Wisconsin Nightjar Survey

2009 Annual Report

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SUMMARY

Wisconsin is home to two nightjar species, the Whip-poor-will and Common Nighthawk. Both are thought to be declining based on anecdotal accounts but existing bird monitoring programs do not adequately monitor their populations. In 2005, nocturnal surveys targeting these species were initiated in the Northeast. Wisconsin became the first Midwest state to join this effort when the Wisconsin Bird Conservation Initiative (WBCI) piloted a small number of survey routes in 2007. An intensive statewide survey coordinated by WBCI staff and made possible by numerous volunteer surveyors was conducted in 2008 and 2009. The survey's primary objectives are to determine population status, trends, habitat relationships, and conservation hotspots for nightjars on a state-level scale.

The Wisconsin Nightjar Survey is a roadside, citizen-based survey whose routes are identical to those of the federal Breeding Bird Survey and Western Great Lakes Owl Survey (WGLOS). These are well distributed through the state but randomly selected irrespective of habitat or other environmental features. Each route consists of ten stops spaced one mile apart. Observers record nightjars and owls (2009 only) detected for six minutes at each stop. Surveys are conducted once or twice between late May and early July after dark when the moon is at least 50% full and visible above the horizon.

In 2008, more than 70 volunteers conducted one replicate survey of 71 routes across the state between June 11 and June 26. Overall, they detected 169 Whip-poor-wills and seven Common Nighthawks, or 2.38 and 0.10 birds per route surveyed, respectively. Whip-poor-wills were detected on 23 of 71 routes (32%) and distributed heterogeneously across the state, with clustered distributions concentrated in sandy outwash plains such as the Northwest Sands, Northeast Sands, and Central Sand Plains. Common Nighthawks were detected on only six routes in various parts of the state.

In 2009, 67 volunteers conducted one or two replicate surveys of 72 routes statewide. All routes were surveyed once between May 31 and June 15, and 29 of these routes were surveyed a second time between June 29 and July 10. During the first survey period, observers detected a total of 167 Whip-poor-wills and 42 Common Nighthawks. For Whip-poor-wills, the 2.32 birds per route and detections on 24 of 72 routes (33%) were extremely similar to 2008, with concentrations again in "sandscapes" across the state. More Common Nighthawks were detected in 2009 but this likely included migrants; only four were detected during the second survey period in early July. Detections of Whip-poor-wills also decreased significantly in the second period. Observers also tallied 124 owls of six species during the first survey period. Detection rates were lower than the spring's WGLOS for all species except Barred Owl.

Overall, this survey appears to be effective for monitoring Whip-poor-wills but inadequate for Common Nighthawks as currently designed. Improvements will include stratification and intensification of the survey effort in sandy ecological landscapes and adaptation of design and protocol for Common Nighthawks, likely involving some focus on urban areas. Results thus far form the foundation for long-term trend monitoring and inform regional conservation planning efforts. These will play a larger role as other Midwest states such as Minnesota, Michigan, and Illinois join the survey effort in the near future.

BACKGROUND

Nightjars (*Family Caprimulgidae*) are cryptic, nocturnal, aerial insectivores whose populations, behaviors, and habitat needs are relatively poorly known (Poulin et al. 1996, Cink 2002). Like other nocturnal and secretive species, nightjars are inadequately monitored by existing bird monitoring programs, such as the federal Breeding Bird Survey (BBS), Christmas Bird Counts, and other focal surveys. However, limited evidence from the BBS (Sauer et al. 2008) and second-generation bird atlases (e.g., McGowan and Corwin 2008, Pennsylvania Breeding Bird Atlas 2009) coupled with ample anecdotal accounts suggest that many species have declined significantly in the past 40 years. Among these are Wisconsin's two nightjar species, the Whip-poor-will and Common Nighthawk. As a result, development of an effective nightjar monitoring program has become a priority among some bird conservation organizations, with hopes of quantifying population trends, better understanding ecology and potential causes for declines, and improving management and conservation approaches for this bird group.

Leadership toward a standardized monitoring program has largely stemmed from the northeastern U.S., particularly through work of the Northeast Coordinated Bird Monitoring Partnership (http://www.nebirdmonitor.org/) and New Hampshire Audubon. Localized survey efforts were initiated there in 2003 with expansion throughout New England in 2005 and to other parts of the Northeast in 2006 (Hunt 2008). During this time, the survey design and protocol were tested and modified, which led to the standard procedures followed in 2007 to present. However, as surveys continue and new data are gathered on detectability, calling activity, and other behaviors, these procedures may be further refined in the years ahead.

