

# Influence of Fire and Other Anthropogenic Practices on Grassland and Shrubland Birds in New England<sup>1</sup>

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Since 1966, many species of grassland and shrubland birds have declined substantially in New England (Askins 2000). The extent of grassland and shrubland habitat in New England has changed dramatically over the past 400 years. Presently, grassland and shrubland habitat in New England are created and maintained primarily as a result of four types of habitat management: mowing, livestock grazing, clearcutting, and prescribed burning.

Agricultural land clearly represents the largest proportion of graminoid-dominated open land in New England. In 1997, there were 1,760,000 ha of open farmland in New England, approximately 718,500 ha were hayfields, pastures, and idle cropland (National Agricultural Statistics Service 2002), sites that are most likely to provide suitable nesting habitat for grassland birds. Hayfields in New England are rarely burned, but are mowed or cut one or more times annually.

Livestock grazing is also an important form of habitat management that affects grassland birds. In New York, Smith (1997) found that moderate annual grazing with stocking rates of 0.12 – 0.24 head of cattle per hectare provided adequate habitat for Henslow's Sparrows (*Ammodramus henslowii*) and Grasshopper Sparrows

(*A. savannarum*) in the Fingers Lake National Forest. The same stocking rates are likely to be applicable for New England as well.

Clearcutting, a silvicultural practice that removes essentially all of the standing wood, is more widespread and is an important disturbance mechanism that benefits shrubland birds. Clearcutting has created extensive shrubland patches in northern Maine. Although the extent of this silvicultural practice has declined in the past 10 years, approximately 3.5 percent of the commercial forest land (243,000 ha), has been clearcut within the past 20 years (Maine Forest Service 2001). This practice has created a continuum of early-successional shrubland habitats used by a wide variety of shrubland warblers and sparrows, especially Chestnut-sided Warbler (*Dendroica pensylvanica*), Palm Warbler (*D. palmarum*), Mourning Warbler (*Oporornis philadelphia*), Common Yellowthroat (*Geothlypis trichas*), Wilson's Warbler (*Wilsonia pusilla*), Lincoln's Sparrow (*Melospiza lincolni*), and White-throated Sparrow (*Zonotrichia albicollis*).

Prescribed fire is used primarily for two separate reasons in New England: habitat management of rare plant and animal assemblages and pruning of commercial lowbush blueberry (*Vaccinium angustifolium*) fields. In the first case, prescribed fires are used for conservation purposes to maintain rare, pyrogenically-mediated habitats such as sandplain grasslands, coastal heathlands, and pitch pine (*Pinus rigida*)-scrub oak (*Quercus ilicifolia*) barrens. Prescribed fires are used to maintain vegetation structure and composition, reduce fuel loads, and provide an important mechanism to protect and enhance globally rare plants and animals (Dunwiddie and Caljouw 1990). In the absence of fire, some rare organisms have declined sharply.

Importantly, the scale of prescribed burns in New England for management of endangered ecosystems tends to be small. In the past 10 yrs, fewer than 400 ha were burned annually and burns were rarely larger than 15 ha. For example, in 2002, 301 ha of native grassland and heathland were burned in New England; average burn size was 10 ha, although somewhat larger burns (60 – 65 ha range) have taken place on Nantucket Island.

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Despite their small size, these burns can have important benefits for grassland birds, at least locally. In Maine, the 210 ha Kennebunk Plains supports a rich assemblage of grassland birds that clearly benefit from fire management, including: Upland Sandpiper, Grasshopper Sparrow, and Vesper Sparrow (Vickery et al. 1999). Prescribed fires in coastal Massachusetts primarily benefit Savannah Sparrows, Eastern Meadowlarks (*Sturnella magna*), and Bobolinks, and foraging Northern Harriers (*Circus cyaneus*) (Zuckerberg 2002).

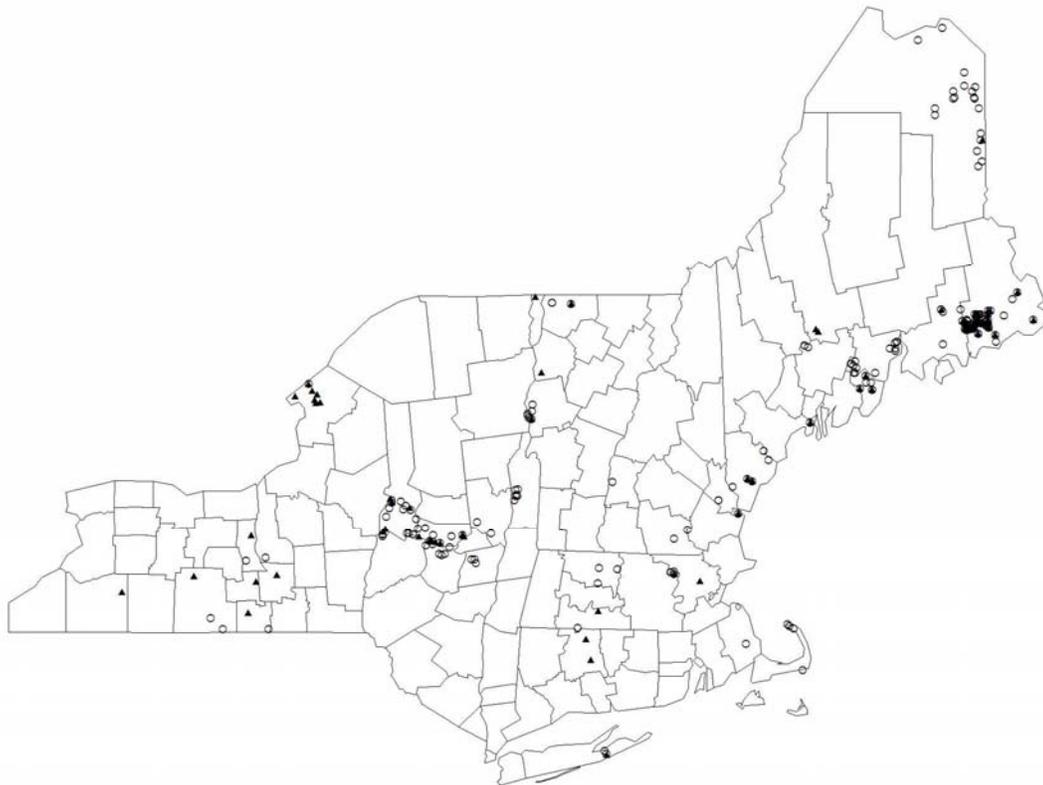
In Maine, lowbush blueberry production covers approximately 26,000 ha, and represents the greatest extent of fire management in New England. Blueberries are harvested on a two year rotation. In the past 10 yrs, approximately 20-30 percent of the non-harvest year fields, or  $\approx$  3,000 ha, have been burned annually. The remaining non-harvest fields are generally flail-mowed (D. Yarborough, pers. comm.). These barrens provide important nesting habitat for Upland Sandpipers (*Bartramia longicauda*) and Vesper Sparrows (Weik 1998, Shriver et al. this volume; fig. 1).

