammal they can catch.”

Must obey laws.

Deer – hollow hair more buoyant.

VG 5.25.2012 Eels

Once an abundant staple; most abundant biomass in freshwater ponds and streams; 50-100,000 lbs harvested annually; only 20 commercial fishermen;

Low popns; import from ME and Canada; evaluated for endangered species listing

Elvers – juveniles, delicacy; up to \$2000 lb in ME;

Distinct American/European varieties with similar lifecycles; breed Sargasso Sea; reach coast as tiny larvae “glass eels”; head upstream as 3 inch elvers;

As heavily impacted as any species; like river herring

MVT 3.19.2014

Eels – Steve Hurley; large #s eels below Mill Pd, above TGP; reduced due to variation in opening;

MVT 6.17.2011 Herring

Alewives – increasing; moratorium since 2005;

Increase at Aquinnah run; Lagoon Pd; but mixed statewide results

State – annually trap and transfer 40,000 from working runs to others

2003-2006 trucked fish from Lagoon Pd to Crackatuxet Pd

MVT 4.13.2006 Herring

Herring – Alewife Late March to mid-May spawn; blueback herring – late April to June; don't return to spawn for 3-4 years;

CT banned taking herring 2002; RI 2006; MA 2005

Wamps claim they are exempt; state may allow personal use; State – no aboriginal right.

MVT 4.3.2009 Herring

4th year of 3 plus 2 yr moratorium; river herring=alewife; near bottom food chain;

new run built at Tashmoo 2000; watch at night; getting better each year with moratorium; birds eat at runs; small fish ladder at Mill Pd;

EGP not opened when herring run was really active to keep fresh; stocked EGP from Lagoon Pd herring;

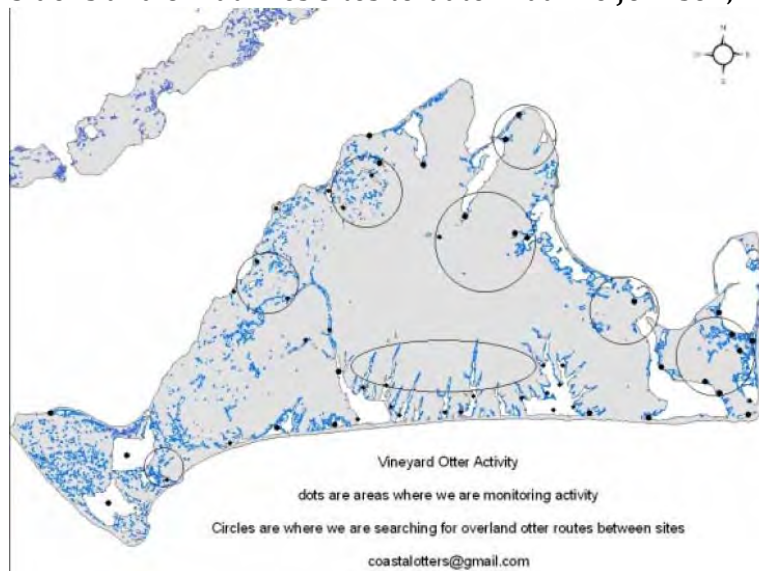
Edg inactive runs: Lily Pd from Trapp's Pd; SMF interested in restoring run;

Lagoon Pd – signature run on MV; Rick Karney; Richard Madeiras Herring Run (OB Shellfish constable);

Commercial fishing big problem; National Fish + Wildlife Fdn recovery of river herring focal initiative;

MVT 1.7.2011 Otters

5 dens and 61 latrines sites to-date. Luanne Johnson, Liz Baldwin



Small fish; big weasel; 40 lbs; nocturnal
Move from Lagoon Pd to Sengekontacket via Wiggy's Pd; Lagoon to Duarte
occasionally; Go across Barnes + County Rd

VG 2.1.2014 Oystercatcher

Overall increasing; declining to 2000; 9000 miles LI to Mexico 11,2000 birds 2013

MVT 6.6.2008 PPlovers

Threatened – state and federal; don't feed young;

Globe 7.13.2010 PPlovers

Plymouth bans ORV to protect 23 pairs;

1986 – 137 pairs in MA; 1999 – 500 at plateau; hatch May

20 of 100 sites in MA with PP allow vehicles;

MVT 5.23.2011 PPlover Tashmoo Beach closed

1 pair PP and chicks; 25-27 days incubation;

VG 1.30.2014 Snowy Owls

Record number; 68 at Logan – largest in 32 yrs (ave 6-8); 33 ACK; 9+ MV (20-25

Gus); possible banner year up north – lemmings in Quebec; as far south as

Bermuda;

Rodents, muskrat, birds, GBH, even peregrines; gulls; 13 dead in MA; rodent poison,
planes;

VG 1.20.2012 Pheasant

Stocked; half shot; rest picked off by red-tail hawks or cold;

40,000 stocked MA annually; 240 on MV – state forest, land bank; some islanders
stock also;

bobwhites seen are also likely released; same for Chukars;

MVT 6.28.2011 Seals

Native popn grown since 1972 Marine Mammal Protection Act;

15-16 sick juveniles;

MVT 7.3.2008 Seals increase

4 spp in waters: harbor, gray, harp, hooded. Harbor and gray most common –
1000s; others 100s; harbor 220 lbs light gray to brown; gray – 450-775 lbs – male
horse head;