Wisconsin became the first Midwest state to join the survey effort in 2007. In response to a surging national movement toward more coordinated bird monitoring, the Wisconsin Bird Conservation Initiative (WBCI) began the process of identifying bird monitoring gaps in the state. Given the lack of adequate monitoring data, perceived population declines, and Whip-poor-will's status as a Species of Greatest Conservation Need, a nightjar survey was deemed a priority. Moreover, implementation of such a survey was facilitated by the program developed in the Northeast and a survey structure similar to the Western Great Lakes Owl Survey (Grosshuesch and Brady 2009) already being implemented here in Wisconsin.

The 2007 Wisconsin Nightjar Survey was a pilot effort consisting of a small number of survey routes meant to explore the feasibility of a statewide survey. Following its success, WBCI coordinated an expanded and more intensive statewide effort in 2008, largely made possible by the generous contributions of many volunteer bird surveyors. This effort continued in 2009 and is intended to be implemented annually in the years ahead. The long-term objectives of the Wisconsin Nightjar Survey are to:

1. *Quantify state-level population status and trends of Whip-poor-wills and Common Nighthawks* – how many are out there, are they declining, by how much;

2. *Determine distribution, habitat associations, and conservation hotspots* – what landscapes and areas of the state are critical for these species; and

3. *Assess nightjar response to habitat management* – how do current management activities affect these species and what can we do to more positively impact them.

METHODS

The Wisconsin Nightjar Survey follows a nationally standardized protocol that was largely developed in the northeastern U.S. through the Northeast Coordinated Bird Monitoring Partnership and New Hampshire Audubon. This allows state-level results to be compared across states and pooled for regional analyses among various land units. For details on this protocol, see http://wiatri.net/projects/birdroutes/Docs/NJprotocol.pdf.

Protocol

Survey routes consist of ten stops along a road, each spaced one mile apart as measured by a vehicle odometer. Volunteer observers passively listen for six minutes at each stop (i.e. no broadcast/playback is used) and record all nightjars and owls detected (owls in 2009 only). Importantly, each individual target bird is recorded on a line-by-line basis and tracked separately during each one minute period (Appendix A) to allow for estimates of detectability, which is a measure of an observer's chance of actually detecting a bird when it is present. For example, a detection history of "1,1,1,0,0,1" represents a bird heard in the first three minutes, not heard the next two minutes, and heard again in the sixth minute. Estimating detectability and understanding factors affecting its variability are important components to long-term bird monitoring programs, in part by ensuring that observed changes reflect true changes in population parameters (Pollock et al. 2002).

In addition, observers also record whether a given bird is a repeat from a previous point (to avoid double-counting on the route level) and in which general direction the bird is detected (to help observers track individuals and possibly contribute to habitat analyses). At each stop, potentially important covariates are tallied, including categories for wind speed, sky cover, ambient noise, and number of passing vehicles. All routes are surveyed by a single primary observer on nights with minimal wind (< 7 mph) and no precipitation. For a sample of a completed data sheet, see Appendix A.

Survey Timing

The Wisconsin Nightjar Survey is a summer/breeding season survey of nocturnal birds. Thus all surveys are conducted after dark between late May and early July. The exact survey window is approximately two weeks in length and changes annually depending on the moon phase. *All surveys are required to occur during periods of high lunar illumination, defined as the moon at least half full, not obscured by clouds, and completely above the horizon.* This requirement is based on previous research by Wilson and Watts (2006) that demonstrated Whip-poor-will calling activity increased significantly under bright moon conditions.

All routes are surveyed once during the primary survey window and each survey takes approximately 90-120 minutes to complete. The primary survey period in 2008 was June 11-

June 26 and shifted to May 30 – June 15 in 2009 based on the lunar cycle. In 2009 observers were also asked to conduct a second replicate survey of their routes, if possible, during a secondary window from June 29 – July 10 to examine phenology of calling activity and subsequent changes in detectability.

Route Selection

Routes for the Wisconsin Nightjar Survey are identical to those of the Western Great Lakes Owl Survey and represent the first nine miles of each federal Breeding Bird Survey route. There are 92 routes across the state (Figure 1), providing good spatial coverage of various landscapes and habitats. Importantly, these routes are randomly selected (i.e., randomly selected starting points and directions) and not habitat-based, although this survey design may be modified in the future (see Discussion). The exact number and locations of routes surveyed each year depend on which routes are chosen by interested volunteers.

RESULTS

Year One - 2008

2008 marked the first full year of the Wisconsin Nightjar Survey. More than 70 volunteers surveyed 71 of the 92 available routes under appropriate lunar and weather conditions between June 11 and 26. Observers recorded a total of 169 Whip-poor-wills and seven Common Nighthawks, or 2.38 Whip-poor-wills and 0.10 Common Nighthawks per route surveyed (Table 1). Whip-poor-wills were detected on 23 of 71 routes surveyed (32%) while Common Nighthawks were detected on only six routes (8%). Whip-poor-wills demonstrated clustered distributions (7.35 birds per route with detection) and were concentrated in sandy outwash plains across the state (Figure 2). Three routes in Burnett, Marinette, and Jackson Counties featured counts of more than 25 Whip-poor-wills (Table 1).

