

BREEDING BIRDS OF THE MASSACHUSETTS MILITARY RESERVATION

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Articles in *Bird Observer* generally focus on places where interested readers can go birding. This article is unusual in that we report on the birdlife of a place inaccessible to birders. The Massachusetts Military Reservation (MMR) has been off-limits to the general public since its establishment in 1935. Because of this and an historic lack of systematic surveys, little information is available on its birdlife. This lack of information is exemplified by the absence of MMR data from *Birds of Massachusetts* (Veit and Petersen 1993). In 1994 the Massachusetts Army National Guard began conducting systematic bird surveys as part of a comprehensive program to inventory and monitor natural resources (Tazik et al. 1992). Results of these and related surveys provide the first information on the MMR's birdlife. Here, we report on the Reservation's breeding birds.

The MMR is a 22,000-acre reservation located in the towns of Bourne, Sandwich, and Mashpee on Cape Cod. Often mistakenly called Otis Air Force Base, the Reservation comprises Camp Edwards; Otis Air National Guard Base; Veterans Administration, Massachusetts National Cemetery; and U.S. Coast Guard, U.S. Marine Corps, and U.S. Air Force facilities. The Reservation is bordered on the north by the Sandwich moraine and on the west by the Buzzards Bay moraine. To the south and east of the moraines is a large, relatively flat glacial outwash plain. Most of the Reservation comprises forested uplands dominated by pitch pine and a mixture of white, black, and scarlet oaks. Large burn areas dominated by live scrub oak and numerous pine and oak snags provide habitat for cavity nesting birds. Wetlands and deep water habitats are rare on the Reservation, comprising less than one-half of one percent of the total land area. Dirt roads and power lines pass through forested and burn areas providing edge habitat. Surrounding the runways at Otis are grasslands, dominated by little bluestem in various stages of succession. Bird surveys were conducted in all of these habitats.

We used a variety of techniques to survey birds. Land Condition-Trend analysis (LCTA) surveys (Tazik et al. 1992), a combination of two fifty-meter radius point counts and a 100 x 100 meter transect, were used in 1994 and 1995 to survey permanent study plots located in forest, grassland, and burn habitats. Secretive waterbird surveys (Gibbs and Melvin 1993) were used in 1995 to detect the presence of rails, herons, and associated species in eighteen wetlands (Wilson and Cavanagh 1996). Grasslands were spot-mapped (White and Melvin 1985) in 1995 to determine the numbers and species of nesting birds present. Limited Whip-poor-will and owl surveys were conducted over two evenings in

July 1995. We drove roads (nine kilometers) between sundown and two hours after sundown, stopping every 500 meters to listen for singing birds. At each stop we spent three minutes listening for Whip-poor-wills and owls, then played two minutes of taped owl calls (either Eastern Screech or Northern Saw-whet). Following broadcast of the calls we spent another three minutes listening for vocalizing birds. Finally, a study of the effects of military activities on the presence and abundance of scrubland birds resulted in 132, twenty-five-meter fixed radius point counts being conducted in 1995. Data from this study have been incorporated into this article. Species identified from incidental observations have also been included.

The breeding status of species identified on the MMR are listed as either confirmed, probable, or possible, in accordance with Veit and Petersen (1993). These terms were defined by the Massachusetts Audubon Society (1974) for use in the Massachusetts Breeding Bird Atlas (results from the atlas have not yet been published). We introduce a fourth category, nonbreeder, for those species that occur on or over the MMR and whose nesting habitat does not occur on the reservation (e.g., Common Tern).

We have also provided information on the relative abundance of each species. We considered a species to be common if it was likely to be encountered in suitable habitat. Uncommon species were those that were unlikely to be encountered in suitable habitat or those for which suitable habitat was lacking.

