USE OF MANAGED FOREST WILDLIFE OPENINGS BY AMERICAN WOODCOCK

Lindsey Shartell

SUMMARY OF FINDINGS

American woodcock (*Scolopax minor*) were surveyed at permanently managed forest wildlife openings in Minnesota. Singing ground surveys conducted from mid-April through May during 2016 and 2017 indicated that 61% of openings were used by singing male woodcock. Roosting ground surveys conducted from June through August 2016 indicated that 23% of openings had confirmed roosting and 71% of openings had woodcock activity in or over the opening. In addition to woodcock surveys, vegetation data along transects were collected within openings to assess the relationship of vegetation metrics to woodcock use and management of habitat in openings. Openings used during singing ground surveys had a higher proportion of grass and lower proportions of herbaceous plants and trees. Across all openings, shrubs and trees were uncommon. Years since mowing did not seem to be a driver of woodcock use, however most openings were treated within the past 4 years. Analysis and results are preliminary. An additional year of singing ground and roosting ground surveys will be conducted at openings in 2018. The information gained from this study will guide wildlife managers in creating optimal singing and roosting habitat for woodcock in forest-dominated areas.

BACKGROUND

The American woodcock is a popular migratory game bird and a Species of Greatest Conservation Need in Minnesota (MNDNR 2015). In 2015, Minnesota had an estimated 13,500 active woodcock hunters harvesting 25,600 woodcock, ranking Minnesota third highest in the country for both woodcock hunter and harvest numbers (Seamans and Rau 2016). Annual woodcock surveys have indicated a long-term (1968-2016) decline in singing male numbers across the full breeding range (Seamans and Rau 2016). These declines have been attributed to the loss of open and early successional forest and shrub habitat due to succession, lack of disturbance, and development (Dessecker and McAuley 2001).

Woodcock require a variety of habitat components including dense young forests or shrublands and open singing and roosting grounds (Wildlife Management Institute 2009). Woodcock move frequently between these habitat types, often being found in forests during the day and open sites at night (Sheldon 1967). In the spring, male woodcock use openings as breeding sites, called singing grounds, where they perform their courtship ritual. Females nest and raise broods in the forest surrounding these openings (Sheldon 1967). Both nest and brood locations have been found to be associated with short distances to openings or forest edges (Gregg and Hale 1977, Daly 2014). In the summer, woodcock make evening crepuscular flights to open habitats to roost. Open roosting grounds provide the benefit of reduced predation risk (Masse et al. 2013). Historically, disturbance by fire, wind, Native American activities, flooding, and beavers created openings and early successional habitat for woodcock (DeGraaf and Yamasaki 2003). Many of these disturbances that created and maintained open areas are now prevented.

Pastures, fields, agricultural sites, and recent clearcuts (Hale and Gregg 1978, Long and Locher 2013) can all serve as open habitat for woodcock, but in areas dominated by forest cover, managed forest wildlife openings are often used to provide this habitat component.

The secretive nature and cryptic coloration of the woodcock makes it difficult to estimate population size and management effects. There have been past studies assessing the use of openings by woodcock, but most have been focused on wintering grounds (for example Glasgow1958, Stribling and Doerr 1985, Berdeen and Krementz 1998). Fewer studies have explored woodcock use of summer roosting grounds in the northern part of the range (though see Sheldon 1961, Sepik and Derleth 1993, Masse et al. 2013), and even fewer have incorporated habitat characteristics and management into studies of use. Researchers have also studied the use of aspen clearcuts in Wisconsin and young pine plantations in Arkansas by woodcock in spring and summer, finding that woodcock do utilize these areas (Hale and Gregg 1978, Long and Locher 2013). Additional research comparing the use and characteristics of temporary openings such as clearcut harvests to permanent openings would improve our understanding and provide context for management in Minnesota.