Year Two - 2009

In 2009, 67 volunteers surveyed 72 of the 92 available routes during the primary survey period between May 31 and June 15. They detected 167 Whip-poor-wills (2.32 per route surveyed) on 24 routes, which was remarkably similar to 2008 (Table 1). Whip-poor-wills were again clustered (6.96 birds per route with detection) in the sand-dominated landscapes of the state (Figure 3). Observers also recorded 42 Common Nighthawks on 15 routes, or 0.58 per route surveyed, which was a large increase from 2008. However, the 2009 survey period was earlier and likely included the migration period for this late-arriving species. For example, a rural southeastern Wisconsin route in Waukesha County accounted for 20 individuals on its single June 6 survey. Last but not least, two possible Chuck-will's-widows, a southern nightjar species that is a vagrant to Wisconsin, reported on July 5 on Route #26 (Crandon) in Forest County were intriguing and deserve future attention.

Twenty-nine routes were also surveyed once during the second survey period between June 29 and July 10. Detections included 72 Whip-poor-wills (2.48 per route surveyed) and four

Common Nighthawks (0.14 per route surveyed; Table 1). The number of Whip-poor-wills detected during this second period was significantly lower than the earlier period (paired t-test, $p = 0.017$; Table 2). Eleven routes showed a decrease from the early to late survey period, while only two routes showed an increase. Sixteen routes detected no Whip-poor-wills during either survey period. Common Nighthawks also decreased greatly from 42 to four detections (the latter on only two routes), probably because of the migration effect mentioned above.

During the first survey period, observers recorded 124 owls of six species on 43 of 72 routes (Table 3), or 1.72 owls per route surveyed. The top three species detected were Barred Owl (85 total, 1.18 per route), Great Horned Owl (21, 0.29), and Eastern Screech-Owl (8, 0.11). Most unusual was a Short-eared Owl detected on Route #35 (Cadott) in Chippewa County. Also of note were two possible Barn Owls detected in Fond du Lac County. Detections dropped off greatly in the secondary survey period with only 30 owls of three species detected on 17 of 29 surveyed routes (Table 3).

DISCUSSION

Whip-poor-will. With similar effort across years, the Wisconsin Nightjar Survey recorded 2.38 and 2.32 Whip-poor-wills per route surveyed in 2008 and 2009, respectively. These detection rates are substantially higher than those recorded by any other survey efforts to date and will greatly improve our ability to monitor this nocturnal species. For example, the federal Breeding Bird Survey – previously our only long-term, large-scale data set for Whip-poor-wills – averages 0.11 Whip-poor-wills per route in Wisconsin and has never exceeded 0.15 birds per route since the survey's inception in 1966 (Sauer et al. 2008).

Perhaps most noteworthy, however, is the similarity of results for Whip-poor-wills in both survey years. The number of birds detected, number of birds per route, number of routes with birds, and locations of routes with birds were extremely similar during the primary survey periods. Although more years of data collection are needed, the consistency of the data thus far is promising for effective long-term monitoring. Low variability among years will provide more precise population estimates and more powerful trend analyses, allowing population changes to be detected in shorter time, of smaller magnitude, or with less survey effort.

Whip-poor-wills were not detected in either year on a high proportion of survey routes (~67%) but where found they tended to be prevalent with approximately seven birds per route on routes with at least one bird detected. In both years, occupancy and relative abundance was highest in ecological landscapes characterized by sandy glacial outwash plains. These landscapes are dominated by the species' preferred habitats, which include dry upland forests such as oak and pine with little underbrush and interspersed with clearings used for foraging (Kreitinger and Paulios 2007). However, the lack of Whip-poor-wills elsewhere in the survey is somewhat alarming given the historical occurrence of the species in these areas, although clearly the randomized survey routes did not sample some of the birds present there.

These distributional patterns are important for identifying landscapes that are important to management and conservation of Whip-poor-wills in Wisconsin. Furthermore, they suggest a

potential modification in design to make the survey more effective. Rather than a purely random selection of routes, more survey effort should be focused in the landscapes identified as hosting disproportionately high numbers of Whip-poor-wills in the state. The other landscapes should not be ignored but the survey effort can be reduced there by surveying fewer routes and/or with less frequency (e.g., not annually). WBCI plans to collect one more year of data with the current design in 2010 and then apply a stratified random design with additional routes in favored landscapes for the years ahead.

