Monitoring of high priority bird species at Camp Grayling Joint Maneuver Training Center

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We collectively acknowledge that Michigan State University occupies the ancestral, traditional, and contemporary Lands of the Anishinaabeg – Three Fires Confederacy of Ojibwe, Odawa, and Potawatomi peoples. In particular, the University resides on Land ceded in the 1819 Treaty of Saginaw. We recognize, support, and advocate for the sovereignty of Michigan's twelve federally recognized Indian nations, for historic Indigenous communities in Michigan, for Indigenous individuals and communities who live here now, and for those who were forcibly removed from their Homelands. By offering this Land Acknowledgement, we affirm Indigenous sovereignty and will work to hold Michigan State University more accountable to the needs of American Indian and Indigenous peoples.

Cover: Wet meadow located along Little Cannon Creek. Photograph by M.J. Monfils.

EXECUTIVE SUMMARY

Federal military facilities, such Camp Grayling Joint Maneuver Training Center (CGJMTC), are important to sustaining biodiversity, including threatened and endangered species and numerous migratory bird species. With many bird species continuing to decline, having current information on the status of bird species of conservation concern is vital to facilitating proactive management and minimizing possible conflicts between conservation measures and military training activities. The Michigan Natural Features Inventory (MNFI) partnered with the Michigan Department of Military and Veterans Affairs (DMVA) to design a bird survey program to gather information on bird species of high conservation concern using CGJMTC, such as listed, special concern, and declining species.

The MNFI worked with DMVA to develop a program that would meet their information needs for several bird species/groups: rare raptors, secretive marsh birds, golden-winged warbler (*Vermivora chrysoptera*, State Threatened), red-headed woodpecker (*Melanerpes erythrocephalus*, State Special Concern), grassland birds, and pine barrens birds. After finishing a complete round of surveys under a three-year panel design in 2023, we modified our sample design slightly to use a five-year panel approach to reduce annual costs. We used standardized point count methodologies for the target species/groups consistent with other monitoring efforts within the state and region. In 2025, staff from MNFI and DMVA completed the second year of surveys under the revised five-year sample frame.

With help from DMVA staff, we conducted 305 points counts for raptors, marsh birds, and at-risk bird species within CGJMTC in 2025. Across all surveys, 99 bird species were recorded, including six State Threatened and eight State Special Concern species, 11 species of greatest conservation need, 12 statewide or northern Lower Peninsula featured species of the Michigan Department of Natural Resources (Wildlife Division), and eight focal species of the Upper Mississippi / Great Lakes Joint Venture. In addition, golden-winged warbler is considered a mission-sensitive species by the Department of Defense (DoD) Partners in Flight, and we observed three DoD Tier 2 species. Data gathered on rare species in 2025 resulted in the creation of four new element occurrences (EOs) of four bird species and updates to 30 existing EOs of 13 bird species in MNFI's Natural Heritage Database, including new occurrences of American bittern (*Botaurus lentiginosus*, State Special Concern), common nighthawk (*Chordeiles minor*, State Special Concern), eastern whip-poor-will (*Antrostomus vociferus*, State Threatened), and wood thrush (*Hylocichla mustelina*, State Special Concern).

Results from five consecutive years of monitoring at CGJMTC highlight the value of the facility to a variety of breeding bird species. The data gathered are providing valuable baseline information for evaluating trends in bird distributions and relative abundances, as well as creating opportunities to explore questions related to bird habitat use and response to management.

ACKNOWLEDGEMENTS

Funding for this project was provided by the Michigan Department of Military and Veterans Affairs (DMVA). Matt Kleitch (DMVA) initiated the project, provided logistical support, and conducted bird surveys within the Pine Barrens Management Area. Amber Ng (Michigan Natural Features Inventory [MNFI]) assisted with bird surveys and data entry. Helen Enander (MNFI) provided GIS support in developing the sample design. Ashley Adkins (MNFI), Katelyn Brolick (Michigan State University [MSU] Extension), Sarah Carter (MNFI), and Deb Richardson (MSU Extension) provided administrative support for the project. Kevin Gardiner (MSU) coordinated lodging for MNFI staff at Camp Wa Wa Sum. We appreciate the assistance of Camp Grayling Range Control personnel in gaining access to the installation to conduct bird surveys.

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INTRODUCTION

Military installations serve as refuges for several at-risk wildlife species. The intact wildlife habitats found on U.S. Department of Defense (DoD) lands support greater densities of threatened and endangered species than those of any other federal agency (Stein et al. 2008). Migratory bird species, even those once considered common and widespread, have been experiencing demonstrable population declines (Rosenberg et al. 2019), despite protection under the Migratory Bird Treaty Act. As more species become a conservation concern, it is increasingly important for land managers at military facilities to document the species that currently exist on their lands and, through proactive management, avoid potential conflicts between conservation measures and military training. Baseline surveys are a critical first step in making informed management decisions and, if repeated over time, can be used to document population changes. Surveys can also play an important part in helping installations to meet regulatory requirements.

Camp Grayling Joint Maneuver Training Center (CGJMTC) is an approximately 147,000-acre installation used for military training that consists of a mosaic of lands owned by the Michigan Department of Military and Veterans Affairs (DMVA) and Michigan Department of Natural Resources (DNR). The facility provides a variety of habitats for migratory and resident breeding birds. The objective of this ongoing project was to develop and implement a bird monitoring program across CGJMTC to better document the species that occur on the installation and the distributions and relative abundances of at-risk and migratory species. Ultimately, these data will be incorporated into the CGJMTC Integrated Natural Resources Management Plan (INRMP) and used to provide guidelines for species management. In 2021 the Michigan Natural Features Inventory (MNFI), a program of Michigan State University Extension, worked with the DMVA to design and begin implementation of a bird survey program to gather information on bird species of high conservation concern, such as state and federally listed, special concern, and declining species. The program provides baseline data on these species and the broader bird communities using CGJMTC lands and a mechanism to monitor changes in relative abundance and distributions over time. In 2025, MNFI and DMVA staff completed the second year of bird surveys under a revised five-year rotational sample design, which is intended to be part of an annual, long-term program. In this report, we describe the monitoring program, methods used, and summarize the results of this year's surveys.

