USE OF MANAGED FOREST OPENINGS BY AMERICAN WOODCOCK

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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 2016 indicated that 59% of openings were occupied 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 transects were collected within openings to assess the relationship of vegetation to woodcock use and management of habitat in openings. Information from this pilot study helped to inform the development of a targeted research project to assess management practices and woodcock use of forest openings. This information 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 (MN DNR 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). 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 8 singing grounds at least 0.5 acres in size and 1 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). They also suggest that recent clearcuts can be used by woodcock as singing grounds for "several years" and as roosting grounds for "at least one year" after harvest (Wildlife Management Institute 2009). Assessing the use of recent clearcuts with known harvest dates is needed to better understand how long they can serve as open areas for singing and roosting woodcock.

OBJECTIVES

1. Assess woodcock use of managed forest wildlife openings with differing management history (time since mowing).
2. Relate opening size and configuration, vegetation composition and height, and surrounding landscape to woodcock use and/or 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. 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 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). The observer was positioned on the edge of the opening and recorded the number of woodcock observed flying into the opening or heard peenting (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 within forest openings was sampled along 2 transects using a line intersect/intercept method (Canfield 1941). The first transect (Transect A) was placed across the widest part of the opening from edge to edge (as determined in GIS and in the field) and the second transect (Transect B) was placed perpendicular to the first crossing the opening from edge to edge. The transect start and end points were marked using a flag and flagging to aid resampling, UTM coordinates were taken at each (using point averaging to increase accuracy). A measuring tape was stretched tight from the starting point to the end point and secured in place by rebar. The direction of the transect (azimuth) from the start point facing the end point was recorded, and a photo of the site from the start point facing the end point of the transect was taken. 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). Vegetation was sampled along the right edge of the measuring tape (from the start point looking towards the end point). For each change in cover, the start distance to the nearest tenth of a meter (e.g., 1.1 m, 5.8 m), the cover type code, abundance, and height class was recorded (Table 1). For shrubs and trees taller than 1.5 m, the actual height to the nearest meter was recorded.

To assess the use of openings in this study by other wildlife (e.g. deer, bear) the presence of scat encountered within 0.5 m of the transect was recorded along with the distance along the transect and suspected species.

PRELIMINARY RESULTS/DISCUSSION

In the 2016 pilot project, singing ground surveys were conducted at 94 openings, with singing males observed at 55 openings (59%). The majority of occupied openings (42 of 55) had only 1 male present, 10 openings had 2 males, and 3 openings had 3 males. These findings suggest that a binary presence/absence assessment of opening use would be most appropriate. Twelve openings were surveyed for singing males on multiple occasions. Woodcock occupancy (presence or absence) remained the same at 10 of these openings (6 present, 4 absent), with the 2 remaining openings having woodcock present in the first visit but not in the second. Repeated surveys on multiple occasions would be ideal, however limited field staff and a short window of activity in the evening and breeding season to conduct surveys makes it difficult to both maximize the sample size of openings and conduct repeated surveys at all sites. Since woodcock use will be assessed as presence/absence for singing ground surveys, effort can be reduced by repeating surveys only at sites without woodcock use to determine if errors of omission exist.

Roosting ground surveys were conducted at 65 openings, and roosting woodcock were spotlighted and flushed at 15 openings (23%). In addition, 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 woodcock observed at roosting openings in this preliminary study in which surveys were conducted from June through August. Roosting surveys can only be conducted at one site per observer per evening, thus making repeated surveys difficult to accomplish with limited field staff. Nevertheless, roosting surveys should be repeated to determine how roosting use varies. Repeated surveys may decrease the total number of openings that can be included, however we currently have no information on how woodcock use of roosting grounds in this study varies. If repeated surveys are possible they would provide important information on the variability in woodcock use of roosting openings and the need to repeat surveys in future studies.

Exploratory data analysis was used to assess the independent variables collected. Kernel density plots and histograms were used to explore the distribution of variables to assess their value as predictors. Opening size (ac) and perimeter (m) were highly skewed with large outliers due to larger forest harvest sites, however the ratio of perimeter to acres was more normally distributed and might serve as a better variable in modeling. Plots for proportion in 9 cover type classes (grass, herbaceous, woody, shrub, tree, coarse woody debris, bare ground, moss, and other) and 6 height classes (0-3cm, 3-10cm, 10-30cm, 30-50cm, 0.5-1.0m, 1.0-3.0m. and >3.0m), as well as combinations of these, were explored. Most openings were dominated by grasses with few shrubs and trees. The cover of herbaceous vegetation seemed to be the most informative variable. Vegetation in the 2 shortest (<10cm) and 3 tallest (>0.5m) size classes was typically rare. The 10-30cm and 30-50cm classes had good variation and would seems most promising as variables. It was noted anecdotally in the pilot that sites heavily invaded by the exotic plant common tansy (*Tanacetum vulgare*) tended to have no woodcock present. This could have important implications for management and prevention of invasive species spread in wildlife openings.

Time since mowing was not always known for sites included in the pilot study. Most sites had recent mowing within 2 years (73 of 94 singing and 47 of 65 roosting openings). Future research should balance sample size and include more sites with longer time since mowing to allow for this important management consideration to be assessed. Excluding forest harvest sites from analysis of woodcock use of openings may be necessary since harvest sites differed markedly from openings in both size and cover, and represent only a small portion of the total sample size (8 sites). Anecdotal and qualitative comparison of harvest sites and openings would be more feasible for this study.

Weather conditions including cloud cover, temperature, wind speed, and precipitation were poorly distributed, partly due to restrictions for surveying conditions. Consequently, no significant relationships were found between woodcock observed and these metrics for either singing or roosting ground data. Date of survey and time since full moon also did not show a relationship with woodcock observed in the pilot data.

Forest wildlife openings are often clustered along hunter walking trails, and openings in the pilot study showed this clustering. To assess if woodcock use of openings showed spatial autocorrelation, Moran's I in ArcGIS was used. The number of woodcock per opening from singing ground surveys showed no spatial autocorrelation (I=0.05, P=0.38). Number of woodcock flushed in roosting ground surveys showed no spatial autocorrelation (I=-0.009, P=0.94), however minimum number of woodcock flying, landing in, or flushing showed a clustered pattern (I=0.21, Z=2.16, P=0.03). Due to the arrangement of openings, spatial autocorrelation should be tested for in future samples and included in modeling when present.

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Table 1. Codes used to describe vegetation composition and structure along transects sampled within managed forest openings Minnesota during 2016.

Cover type codes	Abundance codes	Height codes
G = Graminoid	R = Rare, < 25%	0 = < 3 cm
H = Herbaceous	S = Sparse, 25-50%	1 = 3-10 cm
W = Woody (<0.5 m tall)	M = Moderate, 50-75%	2 = 10-30 cm
S = Shrub (0.5 - 2 m tall)	D = Dense, > 75%	3 = 30-50 cm
T = Tree (>2 m tall)		4 = 0.5 - 1.5 m
B = Bare ground		
C = Coarse woody debris		