Common Nighthawk. Despite the survey's apparent success with Whip-poor-wills, the story is different for Common Nighthawks. Detection rates for this species were only 0.10 and 0.58 birds per route for the primary survey periods in each year. The latter number is also inflated by a high number of birds that were likely migrants during the early part of June. During the second survey period in 2009, detections decreased to just 0.14 birds per route. Consequently, little can be said about Common Nighthawks in Wisconsin based on the first two years of the survey. The species is probably not as rare here as results suggest but the route selection process and/or survey protocol clearly are missing birds that are present. The stratification procedure described above that focuses more intensive survey effort in "sandscapes" of Wisconsin may help, as these areas also host the dry, open barrens this species favors for breeding in the state (Rasmussen 2006). However, a significant number of Common Nighthawks breed in urban settings, using flat rooftops for nesting and vast airspaces above for foraging. Hence, monitoring this species may also require a special stratum (survey effort) in towns and cities throughout the state. Lastly, it should be noted that the problems above are not limited to Wisconsin. The Northeast Nightjar Survey has experienced similarly low detection rates and raised general concern for how to best monitor this species (Hunt 2008).

Early vs. Late Survey Period. Detections for both Whip-poor-wills and Common Nighthawks decreased significantly between the first (early June) and second (early July) survey periods in 2009. For Common Nighthawks, much of this is likely explained by the migration issue, as discussed earlier. For Whip-poor-wills, this was not surprising given that calling activity might be expected to be greatest during territory establishment and mate attraction early in the nesting cycle, which corresponds to late May and early June in Wisconsin (Rasmussen 2006). Moreover, similar declines in calling activity from June to July have been detected in the Northeast Nightjar Survey (Hunt 2006). The implications are not dramatic, however, because if interannual variability in detection rates remains low as in 2008 – 2009, the survey will still have relatively high power without need for a second replicate survey.

Owls. In 2009, observers also recorded owls to facilitate comparisons in detections to the Western Great Lakes Owl Survey, a spring owl survey that uses the same routes and very similar protocol (Grosshuesch and Brady 2009). For the primary survey period, the nightjar survey had lower detection rates for Great Horned and N. Saw-whet Owls, and results for the former were further inflated and confounded by detections of screeching juveniles. E. Screech and Long-eared Owls showed similar but very low numbers of detections in both surveys. Most notable was a higher number of detections for Barred Owls during the nightjar survey, with 1.18 per route compared to the 0.79 per route during the spring survey. It is possible that Barred Owls are less vocal during their earlier spring breeding period and call more frequently in early summer

after their young have fledged, but this needs more work. Nonetheless, the Wisconsin Nightjar Survey may provide data to complement findings of the spring survey for this species.

The Bigger Picture. Data from the Wisconsin Nightjar Survey does not stand alone. For example, when combined with data from the Northeast, analyses revealed Whip-poor-wills fall into two "calling type" categories (Hunt 2008). The first group (about half of all birds) tends to call throughout much of the six-minute survey period and has high detection probability near 75%. The other group may only be heard once or twice at a stop and has low detection probability around 18%. This pattern may have some biological basis, such as territory or mating status, that could profoundly influence monitoring results and thus deserves further investigation.

On a regional level, nightjar monitoring is gaining steam amidst Midwest partners, largely through a newly formed Midwest Nocturnal Bird Working Group spearheaded by regional coordinated bird monitoring coordinator, Katie Koch (USFWS-Marquette). The Illinois Natural History Museum has piloted nightjar surveys in that state since 2008 (T. Beveroth, pers. comm.). To the west, Minnesota DNR and Hawk Ridge Bird Observatory (HRBO) hope to initiate nightjar surveys in 2010 (HRBO, pers. comm.). To the east, the Michigan Bird Conservation Initiative plans to pilot nightjar surveys in the next year or two as well (M. Monfils, pers. comm.). Lastly, the Center for Conservation Biology at the College of William & Mary is conducting a parallel effort to bring nightjar monitoring to all parts of the country through its recently established U.S. Nightjar Survey Network (http://www.ccb-wm.org/nightjars.htm).

The Future. Upcoming plans for the Wisconsin Nightjar Survey are to:

1. Collect another year of data based on current survey design, and then stratify by ecological landscapes to add routes in areas hosting concentrations of Whip-poor-wills.
2. Conduct a power analysis based on 2008 – 2009 data to determine the number of routes needed to adequately monitor Whip-poor-wills.
3. Continue to contribute data for national analyses of calling activity, detectability, and other factors affecting nightjar monitoring.
4. Adapt the survey design and protocol to effectively monitor Common Nighthawks.
5. Facilitate expansion of the survey to adjacent states, which will allow for larger scale monitoring across the region.
6. Update conservation planning efforts for Whip-poor-wills, a Species of Greatest Conservation Need in Wisconsin.
7. Begin work on habitat and management questions for both nightjar species.