The Upper Great Lakes Woodcock and Young Forest Initiative published best management practices for woodcock in 2009. Their recommendations call for establishing eight singing grounds at least 0.5 acres in size and one roosting field at least 5 acres in size per 100 acres of land (Wildlife Management Institute 2009). Open sites should cover not more than 20 percent of the area, and the remaining land should consist of abundant feeding, nesting, and brood-rearing habitat (Wildlife Management Institute 2009). The MN DNR maintains permanent forest wildlife openings to provide singing and roosting grounds for woodcock, as well as habitat for a variety of other game and non-game species such as deer and bear. These openings require regular mechanical treatment to prevent succession. Wildlife managers would like to improve their management of forest openings to maximize benefit, but do not know the optimal frequency of treatment. In addition, not all managed openings are used by woodcock. Understanding the factors that influence use, such as opening size and configuration, vegetation composition and structure, and surrounding landscape characteristics would improve the creation of forest openings and focus management on those openings expected to provide the greatest benefit. This information will allow for the development of better management practices for land managers and landowners interested in providing wildlife openings for woodcock and other wildlife.

OBJECTIVES

1. Assess woodcock use of managed forest wildlife openings with differing management history (years since mowing).
2. Relate opening size and configuration, vegetation composition and height, and surrounding landscape to woodcock use and management history.
3. Develop recommendations to improve the current management of forest wildlife openings.

METHODS

Singing ground surveys for American woodcock were conducted from mid-April through May 2016 in forest openings within the Grand Rapids, Cloquet, and Red Lake work areas and from mid-April through May 2017 in the Grand Rapids work area. Surveys followed Singing Ground Survey (SGS) protocol where possible (Seamans and Rau 2016). Surveys generally took place 15 to 60 minutes after sunset, when temperature was above 40 F, and there was no heavy precipitation or strong wind. Openings in close proximity were grouped to allow surveying multiple openings per evening. At each opening observers recorded their GPS location (UTM coordinates), time of sunset, cloud cover, temperature, wind speed, precipitation, and any noise disturbance present at the time of the survey. Observers listened for and recorded the number

of different woodcock heard peenting or observed displaying (heard and/or seen) within and over the opening during a listening period of at least 5 minutes. Observers also recorded other observations of woodcock (not within the opening) along with time and approximate location (direction and distance) of the woodcock.

Roosting ground surveys were conducted June through August 2016 using crepuscular flight surveys and spotlighting (Glasgow 1958, Berdeen and Krementz 1998). Roosting surveys were not conducted in 2017 due to funding constraints. The observer was positioned on the edge of the opening and recorded the number of woodcock observed flying into the opening, over the opening, or heard (when not seen). Surveys were conducted from 20 minutes before sunset to 40 minutes after sunset (a one hour period). Observers recorded their GPS location (UTM coordinates), time of sunset, cloud cover, temperature, wind speed, precipitation, and any noise disturbance present at the time of the survey. After the survey window, observers systematically walked openings using spotlights and recorded the number of woodcock flushed or spotted.

Vegetation characteristics were sampled using the point intersect method (Levy and Madden 1933). Two transects were sampled per opening, one placed across the widest part of the opening from edge to edge, and the second placed perpendicular to the first. Observers recorded vegetation type (i.e., grass, herbaceous, woody, shrub, tree, or bare ground) and maximum height for each type every 1.0 m along the transect. Methods in 2017 were slightly altered from the pilot study in 2016 to improve repeatability and efficiency, while still producing the same metrics for the opening as a whole (proportion and average height for each type of cover). Observers also described the habitat across the entire opening (e.g., number of trees, distribution of trees, percent shrub cover) and the surrounding habitat by type (e.g. upland forest, lowland forest, upland shrub), tree or shrub species, and coarse age class (young, middle, old). Presence of tansy, or other aggressive invasive species were recorded as approximate percent cover in 10% increments across the opening from a visual assessment. Presence of a mowed or packed trail within the opening was noted, as these may provide persistent areas of short vegetation regardless of years since mowing. To obtain an accurate estimate of opening size and shape, the edge of the opening was walked using a GPS unit to digitize the boundary of the opening.

To assess the frequency of use of openings in this study by other wildlife the presence of scat encountered within 0.5 m on either side of the transect was noted. Distance along the transect and species was recorded for each encounter.