1980s – 1600 harbor – especially Monomy; 20-30 gray between Wasque and
MNWR; grays breeding on Muskeget Island; 2002 – 1000 gray pups on Muskeget
and 5600 others on Muskeget and monomy; 1986 and 1999 3400 and 3900 harbor
seals on Cape Island;

MVT 9.6. 2007 Skunks

Luanne – Antioch PhD – Dogfish Bar, Norton Pt, Wasque, Long Pt; Skunk impact on

PPlover; 1-3000 skunks on MV; tagged 120, 49 with transmitters; 1-2 miles per night; den with lits; various spots without; ground dens in winter – one male and up to 11 females; not more skunks than other places – lots of resources – beach etc.; bump into eggs;

MVT 9.6. 2007 and 2012 Skunks

Luanne – Antioch PhD –1-3000 skunks on MV; tagged 120, 49 with transmitters; 1-2 miles per night; den with lits; various spots without; ground dens in winter – one male and up to 11 females; Back to colonial time; popn declined with clearing and poisoning with arsenic bait; Luanne – distemper will reduce popn; 2004-5 virus hit and tough winter; 30-50% died; red-tail hawk and great horned owl will take them; half die by people; 20% disease; Vineyard trappers remove 400-750 per year

VG 10.25. 2012 Skunks

Increase litter size + numbers; weather, food;

Don't hibernate – 10-12 days at a time;

Back to colonial time; popn declined with clearing and poisoning with arsenic bait; optimal conditions, no disease;

Luanne – distemper will reduce popn; 2004-5 virus hit and tough winter; 30-50% died; red-tail hawk and great horned owl will take them; half die by people; 20% disease;

Vineyard trappers remove 400-750 per year

Forest Pests Liebold et al.

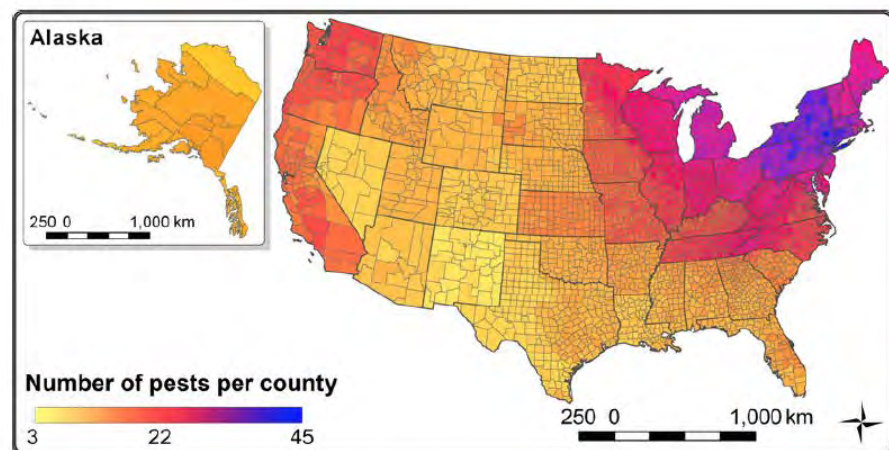


Figure 1 Numbers of damaging invasive forest pests per county.

Deer

MVT 8.8.2012 State trying to increase harvest; current – no limit on # doe tags on MV (W MA lottery) but only possess 2 deer daily; want to increase possession from 2 to 4; 2 week shotgun season; Mid-October to Dec 31; 6 wk archery; 2 week shotgun; 3 week muzzleloader;

Jonathan Way 2009. Deer abundance in Barnstable. Abundant in only 5% of town;

very liberal hunting (2.5 months, most receive doe permit); coyotes;

Webster et al. 2005

Great Smokey Mt National Park; 1970s 43 deer km² then decline; significant reduction ephemerals; little to no recolonization;

Spring browse dominated by herbs up to 75%;

Pulses of intense herbivory followed by chronic herbivory can drastically alter herbaceous communities;

WSJ 12.1.2004 Sterba

US – 200 people killed; \$1B property damage; ecological havoc; acorns, seedlings, saplings,

Don't like black locust, beech

35-45% female mortality annually to stabilize popn;

Hunters a problem; now non-hunters; 1930s most states banned doe hunting; selling game illegal;

Serengeti Quabbin (DBK) herds like antelope;

MVT 2.5. 2014

713 deer in 2013 on MV; 2012 – 610; densities still above DFW goals;

2013 – change – check deer online except shotgun season;

DFW estimate 2000-2500 deer on 100 mi²/47 mi² forest

Deer Season Tallies					
Year	Archery	Shotgun	Muzzleloader	Island Total	Statewide
2013	248	365	100	713	11,413
2012	170	356	84	610	11,022
2011	214	454	124	792	11,081
2010	179	320	71	570	10,699
2009	157	372	99	628	10,581
2008	197	418	81	696	11,217

The Island deer harvest increased in the 2103 hunting season.

MVT 7.2.2009 Record # deer 2008

696 vs 460 2007. Unclear if weather, effort etc. 197 bow – record

VG 11.6.2009 50 mi². “Vineyard is a virtual Tokyo of even-toed ungulates”

2006 shotgun season extended from 1 to 2 weeks. Hunters would like additional season in February.