ACKNOWLEDGMENTS

The Wisconsin Nightjar Survey stems largely from work of the Wisconsin Bird Conservation Initiative's Research and Monitoring Committee and builds on the foundation established by the Northeast Coordinated Bird Monitoring Partnership. In particular, special thanks go to Pam Hunt of New Hampshire Audubon for her tireless devotion to nightjar conservation and inspiration that brought this survey to Wisconsin. Jason Riddle, formely of North Carolina State

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For more information on the Wisconsin Nightjar Survey, please see WBCI's bird monitoring website at http://wiatri.net/projects/birdroutes/index.htm.

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Table 1. Summary of results for the Wisconsin Nightjar Survey, 2008 – 2009. No surveys were conducted during the secondary survey period in 2008. See text for survey dates and Figure 1 for locations associated with route numbers.

	WHIP-POOR-WILL			COMMON NIGHTHAWK		
	2008-1	**2009-1**	**2009-2**	**2008-1**	**2009-1**	**2009-2**
# routes surveyed	71	72	29	71	72	29
# birds detected	169	167	72	7	42	4
# birds per route	2.38	2.32	2.48	0.10	0.58	0.14
# routes w/ target	23	24	9	6	15	2
# birds per route w/ target	7.35	6.96	8.00	1.17	2.80	2.00
# routes = 0 birds	48	48	20	65	57	27
# routes = 1-5 birds	16	12	2	6	14	2
# routes = 6-10 birds	2	8	5	0	0	0
# routes > 10 birds	5	4	2	0	1	0
Top 3 routes (# birds)	#11 (33) #29 (26) #137 (26)	#11 (25) #137 (22) #28, 43 (15)	#28 (13) #137 (13) #43 (10)	#33 (2)	#69 (20) #26 (4) #301 (4)	#11 (3) #303 (1)

Table 2. Comparison of Whip-poor-will detections on 29 routes surveyed in both the early and late survey periods in 2009.

ROUTE #	ROUTE NAME	EARLY PERIOD	LATE PERIOD	DIFF[a]
11	Union	25	8	-17
137	Pigeon Creek	22	13	-9
304	Bashaw	7	0	-7
22	Irma	5	0	-5
43	Saxeville	15	10	-5
32	Cochrane	4	0	-4
23	McNaughton	8	5	-3
38	Mather	10	7	-3
28	Amberg	15	13	-2
29	Wausaukee	9	8	-1
307	Rhinelander	1	0	-1
16 routes[b]	---	0	0	0
26	Crandon	0	1	1
303	Conover	4	7	3
TOTAL	---	125	72	-53
MEAN	---	4.3	2.5	-1.8

[a] Difference in detections between the early and late survey periods

[b] Sixteen routes detected no Whip-poor-wills in either survey period

Table 3. Owls detected during each survey period of the 2009 Wisconsin Nightjar Survey, with comparison to 2009 results of the Western Great Lakes Owl Survey (WGLOS).

	EARLY PERIOD			LATE PERIOD			WGLOS		
OWL SPECIES	**Total**[a]	**Mean**[b]	**Routes**[c]	**Total**	**Mean**	**Routes**	**Total**	**Mean**	**Routes**
Barred	85	1.18	32	19	0.66	12	67	0.79	34
Great Horned	21	0.29	15	10	0.34	8	55	0.65	30
N. Saw-whet	3	0.04	3	1	0.03	1	14	0.17	10
E. Screech	8	0.11	6	0	0.00	0	10	0.12	4
Long-eared	2	0.03	2	0	0.00	0	3	0.04	3
Short-eared	1	0.01	1	0	0.00	0	0	0.00	0
Barn	0[d]	0.00	0	0	0.00	0	0	0.00	0
Unknown	4	0.06	2	0	0.00	0	1	0.01	1
TOTAL	124	1.72	43	30	1.03	17	150	1.77	56

[a] Number of owls detected on all survey routes

[b] Average number of owls detected per route surveyed

[c] Number of routes on which each species was detected

[d] Two individuals possible on one route (see text)

