Northeast Nightjar Survey: 2007 Summary

Whip-poor-will in Altona Barrens, NY, 28 May 2007. Photo by Pamela Hunt

A report to the Nuttall Ornithological Club

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Executive Summary

The Northeast Nightjar Survey (the Survey) began as an in-state project of New Hampshire Audubon in 2003, at which point it was restricted to a single watershed. Over the ensuing years, local and regional concern over declining Whip-poor-will populations resulted in a gradual expansion of the project into much of the northeastern United States. The primary goal of the survey is to create a system of monitoring routes that will ultimately provide information on nightjar population trends throughout the region, and ideally the entire range of Whip-poor-will and Chuck-will's-widow.

In 2007, nightjar surveys were conducted along 142 routes in eight northeastern states, with additional surveys implemented in North Carolina (15 routes) and Wisconsin (22 routes). The protocol used in 2007 was modified from that of previous years so as to collect data that allow estimation of detectability. Specifically, the use of two independent observers was strongly encouraged on all routes, and observers were instructed to track individual birds during six successive one-minute intervals. Survey routes consisted of 10 points spaced one mile apart along roads passing through suitable Whip-poor-will habitat. A modified version of this protocol was also introduced in the southeastern United States, where approximately 60 additional routes were surveyed.

Results of these surveys did not differ significantly from those of the 2006 surveys. Whip-poor-wills were generally rare in New England except in local patches such as southeastern Massachusetts. In New York, they were most abundant on Long Island and in disturbed habitats in the northwestern and northeastern corners of the state. Birds were most common–although still patchily distributed–in New Jersey and Maryland, and observers in the latter state also detected large numbers of Chuck-will's-widows. Whip-poor-wills were also relatively common in both Wisconsin and western North Carolina.

At the same time, there were three attempts to test methods of estimating Whip-poor-will population size in high-density areas. The single such study in New Hampshire detected roughly 14 male Whip-poor-wills in a section of the Ossipee Pine Barrens in late June, suggesting there is potential value in this sort of approach. Data from Connecticut and New York were not available for comparison and inclusion in this report.

Given the revised protocol and large amount of data collected in 2007, the Survey has entered into a partnership with researchers at North Carolina State University to conduct data analysis. In particular, NCSU scientists will use the 2007 data to assess the current protocol's effectiveness at detecting nightjars, and make any additional recommendations based on this analysis. Depending on these results, the Survey will either introduce a final protocol in 2008 or collect additional data under the old protocol to refine the analysis. At the same time, the Survey has begun discussions with Bird Studies Canada as a potential host for the data being collected by the survey. The ultimate goal is to have a centralized database for all nocturnal bird monitoring data, as well as online data entry capacity for observers. Pending results of data analysis and management discussions, the Survey will continue to build partnerships in eastern North America with intent to develop a range-wide monitoring program for these declining species.

Background

As outlined in previous reports (Hunt 2005, 2006a, 2006b), populations of nightjars (Common Nighthawk, *Chordeiles minor*; Chuck-will's-widow, *Caprimulgus carolinensis*; and Whip-poor-will, *Caprimulgus vociferus*) are generally declining in eastern North America. Although these declines are detectable in analyses of Breeding Bird Survey (BBS) data (Sauer et al. 2005), the BBS is not designed to detect and monitor nocturnal species such as nightjars, and any interpretation should be viewed with caution. The bulk of evidence for population declines is anecdotal in nature, and comes from amateur observers who report on declining frequencies of detection in areas that formerly supported a given species. Such a decline is qualitatively corroborated by evidence for range retraction in states and provinces completing second-generation breeding bird atlases (e.g., Maryland, New York, Ontario, and Vermont). Comparison of atlas maps from 2000-2006 with those from the 1980s indicates both a decline in the number of atlas blocks occupied and a systematic disappearance from large portions of species' former ranges (urban areas for Common Nighthawk, western NY and southern Ontario for Whip-poor-will).