VG 11.21.2012 50 mi². State 85-95,000 10-55 mi²

Don't sell out all permits on MV. 2011 allocated 2700 permits and issued 1429

Lack of storage and processing; not enough land; expensive

2012 increased deer possession limit from 2 to 4 per day.

\$150 for vacuum sealed venison on MV vs \$50-60 off island.

MVLB – 120 registered hunters in 2012.
MV good health: antler beam diameter 22.5 mm vs 15 mm.

MVT 3.8.2007 statewide 10-12,000 taken annually
Deer can increase 30% annually.

MVT 8.14.2008 License 2 bucks 2700 doe permits \$5
MV hunters think too few deer – killing too many.

MVT 10.14.12

Deer Season Tallies

Year	Archery	Shotgun	Muzzleloader	Island Total	Statewide
2011	214	454	124	792	11,081
2010	179	320	71	570	10,699
2009	157	372	99	628	10,581
2008	197	418	81	696	11,217
2007	134	275*	51	460	11,576
2006	134	416	72	622	10,479
2005	126	346	82	554	11,643
2004	127	448	113	688	12,099
2003	111	423	68	602	11,747
2002	135	437	72	645	12,264

** The state extended the shotgun season from one to two weeks.*

Lots of acorns and deer move less;

VG 3.21.2013 Poole + Loberg Tick-Borne Illness Reduction Initiative
Graph of people treated with doxy steady increase since 2010; 2011 – 1747
patients; 2010 1563; May-August and November peaks.
Student education

Lyme

VG 10.8.2010

5-yr comprehensive study; piggyback on ACK Tick-Borne-Disease Commission,
which wants to cull herd from 2500 to 500. Or >50 to 10 mi²

MV led by Michael Loberg.

4-poster baited with corn; permethrin (neurotoxin toxic to marine life).

MVT 2.28.2013

MA Special Commission. Education; possible reduction of archery safety zone to
150 feet vs 500 ft; more crossbows.

8.28.2013 Sam Telford Tufts

Density map from Thomas Millette;

MV Bds of Health Tick Borne Disease Council TBDC

Centers for Disease Control – Lyme 10x prevalent than thought

Telford ACK post-doc 1984; studying MV since 1994;

Ticks – 2000 eggs in May; hatch July; July-Sept larvae look for food uninfected; 2nd
year in nymph stage April-late June (Most tick cases June); halfway through feeding

spits infectious material; within 24 hrs little risk; 2 tablets of Doxy dramatically reduces infection; adults take 7 days to feed
 Vaccination – class-action lawsuit over arthritic side effects and limited demand; Lymerix works but off market;
 94 percent female ticks acquire blood form ticks; 300 ticks per deer x 2000 larvae per adult.
 Also tulameria; Rocky Mountain Spotted Fever; Tulameria bacteria live longer in salt spray environment; MV accounts for 10% cases nationally;
 Lone Star Tick – Cuttyhunk, Nashawena – a few on MV but no yr-round popns
 Disease dropping on Naushon due to low deer by coyotes.
 Millette 47-53 deer mi2.

6.14.2007 MVT

Tick-borne Disease Statistics	Dukes County					
	2000	2001	2002	2003	2004	2005
Confirmed/Probable/Suspect Reports of Babesiosis	<5	6	10	20	13	14
Confirmed/Probable Reports of HGE	0	0	0	0	<5	<5
Confirmed Reports of Lyme Disease	34	35	42	58	55	89
Confirmed Reports of RMSF	0	0	<5	0	0	0

Telford – no predictive model of numbers; weather; humidity (need humid); hate hot weather;

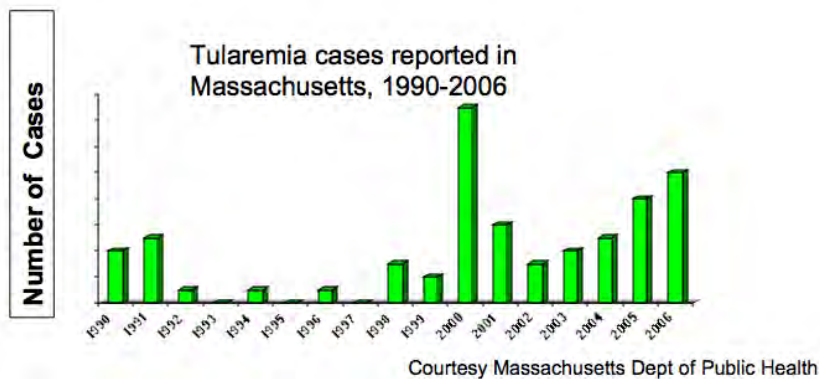
Tufts www Telford

Tularemia #4 on CDC list of infectious diseases after smallpox, plague, anthrax; MV only places to have 2 outbreaks of tularemic pneumonic disease; 2 yr NIH grant to explore on MV;

Telford ppt

Bacterium; transmitted by bite or handling; ticks, rabbits;
 Imported to MA on W rabbits – reported since 1929 (Boston); Falmouth 1937; MV 1946. Various – ticks and skinning rabbits;
 1990-98 MA 18 cases highest in East; Many in Rocky Mts States;

MV advisory MA DPH 2001 – based on 15 cases in fall 2000 on MA; 11/15 pneumonia so likely inhaled; MV 3x risk; none on live rabbits; 3 on dead



Skunks important for dog ticks; dog ticks commonly have tularemia; unknown if skunks or raccoons are reservoirs but intensely exposed;

2.27.2009 PLOS Pathogens Heidi Goethert Sam Telford

MV sustained Tularemia outbreak; dog ticks critical; found one microfocus where tularemia stably perpetuates and genetic diversity is maintained; MV most pneumonic form rather than form bite, which is usual. Most landscapers – mowing and brush-cutting; aerogenic tularemia – only other outbreak also on MV 1978; Field site near Squibnocket; only microsite located (?). Could get spread by raccoons and skunks into temporary foci;

1937 - >20,000 cottontails introduced into MA (including MV and ACK) from KS, MO

Francisella tularensis

Epidemiology infectious disease first described Japan 1837. name related to 1911 description of a plague-like illness in ground squirrels in Tulare County, California, and work done by Dr. Edward Francis.