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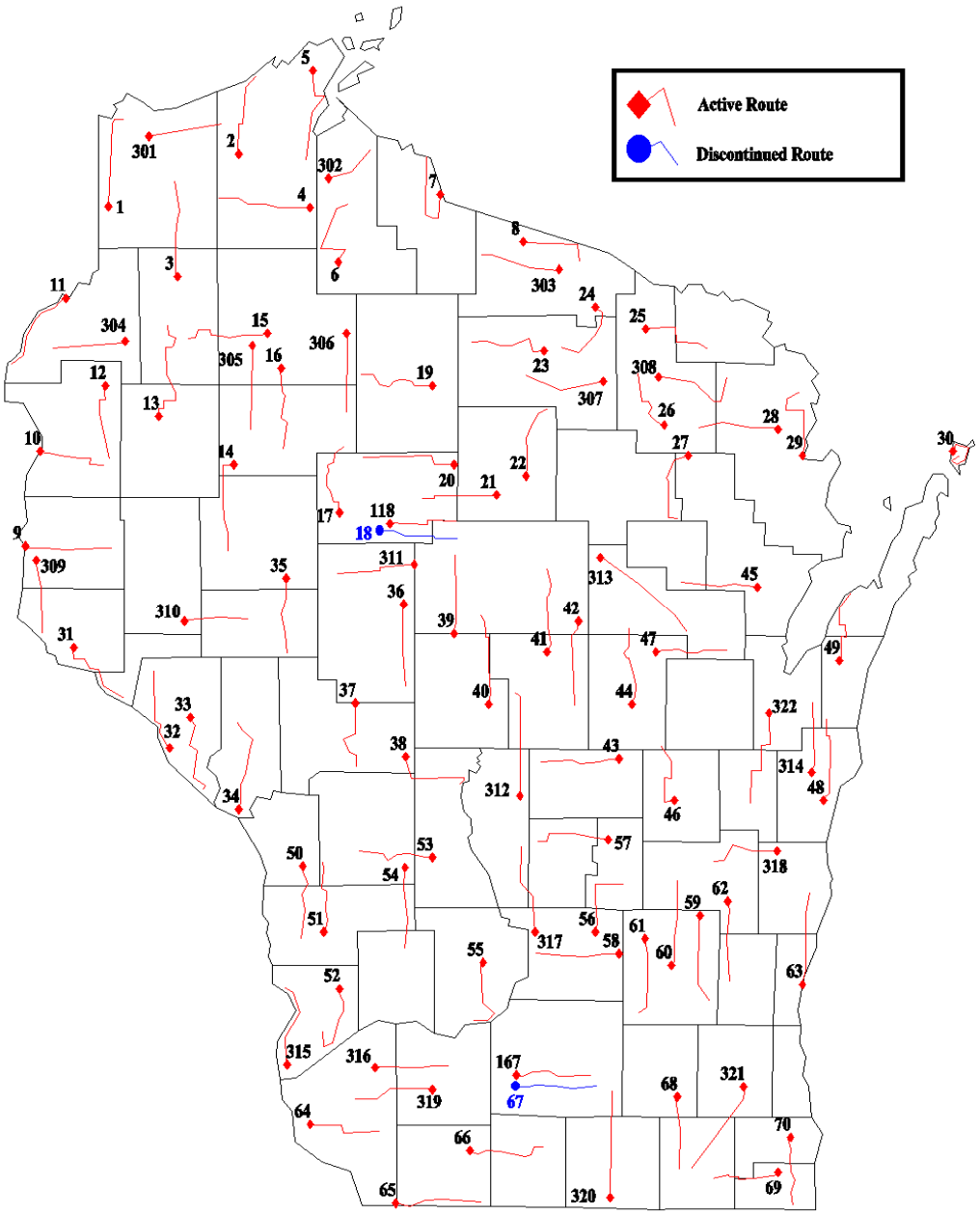
BREEDING BIRD SURVEY ROUTE LOCATIONS



NOTE: Survey routes are not drawn to scale and are intended only to provide approximate route locations (3/96,klp).

Figure 1. Map of the 92 federal Breeding Bird Survey (BBS) routes also used for the Wisconsin Nightjar Survey. Note that the nightjar routes cover only the first nine miles of the 25-mile BBS routes shown.