Statistical analyses were conducted in the statistical package R (R Core Team 2014). Averages are reported with standard errors. A chi-square test was used to compare use from 2016 to 2017. Student's t-tests were used to compare variables at openings with and without woodcock use. Linear regression was used to relate vegetation variables to years since mowing. A significance level of $P < 0.05$ was used for all tests. Opening size (ac) and perimeter (m) were highly skewed toward low values, while the ratio of perimeter to area was more normally distributed and thus was used in analysis. Future work will include analysis of metrics representing the surrounding landscape, such as forest type and age, proportion of desirable habitat in area, and number of openings in area.

PRELIMINARY RESULTS AND DISCUSSION

Singing Ground Surveys

In the 2016 pilot project, singing ground surveys were conducted at 94 openings, with singing males observed at 55 openings (59%). The majority of openings with woodcock use (42 of 55) had only one male present, 10 openings had two males, and 3 openings had three males. In

2017, singing ground surveys were conducted at 64 openings, with males observed at 41 openings (64%). At 33 openings one male was observed and 8 openings had two males present. Of those openings surveyed in both 2016 and 2017 (n=51), 24 openings (47%) had woodcock present in both years. Woodcock use (presence or absence) in 2016 and 2017 was significantly related, with those openings used by woodcock in 2016 being more likely to be used in 2017 ($\chi^2 = 11.57$, $P < 0.01$). Use was not found to be related to date ($P = 0.32$), cloud cover ($P = 0.66$), temperature ($P = 0.52$), or wind speed ($P = 0.45$), and this was likely due to the restrictions placed on conditions for survey.

Openings in 2016 included some forest harvest sites, openings ranged in size from 0.4 to 16.3 ac, and forest harvest sites ranged from 3.5 to 66.3 ac. For all sites, the average size in 2016 was 5.1 ± 0.5 ac. Openings in 2017 did not include forest harvest sites, and ranged in size from 0.5 to 6.4 ac with an average size of 1.8 ± 0.2 ac. Openings used by woodcock had a significantly smaller perimeter to area ratio (i.e. shorter perimeter and larger area, $P < 0.01$).

During singing ground surveys from 2016 and 2017, the proportion of cover in 3 of 6 classes was significantly related to woodcock use. Openings used by woodcock had a significantly higher proportion of grass ($P < 0.01$) and lower proportions of herbaceous plants ($P < 0.05$) and trees ($P < 0.05$). Most openings were dominated by grasses with few shrubs and trees. It was noted anecdotally in 2016 that sites heavily invaded by common tansy (*Tanacetum vulgare*), an exotic invasive plant, tended to have no woodcock present. In 2017 presence of tansy and other invasive species was recorded; however, few sites had invasive plants dominating the opening, restricting analysis. Vegetation height in each age class was analyzed for 2017 data only, but was not found to be significantly related to woodcock use.

Number of years since mowing was not significantly related to woodcock use ($P = 0.48$). Proportion of woody cover ($P = 0.02$) and tree cover ($P < 0.01$) were significantly related to years since mowing, with both increasing with increasing years since mowing. Height of grass ($P = 0.03$), herbaceous ($P < 0.01$), woody ($P < 0.01$), and shrub ($P = 0.02$) vegetation was significantly related to years since mowing, with height increasing with increasing years since mowing for all. Thus, mowing had an effect on the vegetation within openings, but may not be a strong driver of woodcock use within established openings already free of shrubs and trees. The average cover of shrubs (12%) and trees (3%) was low across all openings. Future analysis will focus on other potential drivers of woodcock use such as the surrounding landscape composition and age, and the availability of other open areas.

Roosting Ground Surveys

Roosting ground surveys were conducted at 65 openings in 2016, but were not conducted in 2017. Roosting woodcock were spotlighted and flushed at 15 openings (23%), and woodcock were observed flying, landing in, or flushing from 46 openings (71%). Both flight and spotlighting surveys appear to provide useful information on woodcock use. Roosting surveys were not repeated due to time limits and sample size, but other research has found that the frequency of roosting field use by individual woodcock varies by month and by age and sex (Sepik and Derleth 1993). Sepik and Derleth (1993) found the highest frequencies of roosting field use in June and July. However, there was no significant relationship found between date and the number of woodcock observed at roosting openings in this study in which surveys were conducted from June through August. Roosting surveys will be conducted at openings in 2018 to further assess the importance of openings, and their management, for roosting woodcock.