Eighty-nine species of birds were identified on or flying over the MMR during our surveys (Table 1). Of these birds eight species were nonbreeders, seventeen were considered possible breeders, twenty-three were probable breeders, and forty-one were confirmed as breeding on the Reservation. Our ability to accurately determine a species' breeding status differed among categories. Those birds considered to be nonbreeders were coastal nesters or wetland species and could not breed on the MMR due to a lack of suitable habitat. We believe that all species in this category have been accurately identified. Similarly, accurate determinations of breeding status were made for those species listed as confirmed breeders. Inclusion in this category required observation of a species' nest, eggs, or young, observation of adults carrying food for young or fecal sacs, or adults exhibiting distraction displays, injury feigning, or coition (MAS 1974). In contrast, the status of possible and probable breeders is less definite. These species may have bred on the MMR but were simply not observed in enough detail to be either confirmed or ruled out as breeders. It is also possible that some of these species may not breed on the MMR, but may have bred near the Reservation or have been late migrants. It is likely that the breeding status of species identified as either possible or probable will change over time as more information becomes available.

Table 1. Species, breeding status, and relative abundances of birds identified on the Massachusetts Military Reservation during the 1994 and 1995 breeding seasons.

Species	Breeding Status ¹	Relative Abundance ²	Species	Relative Abundance ²
Common Loon	Non-breeder	U	Barn Swallow	Possible U
Great Blue Heron	Non-breeder	U	Blue Jay	Probable C
Green Heron	Possible	U	American Crow	Possible C
Mute Swan	Non-breeder	U	Fish Crow	Possible U
Canada Goose	Non-breeder	U	Black-capped Chickadee	Confirmed C
Wood Duck	Confirmed	U	Tufted Titmouse	Probable C
Mallard	Possible	U	White-breasted Nuthatch	Probable U
Red-b'ed Merganser	Non-breeder	U	Brown Creeper	Possible U
Turkey Vulture	Possible	C	House Wren	Probable C
Osprey	Confirmed	U	Eastern Bluebird	Confirmed C
Northern Harrier	Confirmed	U	Hermit Thrush	Confirmed C
Sharp-shinned Hawk	Possible	U	American Robin	Confirmed C
Cooper's Hawk	Possible	U	Gray Catbird	Confirmed C
Broad-winged Hawk	Probable	U	Northern Mockingbird	Probable C
Red-tailed Hawk	Confirmed	C	Brown Thrasher	Confirmed U
American Kestrel	Confirmed	U	Cedar Waxwing	Probable C
Ring-necked Pheasant	Possible	U	European Starling	Confirmed C
Ruffed Grouse	Confirmed	C	Chestnut-sided Warbler	Probable U
Wild Turkey	Probable	U	Pine Warbler	Confirmed C
Northern Bobwhite	Confirmed	C	Prairie Warbler	Confirmed C
Killdeer	Confirmed	C	Black & White Warbler	Probable C
Spotted Sandpiper	Possible	U	American Redstart	Probable U
Upland Sandpiper	Confirmed	U	Ovenbird	Confirmed C
American Woodcock	Confirmed	U	Northern Waterthrush	Possible U
Herring Gull	Non-breeder	C	Common Yellowthroat	Confirmed C
Great Black-b'd Gull	Non-breeder	U	Scarlet Tanager	Probable U
Common Tern	Non-breeder	U	Northern Cardinal	Probable C
Rock Dove	Possible	U	Rufous-sided Towhee	Confirmed C
Mourning Dove	Confirmed	C	Chipping Sparrow	Confirmed C
Black-billed Cuckoo	Possible	U	Field Sparrow	Confirmed U
Great Horned Owl	Confirmed	U	Vesper Sparrow	Probable U
Whip-poor-will	Probable	C	Savannah Sparrow	Confirmed C
Chimney Swift	Confirmed	U	Grasshopper Sparrow	Confirmed U
Ruby-t'd Hummingbird	Possible	U	Song Sparrow	Probable C
Belted Kingfisher	Possible	U	Swamp Sparrow	Probable U
Downy Woodpecker	Confirmed	C	Red-winged Blackbird	Probable C
Hairy Woodpecker	Probable	C	Eastern Meadowlark	Probable C
Northern Flicker	Confirmed	C	Common Grackle	Confirmed C
Eastern Wood-Pewee	Probable	C	Orchard Oriole	Possible U
Eastern Phoebe	Confirmed	C	Baltimore Oriole	Confirmed C
Great Crested Flycatcher	Probable	C	Purple Finch	Confirmed U
Eastern Kingbird	Probable	C	House Finch	Confirmed C
Horned Lark	Confirmed	C	American Goldfinch	Probable C
Tree Swallow	Confirmed	C	House Sparrow	Confirmed C
N. Rough-w'd Swallow	Confirmed	C		