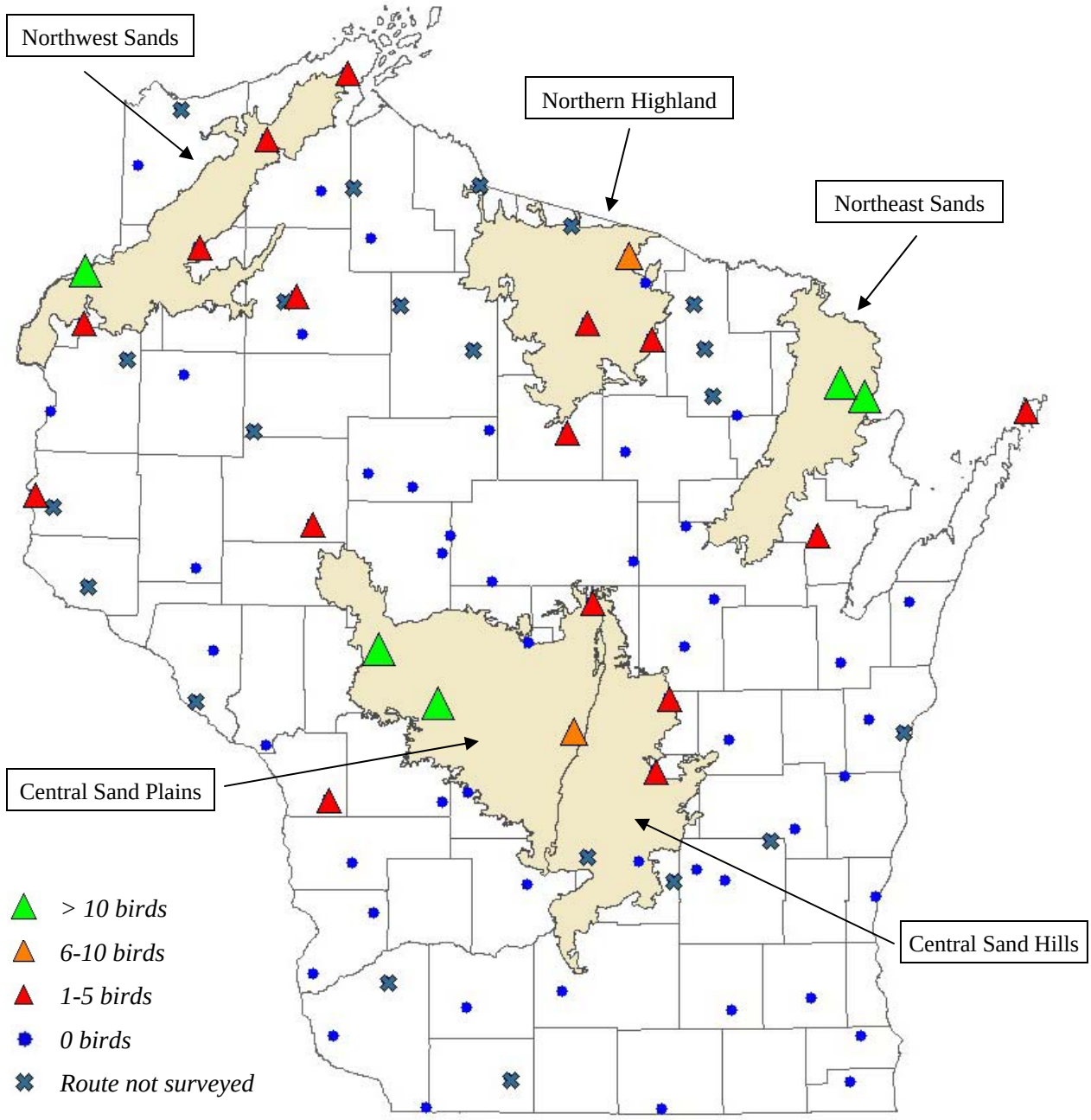


Figure 2. Distribution of Whip-poor-wills during the **2008** Wisconsin Nightjar Survey. Symbol markers correspond to route starting points. For more on ecological landscapes of Wisconsin see http://dnr.wi.gov/landscapes/.