Because of the apparent declines and increasing concern for these species at state and regional levels, Northeast Partners in Flight created a Nightjar Working Group in 2004 (Hunt 2006a). The tasks of this group have been to identify issues related to nightjar monitoring and develop a protocol that can be used to monitor the group over a large area. Only with more rigorous data on status and trend can we move forward to identify important conservation issues for these birds and implement appropriate conservation actions. A Whip-poor-will monitoring program that started in New Hampshire in 2003 was modified as the project spread to a larger portion of the Northeast (Hunt 2005, 2006b). The present report summarizes the project as it stands after further expansion and refinement in 2007, and outlines future steps as currently envisioned by the Nightjar Working Group.

Methods:

Protocol Refinement

The protocol used to survey nightjars has been evolving since the project was first initiated in New Hampshire in 2003, based both on findings of the ongoing surveys and recent developments in the broader field of bird monitoring. A key issue is the need to incorporate estimates of detectability: a measure of the likelihood that an observer actually records a bird that is present at a site. In the 2006 report (Hunt 2006b), I identified five protocol modifications that could help estimate nightjar detectability in the context of a long-term monitoring program:

1) double observer methods (independent or dependant)
2) repeated surveys
3) time-of-detection methods
4) distance sampling
5) playback of pre-recorded calls

The Northeast Nightjar Working Group reviewed these possibilities prior to the 2007 field season, and opted to adopt double-observer and time-of-detection methods in a revised protocol. Preliminary data collected in the fall of 2006 suggested that distance sampling was inappropriate for surveying nightjars (Hunt 2006b), and this conclusion is supported by extensive experimental work showing high observer variation in distance estimation (Alldredge et al. 2007b). In addition, because Whip-poor-will calls could be heard roughly a kilometer away (P. Hunt and M. Medler, unpubl. data) we opted to increase the distance between points to one mile. This distance is also that generally used for owl surveys, and would thus facilitate the potential combination of surveys for both groups of nocturnal birds. Because of the relatively narrow lunar window in which nightjar surveys can be conducted, use of repeated surveys was deemed impractical. Difficulties in equipment standardization were deemed sufficient to eliminate playback as a valid option, especially given consensus that the existing lunar restrictions already allowed for a high level of vocalization.

The use of two observers who simultaneously record data at the same point allows for a direct comparison of individual variation in detections, and thus provides a valuable measure of detectability (Alldredge et al. 2006). In 2007, nightjar volunteers were thus strongly encouraged to recruit a second observer to help conduct the survey. Because many participants in previous years had already taken a companion on their survey, this extra requirement was not expected to be difficult to implement. Nonetheless, only about half of the surveys conducted in 2007 were done using the double-observer protocol (Table 1).

Time of detection methods can be used to model the temporal variation in avian calling rates, and are based in part on the assumption that a longer survey period will increase the chance of detecting a given bird (Alldredge et al. 2007a). We expanded our original three-minute point counts to six minutes, and required observers to record whether a given bird was present in each of six one-minute time periods. When combined with double-observer methods, time of detection may prove to be a reliable tool in estimating nightjar detectability without the need to estimate distances.

The resulting methodology was thus as follows:

1) roadside routes consist of 10 points spaced one mile apart (see also below)
2) observers survey their assigned route during the appropriate lunar conditions
    a. appropriate breeding dates for a given region
    b. moon face at least 50% illuminated (Wilson and Watts 2006)
    c. moon above the horizon and not obscured by clouds (Wilson and Watts 2006)
3) two observers record data independently at each point
4) for each nightjar detected, observers indicated whether they heard it during each of six one-minute periods

In some states, observers were encouraged to record owls using this protocol, and in Maine and Connecticut the owl component also included a playback of Northern Saw-whet Owl mid-way through the six-minute count. These data are being analyzed separately by a subset of the working group to evaluate the feasibility of combining owl and nightjar surveys in the future. As such, the owl component will not be discussed further in this report. The working group also developed a pilot habitat measurement system for use along survey routes, but this was not

uniformly used and awaits further discussion and refinement. A modified version of this nightjar survey protocol was adopted in the southeastern United States in 2007 (Center for Conservation Biology 2007), although data from that effort were not available for inclusion in this report.