METHODS

Sample Design

We developed bird surveys to evaluate the status (e.g., relative abundance, occupancy, trends) of the following rare or declining species with potential to occur at CGJMTC: 1) rare raptors; 2) secretive marsh birds; 3) golden-winged warbler (*Vermivora chrysoptera*, State Threatened); 4) red-headed woodpecker (*Melanerpes erythrocephalus*, State Special Concern); 5) rare grassland birds; and 6) rare pine barrens species. Michigan Forest Inventory (MiFI) data were used to classify potential habitats for each bird species/group (Table 1). Based on cover type, stand area, and size density class, we identified suitable stands and created spatial layers of potential habitat in ArcMap (ESRI 2017). Next, we created layers of potential survey points by overlaying point grids with appropriate spacing over the stands. We used a 250 m x 250 m point grid for late successional forest areas and a wider spaced, 400 m x 400 m point grid for early successional forest, shrub, and open cover types to reduce the likelihood of double counting (Ralph et al. 1995). Those points falling within the potential survey stands formed the sample frame for each species/group. Except for secretive marsh birds, there were more survey points than could be covered in one year, so we developed a panel sampling approach. During 2021 – 2023, we used a three-year panel in which approximately one third of all points was covered in a year and all points are surveyed over the three years. After reviewing the results of the three-year effort and in consultation with DMVA, we decided to shift the bird monitoring effort to a five-year panel approach to reduce annual survey costs. Under this adjusted sampling framework, approximately 20% of the survey points will be visited each year so that all points are surveyed after five years. We also increased the separation distance for both raptor and red-headed woodpecker survey points from 250 m to 400 m.

To develop our five survey panels while providing a spatially balanced and logistically efficient sample, we created a layer of 100-hectare hexagons to serve as our primary sample units (PSU) for CGJMTC. We used 100 hectares as our PSU size because it represents the approximate maximum area an individual can survey in a day under the various protocols used in this project. Each PSU was assigned a random number and after putting them in numerical order, we created the five survey panels for each bird species/group as follows: Panel 1 – first 20% of PSUs, Panel 2 – second 20% of PSUs, Panel 3 – third 20% of PSUs, Panel 4 – fourth 20% of PSUs, and Panel 5 – last 20% of PSUs. In this sample design, survey points are our secondary sample units, so when a PSU is selected for survey, all secondary sample units, or point count stations, falling within the PSU are to be surveyed (Figure 1). We completed the second of the five survey panels in 2025.

Table 1. Michigan Forest Inventory (MiFI) stand descriptors used to identify potential habitats for bird species or groups targeted in the Camp Grayling monitoring program.

Habitat Descriptor	Rare Raptors	Secretive Marsh Birds	Golden-winged Warbler	Red-headed Woodpecker	Grassland Birds
Cover type					
Aspen	X		X		
Treed bog			X		
Lowland deciduous	X				
Herbaceous open land					X
Hemlock	X				
Lowland shrub			X		
Lowland mixed forest	X			X	
Northern hardwood	X			X	
Natural mixed pines	X				
Mixed upland deciduous	X			X	
Marsh		X			
Oak				X	
Lowland aspen/balsam poplar	X		X	X	
Red pine	X				
Upland mixed forest	X			X	
Low-density trees				X	
Bog		X			
Urban				X	
White pine	X				
Size density class	9	NA	All	All	NA
Minimum patch area (ha)	4.0	4.0	2.0	NA	10.0