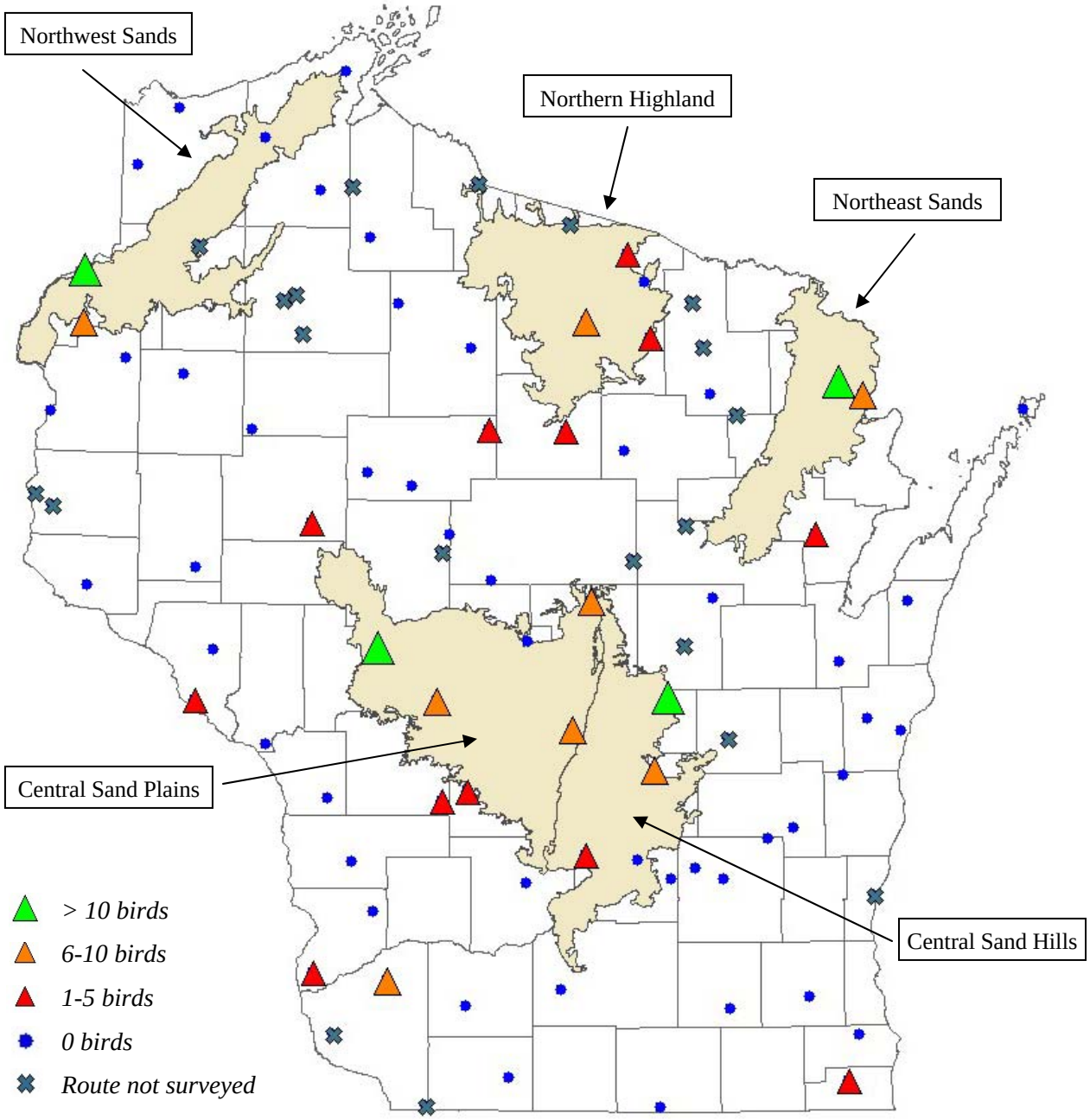


Figure 3. Distribution of Whip-poor-wills during the first survey period of the **2009** Wisconsin Nightjar Survey. Symbol markers correspond to route starting points. As in 2008, Whip-poor-wills were concentrated in dry, sandy landscapes across the state.

APPENDIX A. Sample of a completed data sheet for the Wisconsin Nightjar Survey. Two Barred Owls and five different Whip-poor-wills were detected in this example.

Wisconsin Nightjar Survey

Route # and Name:	22 - IRMO
Observer:	Fred Bloedorn
Date:	6/3/09
Start time: 940 PM	**End time:** 1130PM

Weather Data at Points:

Point:	1	2	3	4	5	6	7	8	9	10
Wind	1	1	1	0	0	0	0	0	0	0
Sky	1	1	0	0	0	0	0	0	0	0
Noise	1	1	1	1	0	0	0	0	0	0
Cars	0	1	3	3	0	0	0	0	0	2

Please remember that surveys should not be conducted under cloudy or windy conditions, or when there is persistent rain. If such conditions manifest after a route is started, and persist for more than three points, it is advisable to abort the route and attempt it again under better conditions.

Wind Codes	Sky Codes	Noise Codes
0 = none	0 = clear	0 = none
1 = slight	1 = m clear	1 = slight
2 = moderate	2 = m cloudy	2 = medium
3 = strong	3 = cloudy	3 = excessive

Pt.	Species	1	2	3	4	5	6	Rep?	Dir.
1	BDOW	0	0	0	1	0	0		S
2	BDOW	0	0	1	0	0	0		N
3	NONE	0	0	0	0	0	0		
4	NONE	0	0	0	0	0	0		
5	NONE	0	0	0	0	0	0		
6	NONE	0	0	0	0	0	0		
7	NONE	0	0	0	0	0	0		
8	WPWI	0	0	1	1	1	1		N
8	WPWI	0	0	0	0	0	1		SW
9	WPWI	1	1	1	1	1	1		E
9	WPWI	0	0	0	1	0	0	Yes	S
10	WPWI	1	1	1	1	1	1	yes	SW
10	WPWI	0	1	1	1	1	1		E
10	WPWI	0	0	0	1	1	1		N

Pt.	Species	1	2	3	4	5	6	Rep?	Dir.

Comments (use back of form if necessary):
Auto noise from Hwy 51, consistent throughout did not affect survey. Frog calling sites 1-3 only occasional after that. Nice route convenient pulloffs. Wolf seen just north while checking out route during daylight (reported to DNR). Sites 5-7 silent.

Return Form to:
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