

# Whip-poor-will Territory Mapping at Two New Hampshire Sites

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## Abstract

The Eastern Whip-poor-will (EWPW, *Caprimulgus vociferus*) has been declining across its range for decades. Habitat loss or maturation has been proposed as an important factor behind these declines, since EWPWs require a mix of open habitat for foraging and forested habitat for nesting. To better understand the potential effects of habitat management on Whip-poor-will populations in New Hampshire, detailed studies were initiated in two high density areas in 2008: Mast Yard State Forest and the Ossipee Pine Barrens. In 2008-10, Mast Yard supported an average of eight EWPW territories, with birds concentrated at the western and eastern portions of the study area. In the west, they used areas of thinned pine, recent clear cuts, and wetlands, while in the east they occupied areas of aspen regeneration, wetlands, and a power line corridor. The remainder of the site, which is dominated by mature pine, was completely unoccupied. In 2010, three birds occupied an area of mature forest that was unoccupied in previous years but which was selectively logged in the summer of 2009. This rapid colonization suggests that EWPWs can respond quite quickly to habitat management, at least within areas that already support a breeding population. Data collection improved at the Ossipee Pine Barrens in 2010, and the resulting territories are far more indicative of actual habitat use than those mapped in 2009. Interestingly, birds continue to avoid the most recently burned areas, suggesting that perhaps the understory is too sparse to serve as suitable nesting habitat.

## **Introduction**

The Eastern Whip-poor-will (*Caprimulgus vociferous*, hereafter whip-poor-will) is a nocturnal insectivorous bird that breeds in a variety of open forest types in eastern North America. Its populations have declined considerably in the northeastern United States in the last 40 years. Details on this decline have appeared in previous reports to the Nuttall Ornithological Club (Hunt 2007, 2009). Among the reasons proposed for these declines is loss or degradation of breeding habitat. Most available data (Cink 2002, Wilson 2003, Hunt 2006) suggest that whip-poor-wills need a combination of open areas (e.g., wetlands, fields, forest openings) for foraging and more closed canopy forest for nesting. As a result, they tend to occur where edges and natural disturbance are more prevalent. In much of the northeastern United States, the continued decline of agriculture and – in some areas – forestry have resulted in a net increase in overall forest cover. At the same time, many shrubland habitats are being lost to development, often in the coastal plain and river valleys where whip-poor-wills were historically more abundant. Thus, even where suitable habitat is less likely to mature (e.g., pine barrens, coastal shrublands), it is being replaced by roads, houses, and other construction. If suitable early successional or edge habitat is declining across the region, it would follow that whip-poor-will populations would also decline.

There is increasing evidence that certain types of habitat management can benefit whip-poor-wills. The species occurs disproportionately close to edges in logged pine plantations in North Carolina (Wilson 2003, Wilson and Watts 2008), uses burned areas relatively soon after treatment in Massachusetts (Garlapow 2007; J. Kelly, pers. comm.), and prefers edge or similar habitats in New Hampshire (Hunt 2006, 2009). The goal of the present study was thus to collect data on whip-poor-will use of two managed areas in New Hampshire, one where the dominant treatment is forest management and the other where fire is being used to restore pine barrens. By collecting habitat data at both sites, it may be possible to evaluate which practices are most likely to benefit the species. In the long run, such data can inform “best management practices” that, if applied, would enhance local whip-poor-will populations and ultimately reduce or reverse the species’ ongoing declines.

## **Study Area and Methods**

Whip-poor-will territory mapping was conducted at two New Hampshire sites known to support high densities. The primary study area was the Mast Yard State Forest in Hopkinton and Concord, which has been surveyed intensively since 2008 (Hunt 2008, 2009; see latter for site details). The second site is in the Ossipee Pine Barrens, probably the highest density area for the species in New Hampshire (see Hunt 2009 for more detail). The Ossipee study area was the same as that in 2009. At both sites, whip-poor-will territories were mapped using a modified spot-mapping protocol called “triangulation mapping,” in which multiple observers take compass bearings on a calling bird, plot these on a map, and use the intersection of the bearings as the whip-poor-will’s approximate location (full description in Hunt 2009).