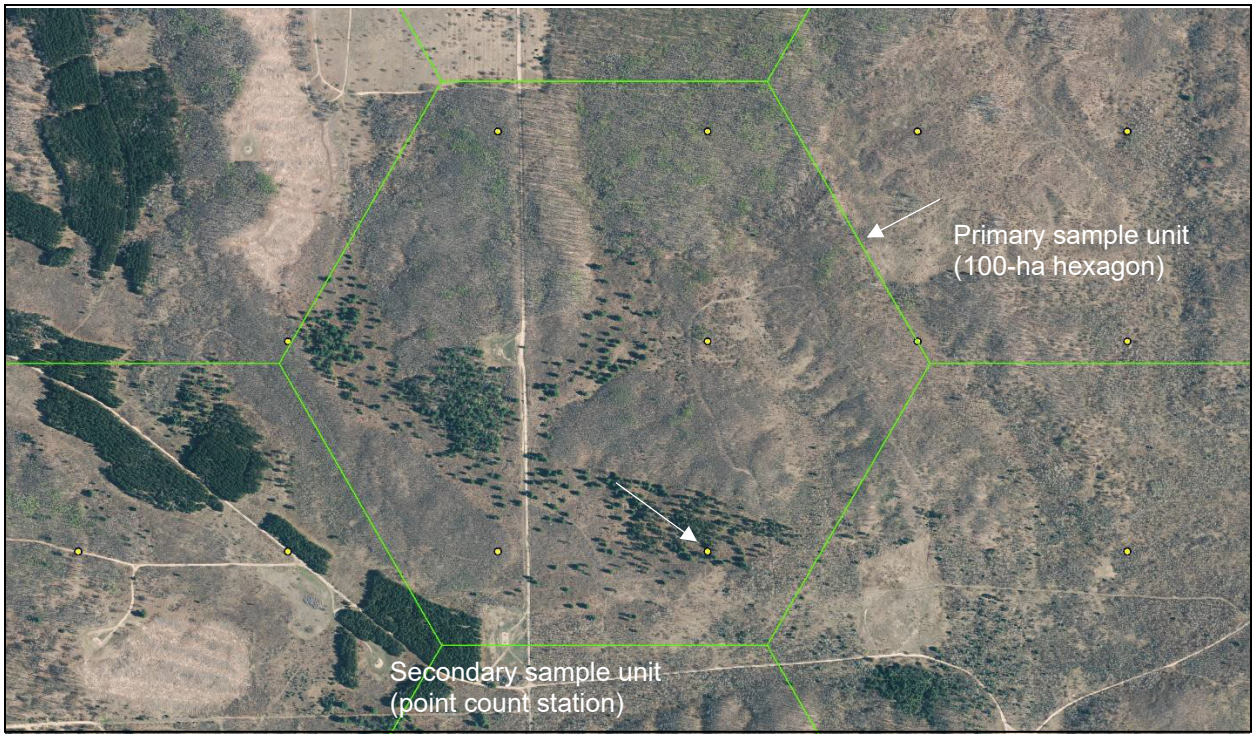

Figure 1. Examples of primary sample units (green hexagons) and secondary sample units (point count stations, yellow points) used in designating Camp Grayling bird surveys.

Rare Raptors

Raptor surveys were designed to target red-shouldered hawk (*Buteo lineatus*, State Special Concern) and American goshawk (*Accipiter atricapillus*, State Threatened). Deciduous, mixed, and coniferous forest stands (except for pine plantations) of size-density class 9 and at least 4 hectares (10 acres) were considered potential habitat for these species. We surveyed raptors using a four-minute point count (Mosher et al. 1990, Anderson 2007, Bruggeman et al. 2011) consisting of two, two-minute broadcast periods (one for red-shouldered hawk, one for American goshawk). Each broadcast period consisted of approximately 10 sec of broadcasted calls followed by 30 sec of silent listening, which was repeated three times for a total of two minutes. Calls were broadcasted using a FoxPro NX4 at a volume that produced a sound pressure of approximately 95 dB at one meter from the unit. The broadcast unit was rotated about 120 degrees for each series of calls to ensure 360-degree coverage.

We conducted surveys from 22 to 28 April 2025 during daylight hours (sunrise to sunset). Weather conditions that can reduce the detectability of raptors were avoided (e.g., strong winds, moderate to heavy precipitation). Although red-shouldered hawk and American goshawk were the focus of surveys, we recorded all raptor observations. For each raptor observation, we recorded the species, approximate distance when first detected (using distance bins of 0-50 m, 51-100 m, 101-250 m, 251-500 m, and > 500 m), and direction (i.e., N, NW, NE, S, SW, SE). When red-shouldered hawks or American goshawks were observed, we searched

the vicinity surrounding the survey point and location of the detection for potential nests. Trees were also visually inspected for stick nests while walking and driving between survey stations. We documented nest locations using tablet computers along with information on the species detected, activity observed (e.g., territorial behavior, incubation), nest status (e.g., decorated, feathers, whitewash), tree species, and approximate nest height. When an active nest was confirmed (e.g., bird seen incubating or flushed from nest), we discontinued surveys at nearby points (i.e., within the same contiguous forest stand or nearest on the 400-meter point grid) to minimize disturbance to the nesting pair.

Secretive Marsh Birds

Open wetlands, such as marshes and wet meadows, of at least four hectares (10 acres) were surveyed for a suite of rare, declining, and secretive marsh bird species. We followed the North American Marsh Bird Monitoring Protocols (Conway 2011), which were further refined for the Michigan Marsh Bird Survey (Michigan Bird Conservation Initiative [MiBCI] 2015). The survey methods target 10 primary species (e.g., rails, bitterns, grebes) and eight secondary species (e.g., selected songbirds, marsh-nesting terns) that occur in marshes and other wetlands dominated by emergent vegetation.

We conducted three visits during the breeding season (mid-May to late June) at points separated by at least 400 m (Conway 2011). Surveys were done in the morning between 30 minutes before to three hours after sunrise. During each visit, we completed a 10-minute point count consisting of a five-minute passive listening period followed by one-minute broadcast periods for the following five species: least bittern (*Ixobrychus exilis*, State Threatened), yellow rail (*Coturnicops noveboracensis*, State Threatened), sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), and American bittern (*Botaurus lentiginosus*, State Special Concern). Calls were broadcasted using a portable wireless speaker (Ultimate Ears Wonderboom 2) at the recommended sound pressure of 80-90 dB at one meter from the speaker. Observations of primary target species were recorded by individual bird across each minute of the 10-min survey and the distance at first detection was estimated to the nearest five meters with aid of a laser rangefinder. Secondary species were tracked at the species level, with only the period of first observation of the species noted and the total number of individuals were recorded within three distance bins (0-50 m, 51-100 m, and > 100 m). Please refer to the Michigan Marsh Bird Survey Protocol (MiBCI 2015) for detailed survey methods.

At-risk Bird Surveys

We used the same point-count methodology for surveys targeting golden-winged warbler, red-headed woodpecker, grassland birds, and pine barrens birds. Areas of early successional aspen (*Populus* spp.) and balsam poplar (*Populus balsamifera*), shrub wetlands, and treed bogs at least 2 hectares (5 acres) in size were the focus of golden-winged warbler surveys. Stands of deciduous, mixed, and oak-dominated forests, and areas with low tree densities within the Hanson Forest and Cantonment were surveyed for red-headed woodpeckers. We identified grasslands (herbaceous open lands in MiFI) of at least 10 hectares (25 acres) as potential

grassland bird habitats where surveys were conducted. Surveys for rare pine barrens species were conducted within the Pine Barrens Management Area.