Use of Openings by Other Wildlife

Other species of wildlife also benefit from the management of forest wildlife openings. In 2016, scats from bear, deer, fox, goose, porcupine, rabbit, ruffed grouse, and wolf were observed

along vegetation transects in forest wildlife openings. In 2017, scats from bear, coyote, deer, moose, rabbit, and ruffed grouse were observed, as well as a woodcock nest and mallard nest Analysis of management effect on wildlife use will be completed in the future.

ACKNOWLEDGEMENTS

This project was made possible thanks to the dedicated fieldwork of Andrew Erickson and Nicole Benson and the cooperation of wildlife staff, especially Jeff Hines, Bruce Anderson, Charlie Tucker, and Ted Dick. Guidance on statistical design and analysis was provided by John Giudice and Véronique St. Louis. This study was funded in part through the Wildlife Restoration (Pittman-Robertson) Program.

LITERATURE CITED

Berdeen JB, Krementz DG. 1998. The use of fields at night by wintering American woodcock. J Wildlife Manag 62:939-947.

Burnham KP, Anderson DR. 2002. Model Selection and Multimodel Inference: A Practical Information-Theoretic Approach (2nd ed.), Springer-Verlag.

Daly KO. 2014. Assessment of techniques to evaluate American woodcock population response to best management practices applied at the demonstration-area scale. MS Thesis. University of Minnesota. 111 pp.

DeGraaf RM, Yamasaki M. 2003. Options for managing early-successional forest and shrubland bird habitats in northeastern United States. Forest Ecology and Management 185:179-191.

Dessecker DR, McAuley DG. 2001. Importance of early successional habitat to ruffed grouse and American woodcock. Wildlife Society Bulletin 29:456-465.

Glasgow LL. 1958. Contributions to the knowledge if the ecology of the American woodcock, *Philohela minor* (Gmelin), on the wintering range in Louisiana. Dissertation, Texas A&M, College Station TX.

Gregg LE, Hale JB. 1977. Woodcock nesting habitat in northern Wisconsin. The Auk 94:489-493.

Hale JB, Gregg LE. 1976. Woodcock use of clearcut aspen areas in Wisconsin. Wildlife Society Bulletin 4:111-115.

Levy EB, Madden EA. 1933. The point method of pasture analysis. New Zealand J Agric 46(5):267-179.

Long AK, Locher A. 2013. American woodcocks' (Scolopax minor) use of pine plantation habitat during spring in central Arkansas. The Wilson Journal of Ornithology 125:322-328.

Masse RJ, Tefft BC, Amador JA, McWilliams SR. 2013. Why woodcock commute: testing the foraging-benefit and predation-risk hypotheses. Behavioral Ecology 24:1348-1355.

Minnesota Department of Natural Resources (MN DNR). 2015. Minnesota's Wildlife Action Plan 2015-2025. Division of Ecological and Water Resources, Minnesota Department of Natural Resources.

Minnesota Department of Natural Resources (MN DNR). 2012. Forest Wildlife Habitat Management Guidelines. Division of Fish and Wildlife. St. Paul, MNLong AK, Locher A. 2013. American woodcocks' (*Scolopax minor*) use of pine plantation habitat during spring in central Arkansas. The Wilson Journal of Ornithology 125:322-328.

R Core Team. 2014. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. http://www.R-project.org/.

Seamans, M.E., and R.D. Rau. 2016. American woodcock population status, 2016. U.S. Fish and Wildlife Service, Laurel, Maryland. 17 pp.

Sepik GF, Derleth EL. Habitat use, home range size, and patterns of moves of the American woodcock in Maine. Proceedings of the Eighth Woodcock Symposium. U.S. Fish & Wildlife Service. Biological Report 16:41-49.
Sheldon WG. 1961. Summer crepuscular flights of the American woodcock in central Massachusetts. The Wilson Bulletin 73:126-139.
Sheldon WG. 1967. The book of the American woodcock. University of Massachusetts, Amherst, MA.
Stribling HL, Doerr PD. 1985. Nocturnal use of fields by American woodcock. Journal of Wildlife Management 49:485-491.
Wildlife Management Institute. 2009. Best Management Practices for Woodcock & Associated Bird Species. Wildlife Management Institute. 24 pp.