Route Selection

An ongoing issue facing the Northeast has been the patchy distribution of the focal species (particularly Whip-poor-will) over much of the region (particularly in New England). Previous surveys have shown that locating routes randomly is not a feasible strategy for these areas (Hunt 2005, 2006b), but the need for a non-biased sampling design is an important consideration as the larger regional effort moves forward. Routes in New England and parts of New York continue to be located based on a rough habitat model (Hunt 2006b), but as the program expands to the south and west this approach does not appear necessary. In 2007, several of the New York routes were located along segments of Breeding Bird Survey routes, and observers on some of these routes did detect Whip-poor-wills. Routes in North Carolina and Wisconsin were all fully random, and significant numbers of these routes also detected the species. From these data it appears that the best approach for a broader monitoring effort may be to use random routes selected within the geographic range of the focal species, with an exception in some parts of the Northeast where habitat-based routes will still be needed to effectively detect these species.

Results and Discussion

Whip-poor-will Distribution and Abundance

In 2007, nightjar surveys were conducted along 179 routes in ten states (Table 1). At least one Whip-poor-will was detected on 85 of these routes, yielding a total of over 600 detections that can be used to assess the time-of-detection component. Of the total routes, only 75 of these routes employed the double-observer method, and of these 43 detected at least one Whip-poor-will. These routes will be used to assess the double-observer methods as discussed below. Roughly 60 additional routes were surveyed in the Southeast using a modified protocol (M. Wilson, pers. comm.), but data from these routes are not currently available.

Based on these data, Whip-poor-will distribution in the Northeast did not vary significantly from that reported on the 2006 surveys (Hunt 2006b). The species remains rare and local over most of northern and western New England, with apparent concentrations in the Connecticut River Valley, Ossipee Pine Barrens (NH), and south coastal Maine. The highest counts in New England continue to come from southeastern Massachusetts, with an average of over eight birds per route.

There were significantly more routes surveyed in New York in 2007, although the general pattern remains unchanged. Whip-poor-wills were most abundant in pine barrens and other disturbed habitats on Long Island and in the northwestern and northeastern corners of the state. One highlight was the discovery of two birds in the Albany pine barrens, the first records in that area in over a decade. Fewer surveys were conducted in New Jersey than in 2006, but again Whip-poor-wills most common in the southern portion of the state. Observers in Long Island and

southern New Jersey also detected single Chuck-will's-widows, here at the northern edge of that species' range.

In Maryland, most surveys were conducted in the eastern portion of the state, with the majority of Whip-poor-wills detected along two routes in the vicinity of the Aberdeen Proving Grounds east of Baltimore. Elsewhere in eastern Maryland, Chuck-will's-widows outnumbered Whip-poor-wills in low elevation areas on the eastern shore side of Chesapeake Bay. Western North Carolina had the highest proportion of routes with Whip-poor-wills (13 of 15), and the species was relatively common in this area. Finally, the pilot effort in Wisconsin detected Whip-poor-wills on roughly half its routes, with concentrations in the more sandy forests in northern and central portions of the state (A. Paulios, pers. comm.).

In conjunction with the route-based monitoring program, partners in three states began testing means of estimating Whip-poor-will abundance in high-density populations, otherwise known as "hot spots." These efforts usually combined simultaneous point counts using multiple observers spaced out in the habitat, and included measurement of distance and/or direction to calling birds. Approximate bird locations could then be plotted on a map to obtain a rough diagram representing Whip-poor-will territory dispersion across the sampled area. Data from New York and Connecticut were unavailable for this report, but the single effort in New Hampshire resulted in an estimate of 14 calling males over roughly two square miles of habitat. There is interest in continued experimentation with this technique as a means to monitor birds in parts of the Northeast where they are patchily distributed.

Data Analysis and Management

With data now collected under the modified protocol, the next step is to evaluate the protocol in terms of its ability to estimate detectability. Such an analysis can determine further refinements to the field methodology. For instance, available data may indicate that detectability does not increase significantly after four minutes, thus allowing for a shorter point count, or that single observers are sufficient. Any such modification would make the survey easily to implement over large areas using volunteers. The Northeast Nightjar Working Group will be working closely with researchers at North Carolina State University on this analysis, although data are not currently in the appropriate format. The NCSU partners are the same group that has published much of the recent literature pertaining to avian point count methodologies (Alldredge et al. 2006, 2007a, 2007b; Simons et al. 2007). This analysis will occur during the fall and winter of 2007-2008, and may be followed by more detailed experimented analysis of the sort reported in Simons et al. (2007). Depending on the results of these analyses, survey efforts in 2008 will either focus on collecting more data using the existing protocol or implementation of a final revised protocol.