Surveys occurred during late May through early July and from sunrise to four hours after sunrise (Ralph et al. 1995). We avoided conducting surveys during weather conditions that can reduce bird detectability (e.g., winds ≥ 20 km/hour [13 mph], moderate to heavy precipitation). All birds seen or heard were recorded during 10-minute point counts. The 10-minute point count consisted of three periods: 1) first three minutes (minutes 1 – 3); 2) next two minutes (minutes 4 and 5); and 3) last five minutes (minutes 6 – 10; Ralph et al. 1995). Use of the three survey periods provides flexibility in making comparisons with other surveys and studies of varying time lengths, such as the North American Breeding Bird Survey. During each period, we assigned each bird observation to one of four distance categories at the time of first observation (0 – 25 m, 26 – 50 m, 51 – 100 m, and > 100 m) based on the estimated distance of the bird from the observer. Having observations assigned to distance bins facilitates analyses to estimate density and population size.

RESULTS

In 2025, we observed 99 bird species during 305 point counts conducted across surveys targeting rare raptors, secretive marsh birds, and several at-risk species. Data gathered during the 2025 breeding season resulted in MNFI creating four new element occurrences (EOs) of four bird species and updating 30 existing EOs of 13 bird species. Below we provide detailed summaries of our 2025 survey results according to the target bird species or group. A complete list of the bird species detected with scientific names is provided in Table A1 (Appendix A).

Rare Raptors

We surveyed 28 (90%) of the 31 points from our Year 2 raptor survey panel for American goshawk and red-shouldered hawk. We were unable to access one point due to ice storm damage and dropped two points that fell within recent clearcuts. We also revisited four points from the previous three years that had rare raptor activity: two from 2023 and one each from 2022 and 2024. Additionally, we checked the four American goshawk nests found in 2021-2024 and the five red-shouldered hawk nests found in 2022-2024.

Red-shouldered hawks were detected at two (7%) of the Year 2 raptor points surveyed and incidentally at one additional location while traveling between points. We also heard red-shouldered hawks at seven points surveyed for golden-winged warblers, at two points surveyed for red-headed woodpeckers, and at one point surveyed for secretive marsh birds. We did not find any new red-shouldered hawk nests in 2025, but we confirmed continued activity at four of five nests documented in 2022-2024. The nest located in NTA21 to the east of Range Road and north of Fruit Farm Road (Figure 2) remained active for the fourth consecutive year, with the pair using the same nest originally found in 2022, located in a 48 cm (19 in) DBH big-toothed aspen (*Populus grandidentata*). There was evidence of new construction and one adult was observed incubating. This information was used to update the existing occurrence from 2022 (EO ID 26108). For the third consecutive year, we could not confirm nesting activity at the second nest found in 2022, located just west of Old US-27 in STA07 (Figure 2). We found multiple nests within the stand but observed no decoration or activity at the nests and received no response to callback.

We reconfirmed red-shouldered hawk activity at both nests found in 2023. We found evidence of new construction and fresh decoration at the nest in NTA26, located in a 25 cm (10 in) DBH sugar maple (*Acer sachharum*) east of N White Road and south of Krause Road (Figure 2). We also observed evidence of new construction at the nest in NTA22, located in a 31 cm (12 in) DBH white birch (*Betula papyrifera*) east of N White Road and south of Bauman Road (Figure 2). Information from both nests was used to update an occurrence created in 2004 (EO ID 14333). We were able to confirm continued nesting activity at the single nest found in 2024, located in NTA19 southwest of the intersection of N Wakeley Bridge Road and Fruit Farm Road (Figure 2). The pair was reusing the same nest from the previous year, located in a 46 cm (18 in) DBH quaking aspen (*Populus tremuloides*). The nest was freshly decorated with down visible and an adult was observed incubating (Figure 3). This information was used to update the element occurrence created in 2022 (EO ID 26108).