From these points, whip-poor-will territories were delineated by creating a minimum convex polygon that included all locations assigned to each individual bird. Three polygons were created for each bird, corresponding to: a) a “core territory” including only triangulated locations clearly attributed to that individual, b) an “expanded territory” that also included non-triangulated locations, and c) a “maximum territory” that also included locations that were not resolved between adjacent birds.

To supplement data collected by triangulation mapping, two male whip-poor-wills at Mast Yard were fitted with radio transmitters and followed from late May through mid-July. The use of radio telemetry allowed for detection of focal birds when they were not calling, including at daytime roost locations. Data from radio telemetry are being analyzed separately by a graduate student at Plymouth State University as part of his masters project, and were not available for this report. Preliminary results will be referred to as appropriate in the discussion below.

## **Results and Discussion**

At Mast Yard, surveys were conducted on 32 days in 2010 (16 May to 30 July), for a total of roughly 25.5 hours. These totals are comparable to those in 2008 (20 days, 26.5 hours) and 2009 (34 days, 25.75 hours). Although the total number of territories in the core study area was lower in 2010 ( $N = 7$ ), the overall dispersion of territories was similar to that of the previous two years. In all three years, birds were concentrated in the southeast near a power line corridor and in the northwest in an area subject to previous timber harvest (Figs. 1 and 2, details in Hunt 2009). The notable change between 2009 and 2010 occurred in an area of private land immediately north of the state forest, and which was selectively logged in the summer and fall of 2009. Whip-poor-wills were rarely if ever detected in this area in 2008 or 2009, but there were three birds here in 2010. This rapid colonization of newly opened-up forest suggests that whip-poor-wills are able to find and settle in suitable habitat soon after it is made available by disturbance (whether natural or man-made). The loss of territories in the southeastern power line area (Fig. 2) is unexplained at present. It is possible that birds may have shifted to the new cut in the north, but in the absence of individually marked birds this hypothesis is impossible to test. Another significant – and unexplained – difference in 2010 was that territory sizes are all measurement scales averaged larger than in 2008 and 2009 (Table 1).

Limited data from radio telemetry at Mast Yard suggest that the core areas used by whip-poor-wills did not differ significantly from those identified through triangulation mapping. For example, almost all radio detections of the southern bird in the power line corridor were within the area outlined in green, and all daytime roosts were in this area. The southeastern-most bird in the western cluster was occasionally detected south of the area outlined in dark blue, but again most locations were in the territory as mapped in Figure 2. Based on preliminary data, it is unlikely that territory sizes will change significantly when radio telemetry data are fully analyzed.

Habitat data have also not been analyzed for 2010, but given the patterns shown in Figure 2, the overall results will likely be extremely similar to those in 2008 and 2009 (Hunt 2009). The

occupied areas are almost identical, and as mentioned above, the expansion into the new northern cut is consistent with the species preference of thinned pine in the 2008-09 analysis. Starting in October 2010, additional cutting is taking place in the south-central portion of the state forest, and the use of this previously unoccupied area by whip-poor-wills in 2011 will be closely monitored to determine if the rapid colonization seen in 2010 is again manifest.

As in 2009, the site in the Ossipee Pine Barrens was visited far less frequently than Mast Yard, and as a result it is much more difficult to draw conclusions from the limited data collected. Thanks to a single dedicated volunteer, West Branch was surveyed for 7.5 hours over seven site visits in 2010 (vs. 5.2 hours over 5 visits in 2009), and the resulting territory maps (Fig. 3) are probably much more representative of whip-poor-will dispersion at this site. However, because a significant number of locations in 2010 were non-triangulated, I have not calculated territory areas for the site. As in 2009, birds were not regularly detected in recently burned areas, most of which are in the northern portion of the mapped area. These areas still have relatively limited understory, and while they may be suitable for foraging, they may not be near enough sites with sufficient cover for nesting and are thus not used.