USA: more endemic in the midwestern USA as well as Martha's Vineyard, with 37 cases affected from 2000 to 2005. In August 2000, a Chilmark resident died of the pneumonic form of tularemia and 14 other cases were successfully treated that summer. In 2001, 3 people, including a 4-year-old Newton boy, who was bitten by a tick on Martha's Vineyard came down with the disease, and, later recovered. 2 cases were reported in 2002, 4 in 2003, 1 in 2004, and 8 in 2005. Prior to 2000, Martha's Vineyard had not had an outbreak since 1978, when 12 people were stricken. The sudden appearance of tularemia on Cape Cod, MA, was associated with the importation into the mainland state and Martha's Vineyard of 29 689 cottontail rabbits from the midwestern states of Missouri and Kansas from

1937 to 1940 by various Massachusetts game clubs (Belding DL, Merrill: *Tularemia in imported rabbits in Massachusetts*. N Engl J Med 1941; 1085-87). 340 of these rabbits were released on Nantucket Island. Prior to 1937, only 1 case of the infection was recognized, related to contaminated rabbit meat from the midwestern USA^{ref}. The genetic diversity of *F. tularensis* obtained from Martha's Vineyard ticks was examined : between 2001 and 2003, 0.7% of 4246 dog ticks (*Dermacentor variabilis*) harbored the tularemia bacillus, and there was a degree of genotypic diversity suggestive of long-standing enzootic transmission of the infection on the island. USA averaged 124 cases of tularemia in 1999 and 2000, usually < 2% of which are fatal.

Naushon

1602 “On the outside of this Island [Cuttyhunk] are many plane places of grass, abundance of strawberries and other berries...This Island is full of high timbered oaks, their leaves thrice as broad as ours, cedars, straight and tall; beech, elm, holly, walnut trees in abundance” (Brereton in Quinn and Quinn 1983). “[Cuttyhunk]...is overgrown with wood and rubbish, viz. oaks, ashes, beech, walnut, witch-hazel, sassafras and cedars...” (Archer in Quinn and Quinn 1983). Cedar and sassafras were harvested from the Elizabeth Islands by Bartholomew Gosnold’s crew (Emerson 1935).

1696 From the Captain’s Log, H.M.S. Falkland: “In this place [Naushon Island] is but one small house in which live one family the Island affords wood and sum deare for other convenient very barren land but being obledged for severall reasons and necessaries we are happy in our safe arrival” (Emerson 1935).

1699 Lease, Winthrop to tenant farmer: “And shall not cut or fell any the red cedar trees nor make any strip or waste of the white cedar trees upon the said land except such of the white cedars as shall be needful for the building and fences upon the said farme and the repairs thereof” (Emerson 1935).

1700 Letter from Matthew Mayhew to Wait Winthrop: “Sr. you may please call to mind you promised to let me have cedars [1,000] for inclosing my field, out of the swamps at Nashawna” (Emerson 1935).

1776 “The said Commissary, be and hereby is directed with the assistance, or the soldiers on said station, to build as many log houses with timber on said Island as will be sufficient for the reception of 70 or 80 men [rebels]” (Emerson 1935). British soldiers set fire to “everything that would burn, so that neither house, barn, hay nor Indian corn that could be met with escaped the Flames, nor did the live stock share a better fate for what could not be carried off was shot” (Emerson 1935).

1815 About 3/5 of trees are beech: the remainder of the wood is white and black oak, hickory, and a little pine. About K of the island is in wood and swamps; and in the swamps grow white cedar. Some fire wood is sold, and transported from the island. Very little ship timber remains, not more than 300 tons; but it is of a superior quality” (Winthrop in MHS 1815).

1824 “I have taken a partial view of the timber on Naushon Island. I find there is a tract of the

best timber land I have seen in this part of the country, say, timber suitable for ships, from 300 to 400 tons...the timber is white oak and yellow bark oak” (Emerson 1935).

1841 Oct. 3 1841 “A gale from the north-east commenced in the morning and in the course of the afternoon and night blew most violently and undoubtedly was the heaviest storm which has occurred since the memorable one of 1815....Tuesday afternoon took a ride in the woods; sad havoc the storm has made there. The ground is covered with leaves torn from the trees; large limbs are wrenched and twisted off; many of the time honored and venerable old oaks and beech lie prostrate with an air of grandeur about them even in their lowly estate. The air is fragrant with the odor of bruised and crushed leaves: the roads and paths are blocked up in many places with trees uprooted and lying across them” (Forbes and Gregg 1979).