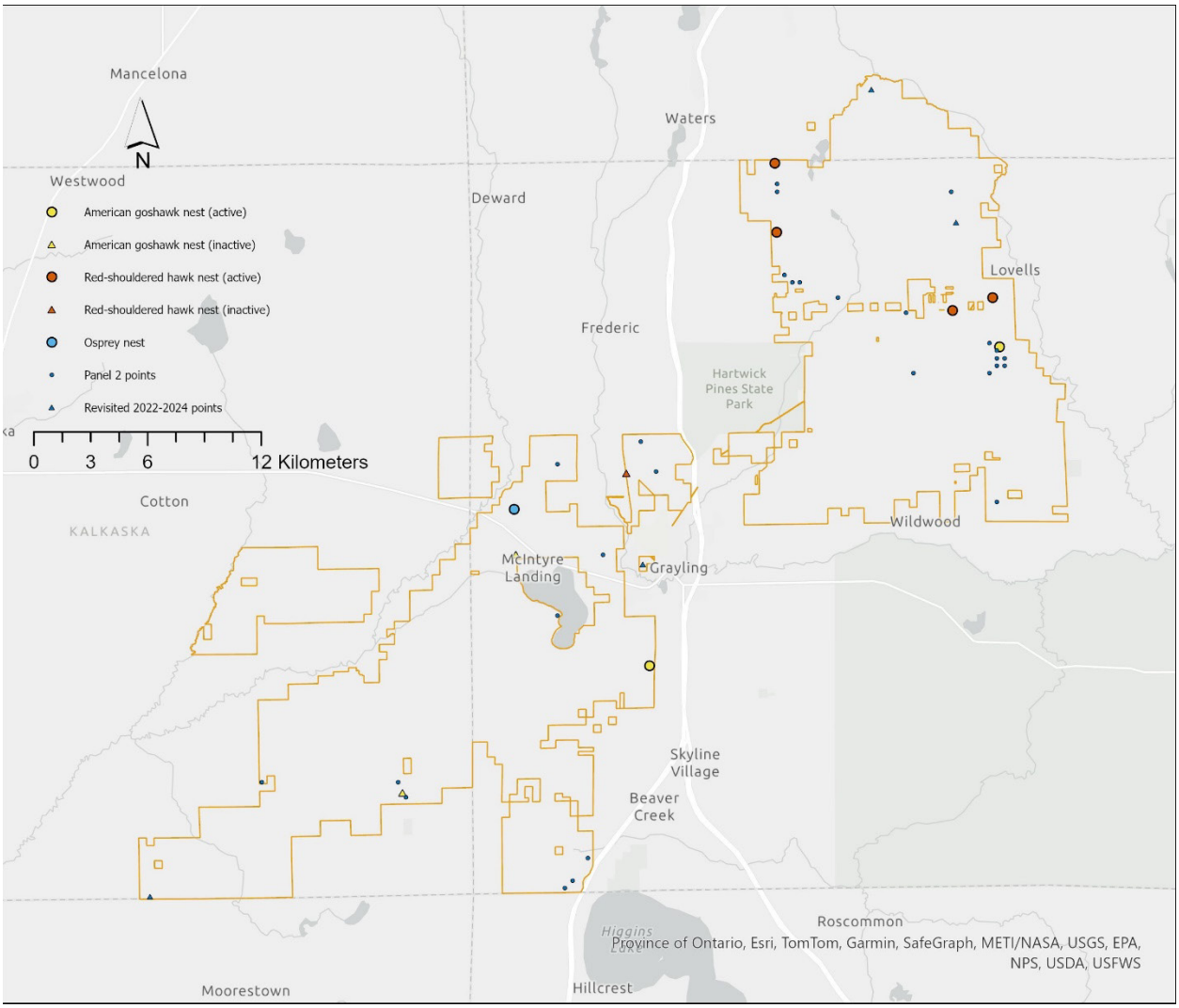

Figure 2. Rare raptor point-count stations where surveys were conducted within Camp Grayling in 2025. Yellow, red, and light blue points indicate American goshawk, red-shouldered hawk, and Osprey nests, respectively.

Figure 3. A red-shouldered hawk nest containing fresh down that was active in both 2024 and 2025. Photograph by A.A. Cole-Wick.

American goshawks were detected at two (7%) of the Year 2 raptor points surveyed. We did not find any new American goshawk nests in 2025, but we confirmed continued nesting activity at two of four nests documented in 2021-2024. The nest located in NTA15 within a red pine (*Pinus resinosa*) stand west of Bald Hill Road, first found in 2024, remained active for the second consecutive year (Figure 2). The nest was freshly decorated with down visible and an adult was observed on the nest incubating (Figure 4). This information was used to update the occurrence created in 2024 (EO ID 27467). We also reconfirmed nesting activity at the second nest found in 2024, located within a small mixed-pine stand in STA11 just west of S Oak Road (Figure 2). The nest was freshly decorated with down visible and two adults were observed in the immediate area, with one on the nest incubating and the second calling from a nearby tree (Figure 5). This information was used to update the occurrence created in 2021 (EO ID 24248). Despite both territories being inactive for several years, we once again visited the two areas with active American goshawk nests in 2021 to check for nesting activity. The first nest, located northwest of Lake Margrethe near McIntyre landing just south of STA05, was destroyed during a timber harvest prior to 2022 surveys and the territory remained inactive for a fourth consecutive year.

The second nest, last active in 2022, was in STA18 within a planted red pine stand north of Six Point Road and west of Pine Road. This nest was destroyed during a timber harvest operation occurring outside of the nesting season and the territory remained inactive for the third consecutive year.

Figure 4. American goshawk nest located within a red pine stand that was active in both 2024 and 2025. Photograph by A.A. Cole-Wick.

Figure 5. American goshawk nest with down visible that was active in both 2024 and 2025. Photograph by A.A. Cole-Wick.

While not a target species, we incidentally located an Osprey (*Pandion haliaetus*, State Special Concern) nest while conducting surveys for at-risk bird species in late May. The nest was located atop a dead pine tree in STA04, just west of N Howes Lake Rd (Figure 2). Two adults were observed in the immediate area, with one adult observed circling above and visiting the nest (Figure 6). This information was used to update an existing occurrence created in 2017 and last observed in 2022 (EO ID 22024).

Figure 6. Osprey nest found in 2025 located atop a standing dead pine in STA04. Photograph by A.A. Cole-Wick.

Secretive Marsh Birds

In 2024, we started surveying several new points in the southwestern portion of the South Camp (STA22). Based on the results of these surveys, we modified the points within STA22 prior to conducting 2025 surveys. Two points located in marginal marsh bird habitat (MB26 and MB29) were dropped and two others (MB25 and MB30) were moved to improve access (Figure 7). There are now 14 points in the updated sample frame, all of which were surveyed in 2025 with nine points visited three times and five points surveyed twice.