These results corroborate those from studies elsewhere in the species' range, as well as more generalized data from New Hampshire. Using data from roadside survey routes, Hunt (2006) determined that survey points where Whip-poor-wills were detected tended to be in landscapes characterized by relatively low forest cover, and where the non-forested land was open rather than developed. Within the Ossipee Pine Barrens, the presence of pitch pine was also a significant habitat feature in the vicinity of points where Whip-poor-wills were detected (Hunt 2006). A similar study in North Carolina found Whip-poor-wills more likely to occur near forest edges in managed pine plantations, and that most birds were within regenerating versus mature habitat (Wilson and Watts 2008). On Cape Cod, Garlapow (2007) found few differences between occupied and unoccupied sites, although Whip-poor-wills preferred to forage over areas with less ground cover. The lack of clear habitat selection in the latter study may be related to the prevalence of pitch pine/scrub oak communities, and thus relatively little habitat that birds would be likely to avoid. A more detailed investigation of whether these patterns hold in New Hampshire will be part of a graduate student project at Plymouth State University, and include more intensive use of radio telemetry in 2011.

There is still much to learn about habitat selection by Whip-poor-wills in this portion of the species' range. Data from a managed forest at Mast Yard supports the idea that Whip-poor-wills preferentially settle in areas with a mix of forest and open areas, and will rapidly occupy new areas as they are created through timber harvest. Continued timber harvest at Mast Yard in 2010-2011 allows for further testing of this hypothesis, and with two years of post-harvest data, we may be able to perform a more robust analysis and create specific management recommendations. In the Ossipee Pine Barrens, there are not presently sufficient data to evaluate habitat relationships at the local scale, but something of a baseline has now been established at the West Branch site. A key need at West Branch is more consistent coverage and thus better data on territory size and dispersion. An additional student may be working in the Ossipee area in 2011, which will hopefully allow for more robust analysis of patterns at that site.

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Table 1. Comparison of three territory measurements for Whip-poor-wills at Mast Yard State Forest, NH: 2008-2010. Maximum territory polygons are displayed in Figure 2.

	<b>Territory Size in hectares (S.E.), by delineation type</b>		
<b>Year (N)</b>	<b>Core</b>	<b>Expanded</b>	<b>Maximum</b>
2008 (9)	3.75 (0.38)	5.49 (0.42)	6.79 (0.46)
2009 (8)	4.94 (0.45)	6.06 (0.43)	6.55 (0.44)
2010 (7)	6.42 (0.73)	12.67 (0.64)	13.61 (0.66)



Figure 1. Aerial photograph of Mast Yard State Forest (red outline) and adjacent conservation lands (yellow outlines). The white triangle in the northwest indicates the approximate area that was selectively logged in the late summer of 2009 (see Fig. 2A for extent). Colored shading indicates the locations of habitats mentioned in the text, as follows:

- Not shaded = mature pine forest
- Dark green = thinned pine forest
- Light green = young pine forest
- Yellow = young hardwood forest
- Brown = poorly vegetated (power line right-of-way, log landings)
- Blue = shrub wetlands