1. Status of breeding birds as defined by Massachusetts Audubon Society (1974).

2. Common (C) birds are likely to be encountered in suitable habitat, while uncommon (U) birds are not.

Some of the species observed were not residents of the MMR but either flew over on their way to another destination or stopped to forage on the Reservation. Common Loons and Red-breasted Mergansers were periodically observed flying over shortly after sunrise during 1995 surveys. Because the MMR lies between Cape Cod and Buzzards bays, these movements may represent birds traveling between these two bodies of water. Common Terns, which were chiefly observed on foggy days, may also have been passing between the bays. Flocks of Herring Gulls were frequently observed passing over the MMR, occasionally with Great Black-backed Gulls. Flight directions suggest the gulls were traveling to and from the Bourne landfill, which abuts the western edge of the Reservation. Gulls were also observed foraging on fields and in dumpsters. Great Blue Herons were periodically observed foraging in wetlands, as were Mute Swans and Canada Geese. Flocks of Canada Geese are common on fields during late summer and early fall, but these birds represent a movement onto the MMR from off-Reservation nesting areas.

It is likely that two of the species listed as possible breeders, the Belted Kingfisher and Ring-necked Pheasant, were actually nonbreeders. Only one kingfisher was observed during the two years of surveys, and it occurred over a small scrub-shrub wetland on the eastern side of the Reservation, near Snake Pond in Sandwich. It is unlikely that this small vegetated wetland, surrounded by closed canopy forest, could support a kingfisher. We believe it more likely that the bird nested off the Reservation in the vicinity of Snake Pond. Only one male Ring-necked Pheasant was observed during our surveys. The absence of females and young suggests that pheasants did not nest on the MMR.

Several species identified as possible or probable breeding birds are considered rare or uncommon in Massachusetts or on Cape Cod. A singing male Orchard Oriole was recorded in 1995. Considered a local and uncommon breeder in Massachusetts (Veit and Petersen 1993), they have been recorded in the towns of Bourne and Falmouth, areas adjacent to the MMR. A Northern Waterthrush, a species described as "absent on the Cape and Islands" (Veit and Petersen 1993), was observed in an emergent wetland (Cowardin et al. 1979) on the northern portion of the MMR on May 25, 1995. Veit and Petersen (1993) reported egg dates of May 21 to June 15 for this species in Massachusetts. Although the bird observed on the MMR could have been an extremely late migrant, the timing and location of the observation suggest that it may have been nesting. Three species of forest hawks, the Broad-winged, Cooper's, and Sharp-shinned hawks, likely bred on the MMR. Broad-winged Hawks are considered rare breeders on Cape Cod, Cooper's Hawks rare and local breeders in Massachusetts, and Sharp-shinned Hawks very rare and local in the Commonwealth (Veit and Petersen 1993). Finally, although Wild Turkey is a "fairly common resident" in Massachusetts (Veit and Petersen 1993), it is uncommon on Cape Cod. Wild Turkeys were released on the MMR in 1989 by

the Massachusetts Division of Fisheries & Wildlife (see Cardoza (1993) for an overview of state restoration efforts). Although the birds were not closely monitored following release, our periodic sightings of males with harems suggest that breeding occurs.

Most birds confirmed as breeders on the MMR are common on the Reservation. The abundance of these species increased the likelihood of finding nests or observing breeding behaviors while conducting surveys. Many of these species' nests were identified because they were associated with human structures. A nesting platform used by Osprey in 1994 was used by a Great Horned Owl in 1995. Nest boxes were used by Wood Ducks, American Kestrels, and Tree Swallows. Light poles and building ledges were used by European Starlings, House Sparrows, and House Finches. Intensive grassland bird surveys, conducted in 1995, permitted us to locate the nests and young of Upland Sandpipers, Northern Bobwhite, Chipping Sparrows, Field Sparrows, Savannah Sparrows, and Eastern Meadowlarks. All other nests, young, or nesting behaviors were incidentally observed. Of particular note was a pair of Northern Rough-winged Swallows, an uncommon and local species in Massachusetts (Veit and Petersen 1993), observed nesting in a sandpit in 1995.