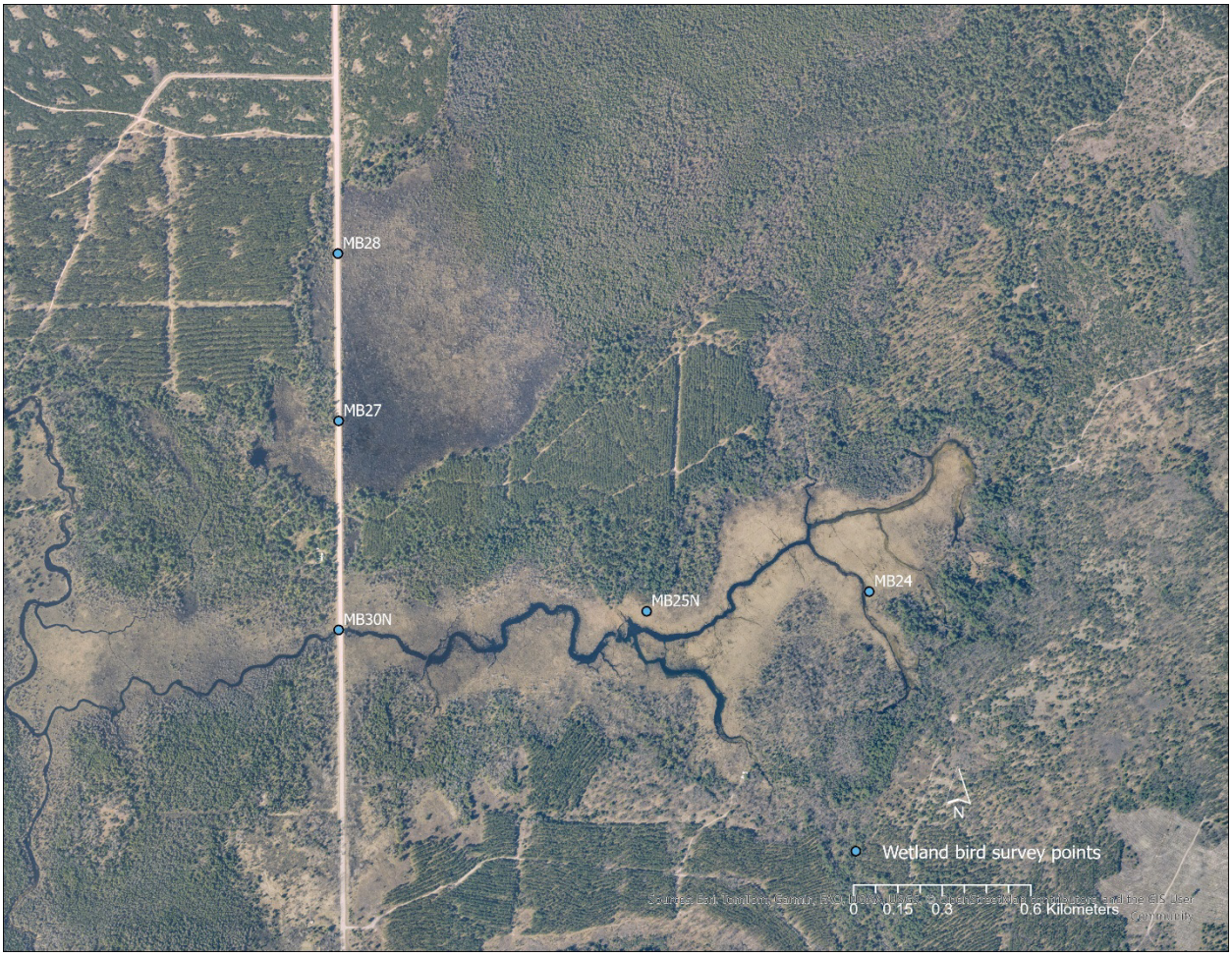

Figure 7. Secretive marsh bird survey stations (blue points) surveyed in 2025 within STA22.

We recorded eight target species during surveys: American bittern, least bittern, sandhill crane, sora, Virginia rail, sedge wren, swamp sparrow, and Wilson's snipe. We reconfirmed the presence of American bittern within the wetland complexes along Black Creek and Barker Creek (EO IDs 14318 and 26743) and detected the species for the first time in wetlands adjacent to Little Cannon Creek within STA22, which represented a new EO (EO ID 28241; Figure 8). Least

bittern was documented for the first time in Camp Grayling within the Barker Creek wetland complex in 2024 (EO ID 27516), and we observed the species in the same area again in 2025 (Figure 8). We detected sedge wren again in 2025 within the Little Cannon Creek wetland complex (EO ID 27517), but none were observed within the Barker Creek complex (EO ID 27519). Two species detected during marsh bird surveys, American bittern and sora, are focal species of the Upper Mississippi / Great Lakes Joint Venture (JV) Waterbird Habitat Conservation Strategy (Soulliere et al. 2018).