1869 “September...It was the greatest gale since the famous September gale of 1815. The “Apollo” tree in the amphitheatre was rooted up, and many other fine trees” (Hughes 1902).

1898 Winter gale: “probably wrecked 1,000 trees on Naushon...you would be surprised to see the tremendous number of trees that are down everywhere through the woods...that whole hillside sloping north looks like a battleground; it is so thick with the fallen bodies of trees” (Forbes and Gregg 1979).

1938 Sept. 21. “Terribly destructive hurricane hit the Island at extreme high tide. Pine Island was swept clean of its age-old cedars and all but washed away. At the Blue Hills Observatory the wind reached 186 mph” (Emerson and Leon 2003). “A great many of the noblest trees on the island were blown down...Most of the trees on Cedar Island were blown down” (Forbes 1964). “The storm, by far the worst in many years, blew down thousands of trees, some of magnitude and beauty, but fortunately most of those blown down showed that they had been defective in sundry respects, and once they had fallen and were cleared away, there were enough fine trees left so that the grandeur of the forest will be in no way impaired” (Annual Report 1939).

1944 Sept. 14. “The hurricane hit Naushon with 134 mph winds. All bath houses were destroyed and wharves and bridges damaged but the greatest destruction was to the trees. In many places the woods were flattened down to the ground in tangled masses” (Forbes 1964). “A survey of the woods after the 1944 hurricane shows that although the damage was very severe in several of the most heavily wooded regions, about two thirds of the island woods containing many very fine trees have not been appreciably injured...The forests were not seriously damaged by the hurricane of 1938, but were hard hit by that of September 1944. The wind came across the island from the southeast and blew down a large proportion of the heaviest stands of timber. The wind was gusty, so that the damage is not entirely uniform, leaving some stands relatively untouched and destroying others almost completely. In general, however, most of the woods containing large trees were more or less affected” (Raup 1945). An estimated 1/5 of trees, or 30,000, blew down in the hurricane (Annual Report 1945). Post-hurricane timber salvage (1946–48): “So far the total amount removed is a little under 1,000 cords or less than 10% of the estimated total” (Annual Report, 1946). “To date Smith has sawed up about 330,000 feet of lumber, 90% of which is oak.” (Annual Report 1947) “H.D. Smith sawed over 200,000 board feet, chiefly oak, most of which remains unsold” (Annual Report 1948).

Eberhard et al.

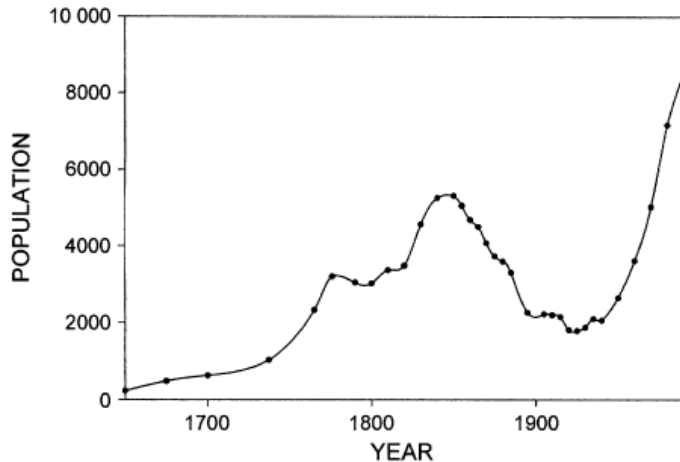


FIG. 2. European population trends in Eastham, Wellfleet, and Truro (1650–1990). Data for 1650–1765 are from Altpeter (1937), and state and federal census data are used for later time periods. Aboriginal populations are estimated to have been 450–500 as late as 1698 (Ruberstone 1985).

Nuttall 1834 *A Manual of the Ornithology of the United States and Canada. The Land Birds.*

Nuttall Manual of the Ornithology of the US

Introduction

The Great Plover finds its chief security in stony places, to which its colors are so nicely adapted, that the most exact observer may be deceived. The same resort is taken advantage of by the Night-Hawk. Partridge, Plover, and the American Quail, the young brood of which squat on the ground, instinctively conscious of being nearly invisible, from their close resemblance to the broken ground on which they lie, and trust to this natural concealment.

A man on horseback, or in a carriage, is much less an object of suspicion to those wily birds, than when alone; and I have been frequently both amused and surprised, in the Southern States, by the sagacity of the Common Blackbirds," in starting from the ploughing field, with looks of alarm, at the sight of a white man, as distinct from and more dangerous than the black slave, whose furrow they closely and familiarly followed, for the insect-food it afforded them, without betraying any appearance of distrust.

Turkey Buzzard

This common Turkey-like Vulture is found abundantly in both North and South America, but seems wholly to avoid the North-eastern or New England states, a straggler being seldom seen as far as the latitude of 41 degrees. The Turkey-Buzzard has not been known to breed north of New Jersey in any of the Atlantic states.

BlackVulture

Tins smaller, black, and truly gregarious species of Vulture, in the United States, appears to be generally confined to the Southern states, and seems to be most numerous and familiar in the large maritime towns of North and South Carolina, Georgia, and Florida.

Fish-Hawk or Osprey

Of a cowardly disposition, and living on fish, they inhabit near waters, retiring from them, when frozen, to warmer climates. In America it is found in the summer from Labrador, and the interior around Hudson's Bay, to Florida.