The effects of burning differ in grasslands versus shrublands. In native grasslands, burning has a strong effect on the vegetation, which, in turn, affects a suite of grassland and shrubland specialists. In an 8-yr study at Kennebunk, Maine, prescribed fire affected all eight nesting species that breed at that site. Savannah

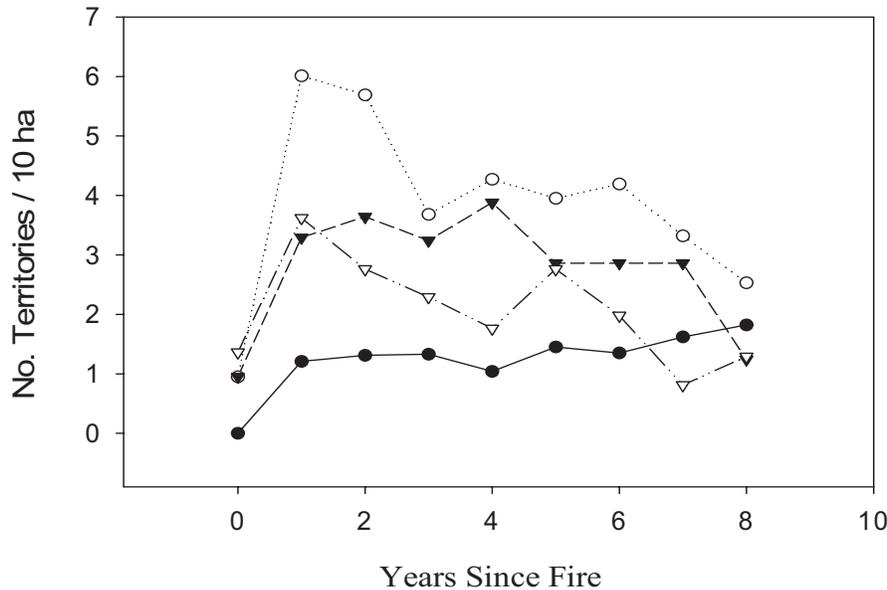
Sparrow, Grasshopper Sparrow, Bobolink, and Eastern Meadowlark densities declined for one yr following fire, but remained high for 5-7 yrs following prescribed burns (fig. 2). Horned Larks (*Eremophila alpestris*) and Vesper Sparrows preferred recently burned sites. Abundances of both these species and Upland Sandpipers declined with time since fire. Field Sparrows (*Spizella pusilla*) preferred sites that had not been burned or mowed in 5 years (Vickery et al. 1999).

On Nantucket Island shrublands, Eastern Towhees (*Pipilo erythrophthalmus*) were more abundant in areas that had been burned or were left unmanaged, as compared to those shrublands that had been mowed. Song Sparrow territory densities in shrublands were similar in mowed, burned, and unmanaged units (Zuckerberg 2002). In general, these results indicate that burning has a strong effect in grassland systems but does not affect shrubland birds. Not surprisingly, mowing has a more substantial effect on bird occupancy in shrubland habitats because this form of habitat manipulation has a much more pronounced effect on vegetation structure (Zuckerberg 2002).

Large-scale prescribed burning in most of New England will continue to be a difficult management issue because of the density and spatial distribution of



**Figure 1**—A grassland bird inventory of New England and New York (1997-2000) revealed that Upland Sandpipers (filled triangle) and Vesper Sparrows (open circle) were most common on the large commercial blueberry fields in eastern Maine. These two species frequently occurred together on these sites (Shriver et al. 2003).



**Figure 2**—Breeding densities of four species of grassland birds followed the same general pattern at Kennebunk, Maine, 1984-1991. Breeding densities of all species were very low during the burn-year but increased markedly in the yr following the burn. Eastern Meadowlark (black circle) densities remained high for 8 yrs following fire. Bobolink (open circle) and Savannah Sparrow (open triangle) were high in the yr following but generally decreased thereafter. Grasshopper Sparrow (black triangle) densities remained high for 4 yrs following fire but then decreased. Standard errors, not shown, were less than 0.2 territories per 10 ha (Vickery et al. 1999).

houses and other man-made structures. Consequently, prescribed fires will generally continue to be small and isolated, usually occurring in the winter months. Small-scale prescribed fires alone are unlikely to substantially increase habitat for declining grassland birds in New England. It seems likely that grassland and shrubland sites will eventually be managed by a combination of burning, mowing, and grazing.

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