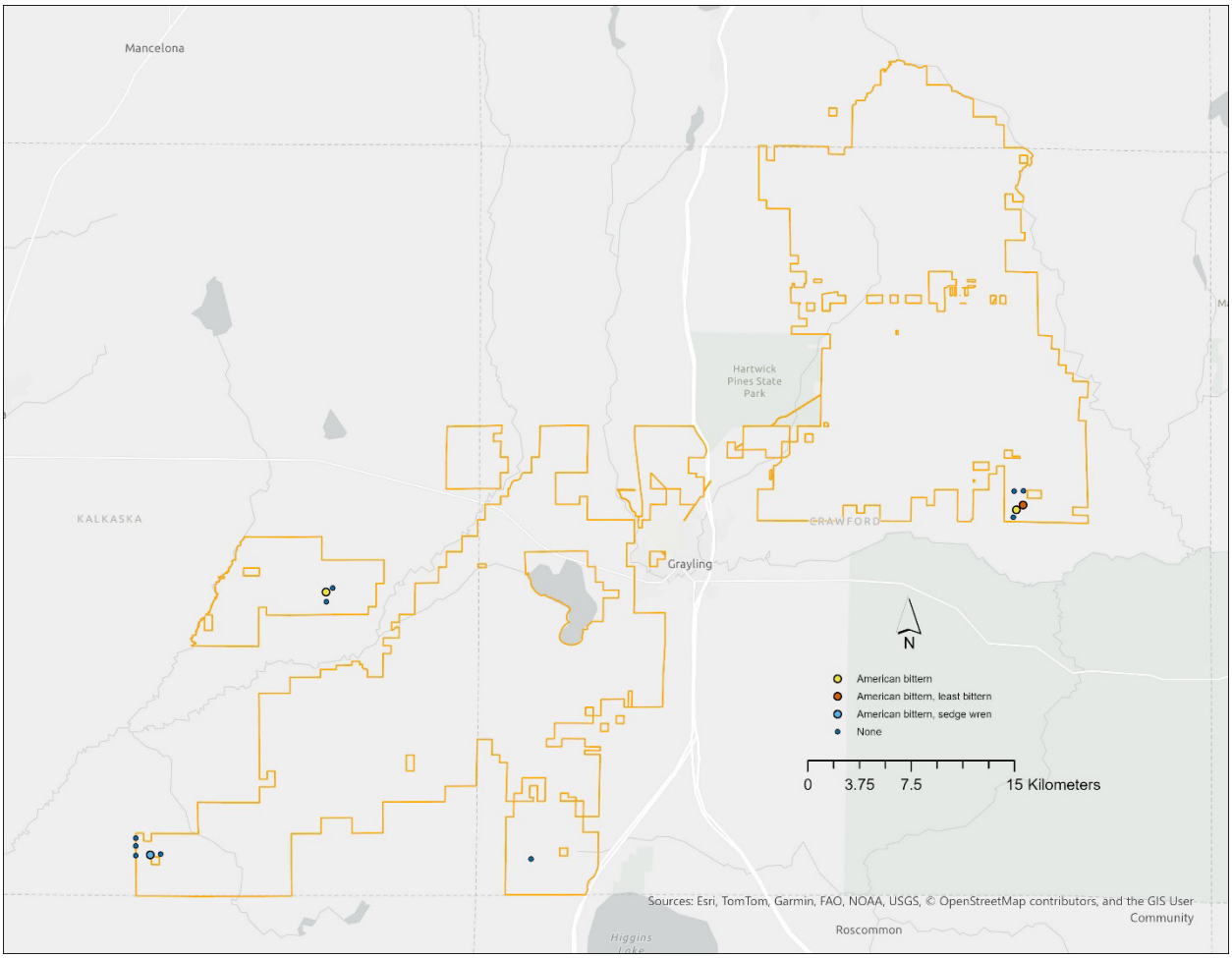

Figure 8. Secretive marsh bird point count stations where surveys were conducted within Camp Grayling in 2025.

At-risk Bird Species

We completed 234 point counts for all targeted at-risk bird species or groups in 2025, consisting of 155 golden-winged warbler points, 52 red-headed woodpecker points, 14 grassland bird points, and 13 pine barrens points. Surveys were conducted between 21 May and 11 July 2025, with 212 points surveyed by MNFI and 22 points covered by DMVA. We recorded 93 bird species across all 234 points surveyed (Table 2). During 2025 surveys, we documented new EOs of wood thrush and common nighthawk, while also updating existing EOs of common loon, common nighthawk, golden-winged warbler, Kirtland's warbler, red-headed woodpecker, and upland sandpiper with substantial new data. Incidental observations recorded while traveling between survey stations resulted in the creation of one new EO for eastern whip-poor-will and updates to existing EOs of eastern-whip-poor-will and osprey. We also recorded an incidental observation of Canada warbler, a DoD Tier 2 and JV focal species, while traveling between survey stations in Environmental Area 6. Bald eagle, red-shouldered hawk, and trumpeter swan were also detected during surveys, but the information was not sufficient to create new or update existing EOs. In addition, we recorded several featured species of the DNR, Wildlife Division, and focal species of the JV (Table 2).

Golden-winged Warbler

We surveyed 155 (99%) of the 157 survey points identified in the Year 2 panel of our golden-winged warbler survey stations. Golden-winged warblers were detected at about 3% of the survey points, which is a similar proportion to what we have observed in past years (range 2-6%). We recorded six golden-winged warblers at five survey points, with another 18 being detected incidentally while traveling between survey stations or while conducting point counts for other target species/groups (Figure 9). Most of our golden-winged warbler observations occurred in aspen stands (40%) and mixed upland forest and shrub cover (40%), with the remainder occurring in shrub wetlands (Figure 10). The majority (70%) of our golden-winged warbler detections were concentrated in two general areas - the northern half of the North Camp (NTA 15, 20, 22, and 25) and the west-central portion of the South Camp (STA8). The remaining 30% of the detections occurred in the central portion of the South Camp (STA16 and Environmental Area 6) and the southwest part of the South Camp (STA22; Figure 9). Our golden-winged warbler observations did not produce any new EOs, but we used the new data to update six existing EOs. In addition to being a SGCN and JV focal species, golden-winged warbler is a DoD mission-sensitive species, meaning it is a species with high potential to impact DoD missions if federally listed under the Endangered Species Act (DoD 2021). This species is currently under review for federal listing within the Midwest Region (U.S. Fish and Wildlife Service 2011).

Table 2. Proportion of points with bird species detected during 2025 surveys at Camp Grayling by target species or group.