At the same time, the increasing geographic scope of the project increases the need for a centralized system of data management, ideally including online data entry. The working group has initiated discussion with Bird Studies Canada (BSC), which already manages a large database for owl surveys across Canada. The possibility of combining owl and nightjar surveys in the Northeast, when combined with the pre-existing Canadian database, makes selection of BSC as an ultimate data repository a reasonable one. Under this partnership, BSC has already

developed a pilot online data entry module which will be tested by Working Group members over the next few months. Discussions will also need to occur between BSC and the NCSU research team to ensure that the data entered in the database are in a format compatible with future analysis.

Next Steps

The Northeast Nightjar Survey has grown considerably from a collection of 16 routes in the Piscataquog Watershed of southern New Hampshire. The program has now been implemented in ten states east of the Mississippi, with additional surveys conducted under a similar program in much of the Southeast. As the project has grown, we have continually refined our survey protocol, and have reached a point where data are available to test the protocol's efficacy. The latter analysis, being conducted in partnership with North Carolina State University, has the potential to result in a final protocol than can be implemented anywhere with the range of Whip-poor-will or Chuck-will's-widow.

For such a broad scale implementation to be successful, the program still needs several key elements. One such need is a unified and centralized system for data entry and management, and this is being pursued in partnership with Bird Studies Canada. We will also need a systematic method for determining the locations of survey routes on the ground, particularly in states that have yet to implement the survey. Placement of routes will require consideration of both sample size (how many routes does a region need to collect good trend data?) and the trade-offs between random and non-random routes. Current consensus with respect to the latter point is that random routes may work well except in the New England and portions of New York where Whip-poor-wills are patchily distributed. Work on integrating fully random and habitat-based routes will continue as the 2007 data are analyzed.

A final need will be–at least initially–a continued mechanism for in-state coordination. This involves identifying volunteer observers, informing them of the protocol, assigning routes, and collecting their data. Online data entry will facilitate the latter, but general volunteer management can be very time consuming. At present, states have varied considerably in the extent to which this task has been achieved in a timely manner, and as the program expands it will be critical to aim for greater centralization. There has been some discussion within the Nightjar Working Group of a system of three regional coordinators: Northeast, Southeast, and Midwest, with each working with state contacts to initially identify survey participants. Once the latter are recruited, and assuming online data entry, state-level project management would be minimized, and consist largely of replacing volunteers as needed and perhaps soliciting missing data.

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Table 1. Summary of nightjar surveys in 10 states in 2007. WPW = Whip-poor-will, CWW = Chuck-will's-widow, CONI = Common Nighthawk. "Max WPW" represents the sum of all routes using the higher of the two totals on routes with two observers.

State	# Routes Surveyed	# with 2 Observers	# Routes w/WPW	Max WPW	WPW/ Route	*WPW/Rt w/WPW	# Routes w/CWW	Max CWW	# Routes w/CONI	Max CONI
CT	26	4	6	17	0.65	2.83	0	0	0	0
MA	7	0	7	74	10.57	10.57	0	0	0	0
MD	12	3	7	91	7.58	13.00	8	92	0	0
ME	23	0	6	12	0.52	2.00	0	0	2	3
NC	15	13	13	91	6.07	7.00	2	2	0	0
NH	15	9	10	16	1.07	1.60	0	0	2	2
NJ	6	3	4	55	9.17	13.75	1	1	1	2
NY	41	27	18	184	4.49	10.22	1	1	5	13
VT	12	5	4	9	0.75	2.25	0	0	1	1
WI	22	11	10	58	2.64	5.80	0	0	5	10
Sum	**179**	**75**	**85**	**607**	**3.39**	**7.14**	**12**	**96**	**16**	**31**

* = total number of WPW divided by the number of routes on which WPW were detected.