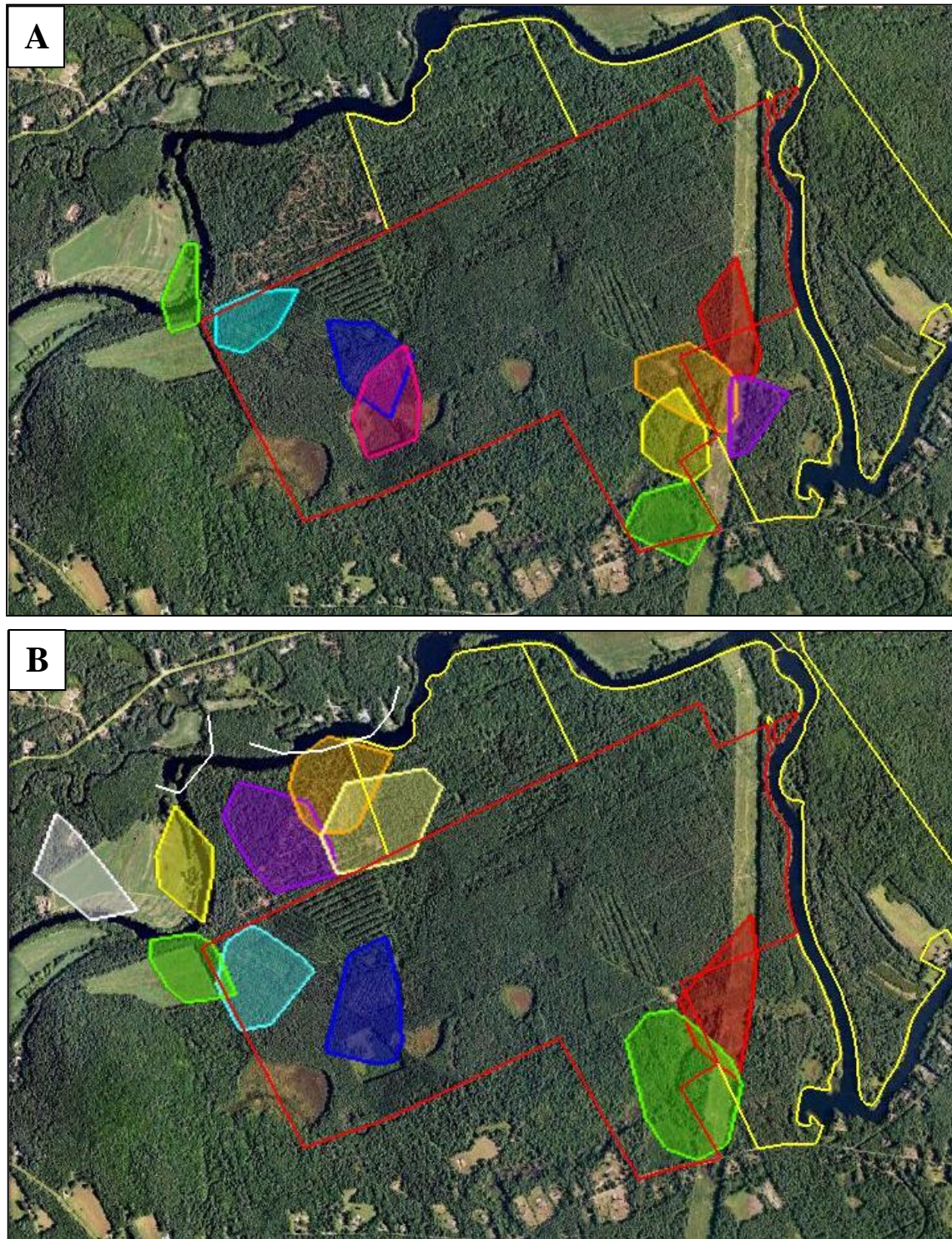


Figure 2. Whip-poor-will territories at the Mast Yard State Forest (outlined in red) in A) 2009 and B) 2010. Boundaries of territories located off the state forest to the west are not shown. Territories in 2008 are similar to those in 2009 (see Hunt 2009).