This early period of departure is, in all probability, like their arrival towards the close of March, wholly regulated by the coming and going of the shoals of fish on which they are accustomed to feed.* Their arrival in the spring is welcomed by the fisherman, as the sure indication of the approach of those shoals of shad, herring, and other kinds of fish which now begin to throng the bays, inlets, and rivers near the ocean ; and the abundance with which the waters teem affords ample sustenance for both the aerial and terrestrial fishers, as each pursues in peace his favorite and necessary employment.

In short, the harmless industry of the Osprey, the familiarity with which he rears his young around the farm, his unexpected neutrality towards all the domestic animals near him, his sublimely picturesque flight, and remarkable employment, with the strong affection displayed towards his constant mate and long helpless young, and the wrongs he hourly suffers from the pirate Eagle, are circumstances sufficiently calculated, without the aid of ready superstition, to ensure the public favor and tolerance towards this welcome visitor.

Ospreys may be almost considered gregarious, breeding so near each other, that, according to Mr. Gardiner, there were on the small island on which he resided, near to the eastern extremity of Long Island (New York), no less than 300 nests with young. Wilson observed 20 of their nests within half a mile. I have seen them nearly as thick about Rehoboth Bay, in Delaware.

Red-Tailed Hawk

They also occasionally nest and breed in large trees in the secluded forests of this part of Massachusetts. They will at times pounce upon rabbits, and considerable sized birds, particularly Larks, and have been observed in the southern states perseveringly to pursue squirrels from bough to bough until they are overtaken and seized in their talons. They are frequently seen near wet meadows where mice, moles, and frogs are prevalent

American Starling or Meadow Lark

This well known harmless inhabitant of meadows and old fields. They are now seen in considerable numbers in and round the salt marshes, roving about in flocks of 10 to 30 or more, seeking the shelter of the sea-coast, though not in such dense flocks as the true Starlings; usually remains the whole summer in moist meadows, and in winter retires to the open grassy woods,

Red-Winged Black-bird or Troopial

They are migratory north of Maryland, but pass the winter and summer in great numbers in all the southern states, frequenting chiefly the settlements and rice and corn-fields, towards the sea-coast, where they move about like blackening clouds, rising suddenly at

times with a noise like thunder, and exhibiting amidst the broad shadows of their funereal plumage, the bright flashing of the vermilion with which their wings are so singularly decorated. After whirling and waving a little distance, like the Starling, they descend as a torrent, and darkening the branches of the trees by their numbers, they commence a general concert that may be heard for more than two miles.

They continue to feed in small parties in swamps and by slow streams and ponds till the middle or close of April, when they begin to separate in pairs. About the beginning of September, these flocks, by their formidable numbers, do great damage to the unripe corn, which is now a favorite repast, and they are sometimes seen whirling and driving over the devoted cornfields and meadows so as to darken the air with their numbers. The destruction at this time made among them by the gun and the Hawks produces but little effect upon the remainder, who continue fearlessly, and in spite of all opposition, from morning to night, to ravage the cornfields while any thing almost remains to be eaten. The farms near the sea-coast, or alluvial situations, however, are their favorite haunts ; and towards the close of September, the corn becoming hard, it is at length rejected for the seeds of the wild rice (*Zizania aquatica*), and other aquatic plants, At this time, also, they begin to roost in the reeds, whither they repair in large flocks every evening from all the neighboring quarters of the country ; upon these they perch or cling so as to obtain a support above the surrounding waters of the marsh. When the reeds become dry, advantage is taken of the circumstance to destroy these unfortunate gormandizers by fire ; and those who might escape the flames are shot down in vast numbers as they hover and scream around the spreading conflagration.

Rice Bird or Bob-o-link

About the 1st of May the meadows of Massachusetts begin to reecho their lively ditty. At this season, in wet places, and by newly ploughed fields, they destroy many insects and their larve. According to their success in obtaining food, parties often delay their final northern movement as late as the middle of May, so that they appear to be in no haste to arrive at their destination at any exact period. Although they devour various kinds of insects and worms on their first arrival, I have found that their frequent visits among the grassy meadows were often also for the seeds they contain ; and they are particularly fond of those of the Dock and Dandelion, the latter of which is sweet and oily. Later in the season, and previously to leaving their native regions, they feed principally on various kinds of grass seeds, particularly those of the Panicums, which are allied to millet. They also devour crickets and grasshoppers, as well as beetles and spiders. Their nest is fixed on the ground in a slight depression, usually in a field of meadow grass, either in a dry or moist situation, and consists merely of a loose bedding of withered grass, so inartificial as scarcely to be distinguishable from the rest of the ground around it.

About the middle of August, in congregating numbers divested already of selective attachment vast foraging enter New York and Pennsylvania, on their way to the south. Here, along the shores of the large rivers, lined with floating fields of the Wild Rice,* they find abundant means of subsistence during their short stay; and as their flesh, now fat, is little inferior to that of the European Ortolan, the Rccd or Rice Birch, as they are then called in their Sparrow-dress, form a favorite sport for gunners of all descriptions,

who turn out on the occasion, and commit prodigious havock among the almost greedy and thronging roosts. The markets are then filled with this delicious game, and the pursuit, both for success and amusement, along the picturesque and reedy shores of the Delaware, and other rivers, is second to none but that of Rail-shooting.