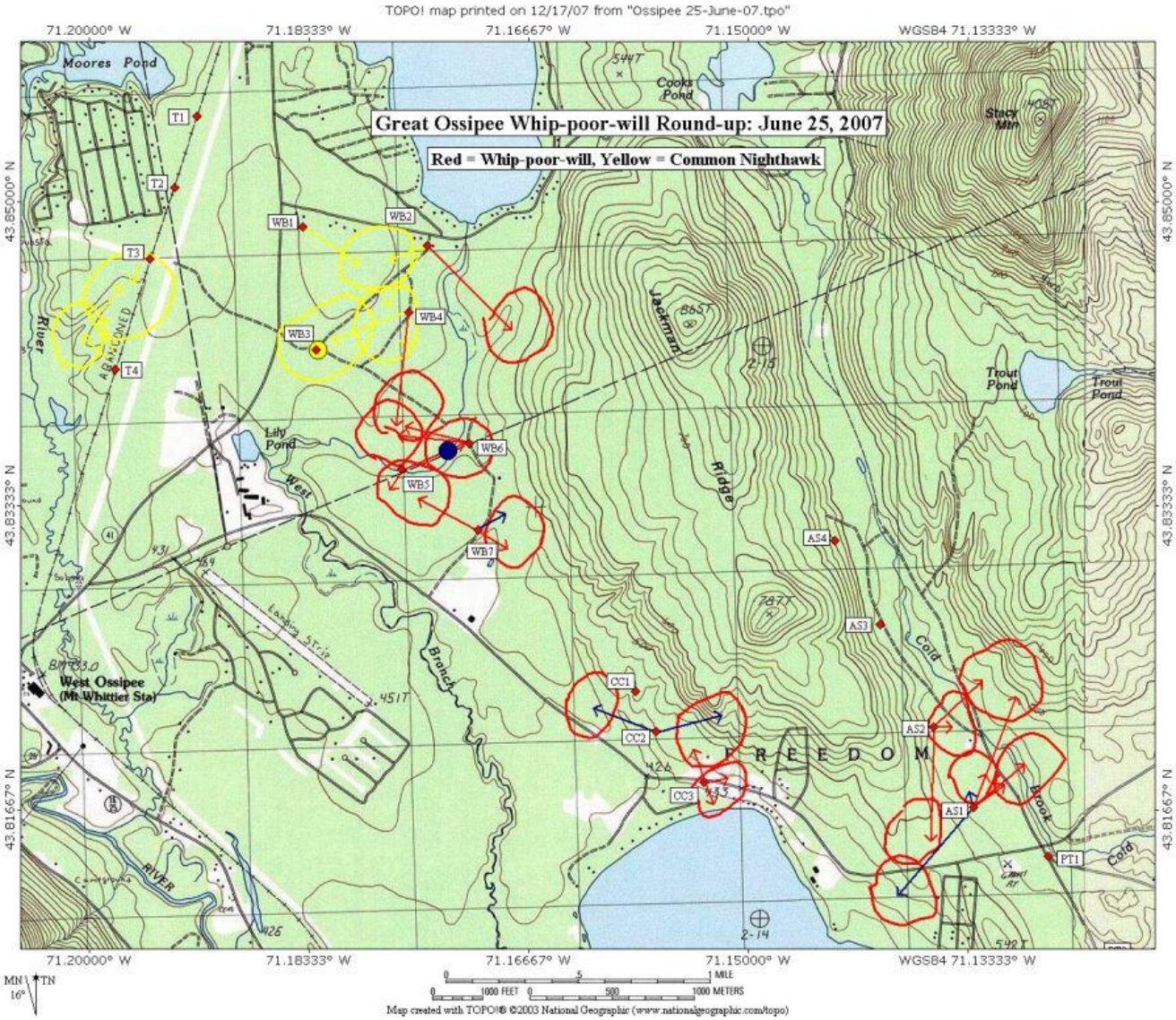

Figure 1. Rough map showing estimated Whip-poor-will and Common Nighthawk locations in the Ossipee Pine Barrens (NH) on June 25, 2007. Map is based on data collected by a team of observers as described in the text.