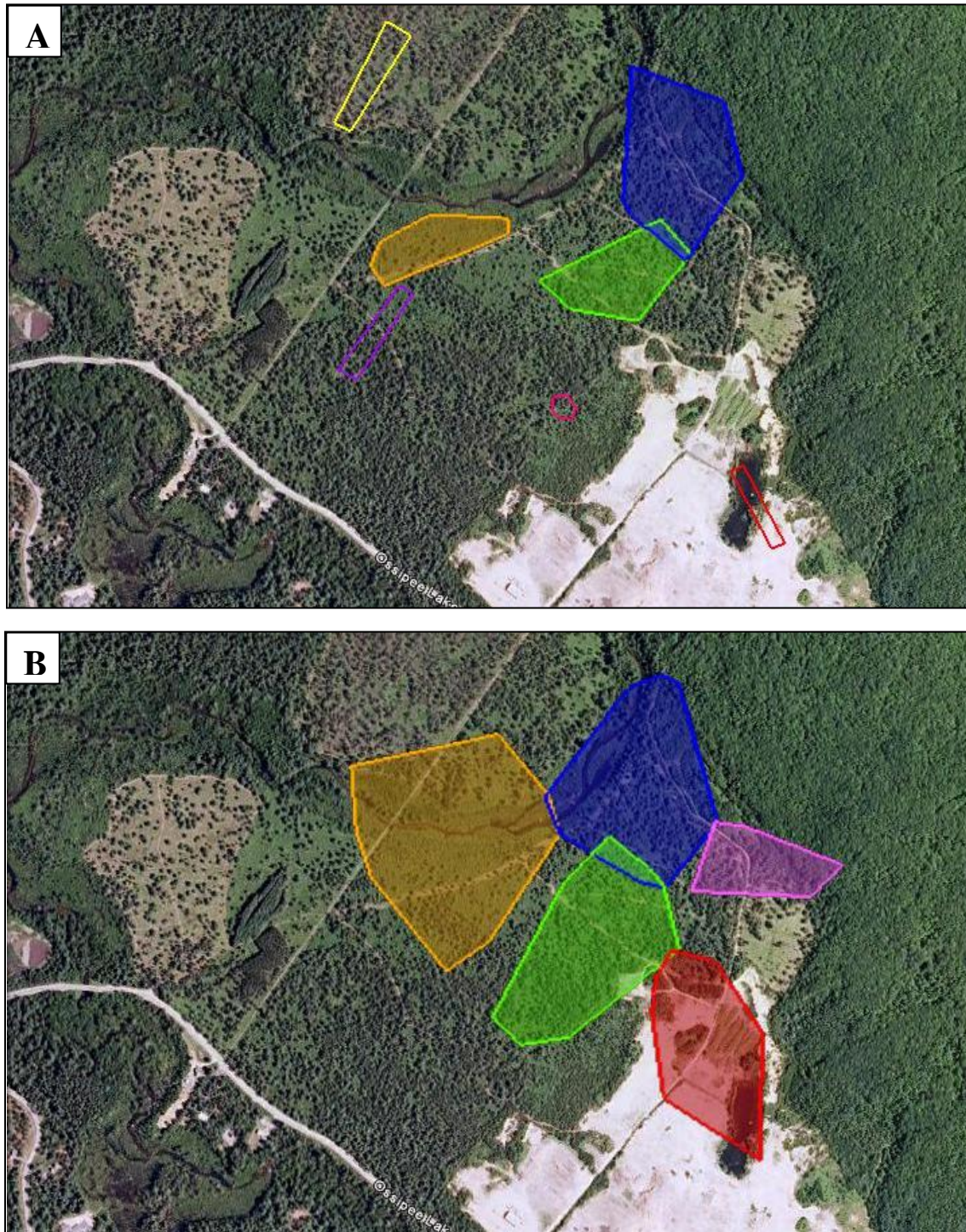


Figure 3. Locations of Whip-poor-will territories (tinted polygons) at the West Branch Preserve in A) 2009 and B) 2010. Unfilled polygons in 2009 are based on extremely limited amounts of data and should be considered more as locations of birds at the periphery of the study area.