As soon as the cool nights of October commence, and as the Wild Rice crops begin to fail, the Reed-birds take their departure from Pennsylvania and New Jersey, and in their further progress through the Southern States they swarm in the Rice fields, and before the crop is gathered they have already made their appearance in the islands of Cuba and Jamaica, where they also feed on the seeds of the Guinea grass, they become so fat as to deserve the name of 'Butter-birds, and are in high esteem for the table.

Tufted Titmouse

it scarcely appears to exist north beyond the states of Pennsylvania, or New York. They are seldom, if ever, seen or heard in this part of Massachusetts, and instead of being more abundant to the north, as believed by Wilson, they are probably not known there at all.

Mocking Bird

inhabits the whole continent, from the state of Rhode Island to the larger isles of the West Indies, In summer, a few proceed as far as Rhode Island, following the mild temperature of the sea-coast; but further north, they are, I believe, nearly unknown, except rarely and occasionally in Massachusetts near the sea.

Robin or Migrating Thrush

Even in the vicinity of Boston, flocks of Robins are seen, in certain seasons, assembling round open springs in the depth of winter, having arrived probably from the colder interior of the state ; and in those situations they are consequently often trapped and killed in great numbers.

Blue Bird

In the Middle and Northern States, the return of the Blue-Bird to his old haunts round the barn and the orchard, is hailed as the first agreeable presage of returning spring, Though sometimes he makes a still earlier flitting visit, from the 3d to the middle of March he comes hither as a permanent resident, and is now accompanied by his mate, who immediately visits the box in the garden, or the hollow in the decayed orchard tree, which has served as the cradle of preceding generations of his kindred.

Their principal food consists of insects, particularly beetles, and other shelly kinds ; they are also fond of spiders and grasshoppers, for which they often, in company with their young, in autumn, descend to the earth, in open pasture fields or waste grounds. In the autumn, they regale themselves on various kinds of berries,

Gentle, peaceable, and familiar, when undisturbed, his society is courted by every lover of rural scenery, and it is not uncommon for the farmer to furnish the Blue-Bird with a box as well as the Martin, in return for the pleasure of his company, the destruction he makes upon injurious insects, and the cheerfulness of his song.

Shore Lark = Horned Lark

They fly rather high and loose, in scattered companies, and follow no regular time of migration, but move onward only as their present resources begin to fail. They are usually fat, esteemed as food, and are frequently seen exposed for sale in our markets.

Savannah Sparrow

On their first arrival in Massachusetts, they frequent the sandy beaches and shores of the bays in quest of Cicindcu and other coleopterous insects, which frequent such situations; and they are at this time exceedingly fat, though their moult is not yet completed. In summer this shy and timid species lives wholly in pasture or grass fields, and often descends to the ground in quest of food.

Ground Robin or Towee Finch

Tins is a very common, humble, and unsuspecting bird, dwelling commonly in thick dark woods and their borders, In the pairing season, and throughout the period of incubation, the male frequently mounts to the top of some bush amidst, the thickets,

Cardinal

This splendid and not uncommon songster chiefly occupies the warmer and more temperate parts of the United States from New York to Florida, and a few stragglers even proceed as far to the north as Salem in Massachusetts. Some of these more restless wanderers occasionally, though rarely, favor this part of New England with a visit.

Flicker

As the maize too ripens, while yet in the milky state, the Flicker pays frequent visits to the field, and the farmer, readily forgetful of his past services, only remembers his present faults, and, closing his career with the gun, unthinkingly does to himself and the public an essential injury, in saving a few unimportant ears of corn. In this part of New England they are known by the name of Pigeon Woodpeckers from their general bulk and appearance; and, to the disgrace of our paltry fowlers, they are, in the autumn, but too frequently seen exposed for sale in the markets, though their flesh is neither fat nor delicate. It is exceedingly to be regretted that ignorance and wantonness, in these particulars, should be so productive of cruelty, devastation, and injurious policy, in regard to the animals with whose amusing and useful company nature has so wonderfully and beneficently favored us.

Pileated Woodpecker

It is however, sufficiently singular, and shows perhaps the wild timidity of this northern chief of his tribe, that, though an inhabitant towards the savage and desolate sources of the Mississippi, he is unknown, at this time, in all the maritime parts of the populous and long settled state of Massachusetts.

Red-Headed Woodpecker

Like the Log-cock, the present species is but rarely seen in the maritime parts of

Massachusetts ; this region is only occasionally visited by solitary stragglers; yet, in the western parts of the State, they are said to be as common as in the Middle States. They live principally in old forests of tall trees

Red-Bellied Woodpecker

This also, like the preceding, is unknown in all the eastern parts of Massachusetts and probably New Hampshire.

Whip-poor Will

This remarkable and well known nocturnal bird arrives in the Southern States in March, and in the Middle States about the close of April, or the beginning of May, and proceeds, in his vernal migrations along the Atlantic States, to the centre of Massachusetts, In the eastern part of Massachusetts, however, they are uncommon, and always affect sheltered, wild, and hilly situations, for which they have in general a preference. The well known saddening sound is first only heard in the distant forest, reechoing from the lonely glen or rocky cliff; at length, the oft-told solitary tale is uttered from the fence of the adjoining field or garden, and sometimes the slumbering inmates of the cottage are serenaded from the low roof or from some distant shed. Superstition, gathering terror from every extraordinary feature of nature, has not suffered this harmless nocturnal babbler to escape suspicion, and his familiar approaches are sometimes dreaded as an omen of misfortune.