We recorded similar numbers of uncommon (forty-four) and common (forty-five) species on the MMR. Causes of rarity on the MMR varied among taxa. Many of the uncommon species require habitats that are absent or poorly represented. For example, the number and sizes of the Reservation's wetlands and deep water habitats may not be suitable for nesting by birds such as Belted Kingfishers and waterfowl. Similarly, it is likely that some species of grassland birds were uncommon because of variable habitat quality and interspecific differences in tolerance to disturbance. For example, Upland Sandpipers require extensive open tracts of short grasslands for nesting (Carter 1992), while Killdeer nest in a variety of open habitats, including gravel rooftops (Veit and Petersen 1993). Coast species, such as Common Tern, are uncommon on the Reservation because of a complete lack of suitable habitat. Some species (e.g., Broad-winged and Cooper's hawks) are uncommon because they naturally occur at low densities. Finally, others are uncommon on the MMR because they are uncommon in the state (e.g., Orchard Oriole), and their regional abundances are reflected in our surveys.

Despite extensive surveys, we may have underestimated the relative abundances of some species and may have entirely overlooked others. With the exception of Whip-poor-will surveys, our methods focused on diurnal birds. As a result, crepuscular or nocturnal birds may not have been adequately surveyed. Although observed in small numbers, the presence of large areas of suitable habitat suggests that Woodcock and Great Horned Owls may be more abundant than indicated by our surveys. Two other owls, the Eastern Screech Owl and Northern Saw-whet Owl, may potentially breed on the MMR. Although

uncommon on Cape Cod (Hill 1965, Veit and Petersen 1993), Eastern Screech Owls have been confirmed as breeding immediately north of the MMR and probably also occur to the east (Veit and Petersen 1993). Northern Saw-whet Owls are uncommon Massachusetts residents but have been recorded in pitch pine barrens and on Cape Cod (Veit and Petersen 1993), suggesting that breeding is possible within the MMR's thousands of acres of pitch pine. Further surveys, focused specifically on singing owls, are necessary to determine if these species occur on the MMR.

The size and relatively undeveloped condition of the MMR make it an important area for many of Cape Cod's birds. The Camp Edwards Training site, which occupies almost three-quarters of the MMR's land area, may represent the largest tract of undeveloped forest lands on Cape Cod (Jenkins 1995). This area, along with other forested sections of the MMR, provides breeding habitat for several species that appear to be in decline (e.g., Rufous-sided Towhee [Hagan 1993]). Additionally, large burn areas that have resulted from a series of prescription burns and wildfires contain an abundance of snags that provide nesting habitat for cavity-nesting species such as Eastern Bluebirds, Great Crested Flycatchers, and Eastern Kingbirds. Finally, the Reservation's grasslands provide valuable nesting habitat for some of the state's rarest birds (e.g., Upland Sandpiper and Grasshopper Sparrow). Although the value of these grasslands has decreased over the years due to plant succession (Melvin 1994), they remain important for maintaining local and regional avian diversity. The ecological importance of the Massachusetts Military Reservation is likely to increase over time as the quantity and quality of breeding bird habitat off the Reservation continues to decline due to development and the associated habitat fragmentation.

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LCTA, secretive waterbird, and grassland bird surveys were conducted by the Massachusetts Army National Guard as part of the Camp Edwards LCTA program. Point counts were funded by a Department of Defense Legacy Resource Management Program grant awarded to the Massachusetts Army National Guard. The authors thank the Adjutant General, State Quartermaster, commanders of Camp Edwards (past and present), and the Director of Environmental Affairs for their support. They also thank Dr. Scott Melvin, Austin Stokes, and Daniel Kluza for assistance with grassland bird and Legacy surveys.