The Whip-Poor-Will, when engaged in these nocturnal rambles, is seen to fly within a few feet of the surface in quest of moths and other insects, frequently, where abundant, alighting around the house. During the day they retire into the darkest woods, usually on high ground, where they pass the time in silence and repose, the weakness of their sight by day compelling them to avoid the glare of the light. Their food appears to be large moths, beetles, grasshoppers, ants, and such insects as frequent the bark of decaying timber. Sometimes, in the dusk, they will skim within a few feet of a person, making a low chatter as they pass; they also, in common with other species, flutter occasionally around the domestic cattle to catch any insects which approach or rest upon them, and hence the mistaken notion of their sucking goats, while they only cleared them of molesting vermin.

Night-Hawk

They are now commonly seen towards evening, in pairs, sailing round in sweeping circles, high in the air, the female selects some open spot in the woods, the corner of a corn-field, or dry gravelly knoll, on which to deposit her eggs, which are only 2,

Passenger Pigeon

Wild Turkey

The Wild Turkey, once prevalent throughout the whole continent of North America, from Mexico and the Antilles, to the forests of Lower Canada, is now by the progress and density of population chiefly confined to the thickly wooded and uncultivated tracts of the Western States, being particularly abundant in the unsettled parts of Ohio, Kentucky,

Illinois, Indiana, and throughout the vast forests of the great valleys of the Mississippi and Missouri. According to Audubon a few of these valuable birds are yet found in the States of New York, Massachusetts, Vermont, and Maine.

American Partridge or Quail

They seldom migrate, except to short distances, in quest of food, and consequently, often perish beneath deep drifts of snow, so that their existence is rendered impossible in the arctic winters of our high latitudes. Indeed, sometimes they have been so thinned in this part of the country, that sportsmen, acquainted with their local attachments, have been known to introduce them into places for breeding and to prevent their threatened extermination.

The partridge [sic] is not partial to the depths of the forest, though fckey sometimes seek the shelter of trees, and perch on the low branches or hide amongst the brush and underwood. Their favorite food, however, commonly conducts them to the open fields, where they glean up various kinds of grain, and are particularly fond of rye and buckwheat, as well as Indian corn; and when not too much disturbed by the sportsman, will often, particularly in the autumn and winter, fearlessly assemble along the most public roads, or around the barn and stable, in search of a scanty pittance among the domestic fowls ; like them, also, very industriously scratching up straw, and probably the ground, in quest of grain and insects, which, with seeds,* and various kinds of buds and berries, as well as broken acorns, according to the seasqn, often constitute a-considerable part of their native food.

As they happen to afford a favorite and delicate article of food, every means which gun and trap can be put in operation against the innocent race; Their very sociability affords means for their destruction; for while crowded together in a ring, a dozen or more have been killed at a shot, and the small remains of the unfortunate covey, feeling their weakness and solitude, are said to join some neighboring brood, for whom they soon form the same friendly attachment they had for the fraternity they have lost. From the latter end of August to the month of March, the markets of all our principal cities are often stocked with this favorite game.

Wildlife – History

General

Beside domestick animals, the quadrupeds which are found on Martha's Vineyard are these which follow: the skunk; the musquash; the mink; four or five species of ground mice; the mole; the rabbit: four or five otters have been killed during the past ten years, and are supposed to have swum from the Elizabeth Islands across the Sound. There are no deer, foxes, nor squirrels." (Freeman 1802)

Skunks a real problem – bounty; according to Devens 1838 – they became so uncommon that missed. (Prob. Banks)

Introduced – deer, mink, squirrel, cottontail, skunk, raccoon (Dunwiddie 1994)

17 sites stocked with quail; 13 with pheasant (Dean 1939)

Short-eared owls, grasshopper sparrows once common; SEO no longer nest; GHS persist
Dunwidde 1994

Our people here, some of them, brought a drift whale ashore at Sqjubnocket on friday and cut her up on Saturday. (Diary Rev. William Homes - Xber 25. 1720)

Large white owls in winter (NSS Atl)

Thursday August 13th 1846 Mr. Whiting and McCleary gunning very good luck some fine Plover, etc. (Journal of a Young Man)

Heath Hen

Heath hen or pinnated grouse, which has been on the island for at least a century. It was probably brought here for breeding as a game bird, and in 1824 laws for its protection were passed by the voters of Tisbury, where it is found to-day in its feeding grounds on the plains. A cock, hen, and their young may frequently be seen from the state. (Banks 1911)

1823 Reconsidered to except hunting of heath hen; \$5 fine for Heath Hen; split with poor and complainant.

1842 Law for preservation of grouse or heath hen be suspended in Tisbury to allow inhabitants to kill, take or sell from December 1-10, without dogs.

1842 November 14 – Warrant to prevent illegal hunting and shooters of heath hen first ten days in December. Swift & Cleveland

Committee of vigilance to see that non-residents don't trespass on town rights to shoot heath hens the first 10 days in December. Printed in *New Bedford Mercury and Weekly Register*.

Last heath hen – Jimmy Green's farm on Takemmy Trail (Huntington 1969)

Thursday August 13th 1846 Mr. Whiting and McCleary gunning very good luck some fine Plover, etc. (Journal of a Young Man)