Species	Special Status[1]	Golden-winged Warbler	Red-headed Woodpecker	Grassland and Pine Barrens Birds
Alder Flycatcher		0.013	0.038	---
American Crow		0.187	0.192	0.111
American Goldfinch		0.116	---	0.111
American Redstart		0.284	0.173	0.074
American Robin		0.574	0.769	0.148
Bald Eagle	SC, SGCN	0.006	---	---
Baltimore Oriole		0.052	---	0.074
Barn Swallow		---	---	0.037
Bay-breasted Warbler		0.006	---	---
Black-and-white Warbler		0.135	0.058	0.037
Black-billed Cuckoo	DoD-2	0.065	0.019	---
Blackburnian Warbler		0.013	---	---
Black-capped Chickadee		0.342	0.327	0.185
Black-throated Blue Warbler	DNR	0.006	---	---
Black-throated Green Warbler		0.026	0.019	0.037
Blue Jay		0.684	0.596	0.852
Blue-winged Warbler		0.019	---	---
Brewster's Warbler		0.013	---	---
Brown Creeper		0.052	0.192	---
Brown Thrasher		0.142	0.154	0.630
Brown-headed Cowbird		0.187	0.038	0.074
Canada Goose	DNR	0.052	0.058	0.185
Cedar Waxwing		0.110	0.058	0.074
Chestnut-sided Warbler		0.116	0.019	0.074
Chipping Sparrow		0.026	0.058	0.444
Clay-colored Sparrow		---	---	0.074
Common Grackle		0.045	---	0.185
Common Loon	T, SGCN	0.006	---	---
Common Nighthawk	SC, SGCN	0.006	---	0.037
Common Raven		0.290	0.077	0.519
Common Yellowthroat		0.123	---	---
Dark-eyed Junco		0.026	---	0.111
Downy Woodpecker		0.032	---	---
Eastern Bluebird		0.026	0.019	0.037
Eastern Kingbird		0.026	---	0.222
Eastern Towhee		0.387	0.365	0.333
Eastern Wood-Pewee		0.252	0.558	0.111

Species	Special Status[1]	Golden-winged Warbler	Red-headed Woodpecker	Grassland and Pine Barrens Birds
Field Sparrow		0.213	0.327	0.667
Golden-crowned Kinglet		0.006	---	---
Golden-winged Warbler	T, SGCN, DNR, DoD-M, JV	0.032	0.038	---
Gray Catbird		0.039	0.038	---
Great-crested Flycatcher		0.181	0.192	0.148
Hairy Woodpecker		0.045	0.038	0.074
Hermit Thrush		0.400	0.385	0.444
House Wren		0.026	---	0.074
Indigo Bunting		0.174	0.212	0.185
Killdeer		0.000	0.019	---
Kirtland's Warbler	T, SGCN, DNR, JV	0.006	---	0.148
Least Flycatcher		0.026	0.019	---
Lincoln's Sparrow		0.019	---	0.074
Magnolia Warbler		---	---	0.037
Mourning Dove		0.310	0.231	0.148
Nashville Warbler		0.490	0.212	0.667
Northern Cardinal		0.026	---	---
Northern Flicker		0.194	0.173	0.222
Northern Parula		0.013	---	---
Northern Waterthrush		0.019	---	---
Ovenbird		0.910	0.808	0.370
Pileated Woodpecker	DNR	0.006	0.038	---
Pine Warbler		0.065	0.077	0.037
Red-bellied Woodpecker		0.013	0.019	---
Red-breasted Nuthatch		0.077	0.019	---
Red-eyed Vireo		0.561	0.519	0.111
Red-headed Woodpecker	SC, SGCN, DNR, DoD-2, JV	0.019	0.077	---
Red-shouldered Hawk	SC, SGCN, DNR	0.045	0.038	---
Red-tailed Hawk		0.006	---	---
Red-winged Blackbird		0.097	---	0.074
Rose-breasted Grosbeak		0.671	0.462	0.481
Ruby-throated Hummingbird		---	---	0.037
Ruffed Grouse	DNR	0.181	0.019	0.037
Sandhill Crane		0.052	---	0.259
Scarlet Tanager		0.368	0.404	0.074
Song Sparrow		0.103	0.019	0.111
Swamp Sparrow		0.019	---	---
Tennessee Warbler		0.026	0.019	---
Trumpeter Swan	SC, SGCN	0.006	---	---

Species	Special Status[1]	Golden-winged Warbler	Red-headed Woodpecker	Grassland and Pine Barrens Birds
Tufted Titmouse		0.058	0.058	0.074
Turkey Vulture		0.000	0.038	---
Upland Sandpiper	T, JV	---	---	0.370
Veery		0.123	0.019	---
Vesper Sparrow		0.039	0.038	0.370
White-breasted Nuthatch		0.052	0.058	0.074
White-throated Sparrow		0.077	---	---
Wild Turkey	DNR	0.052	---	0.037
Wilson's Snipe	JV	0.006	---	0.037
Winter Wren		0.006	---	---
Wood Duck	DNR	0.006	---	---
Wood Thrush	SC, DNR, DoD-2, JV	0.006	---	---
Yellow Warbler		0.084	0.096	0.037
Yellow-bellied Sapsucker		0.123	0.019	0.333
Yellow-billed Cuckoo		0.026	---	---
Yellow-rumped Warbler		0.032	0.019	---
Yellow-throated Vireo		0.013	0.077	---

[1]Special status abbreviations: SC = State Special Concern; T = State Threatened; E = State Endangered; SGCN = species of greatest conservation need (Derosier et al. 2015); DNR = Department of Natural Resources, Wildlife Division feature species for the state or northern Lower Peninsula; DoD-M = Department of Defense mission-sensitive species; DoD-2 = Department of Defense Tier 2 species; and JV= focal species of the Upper Mississippi / Great Lakes Joint Venture.

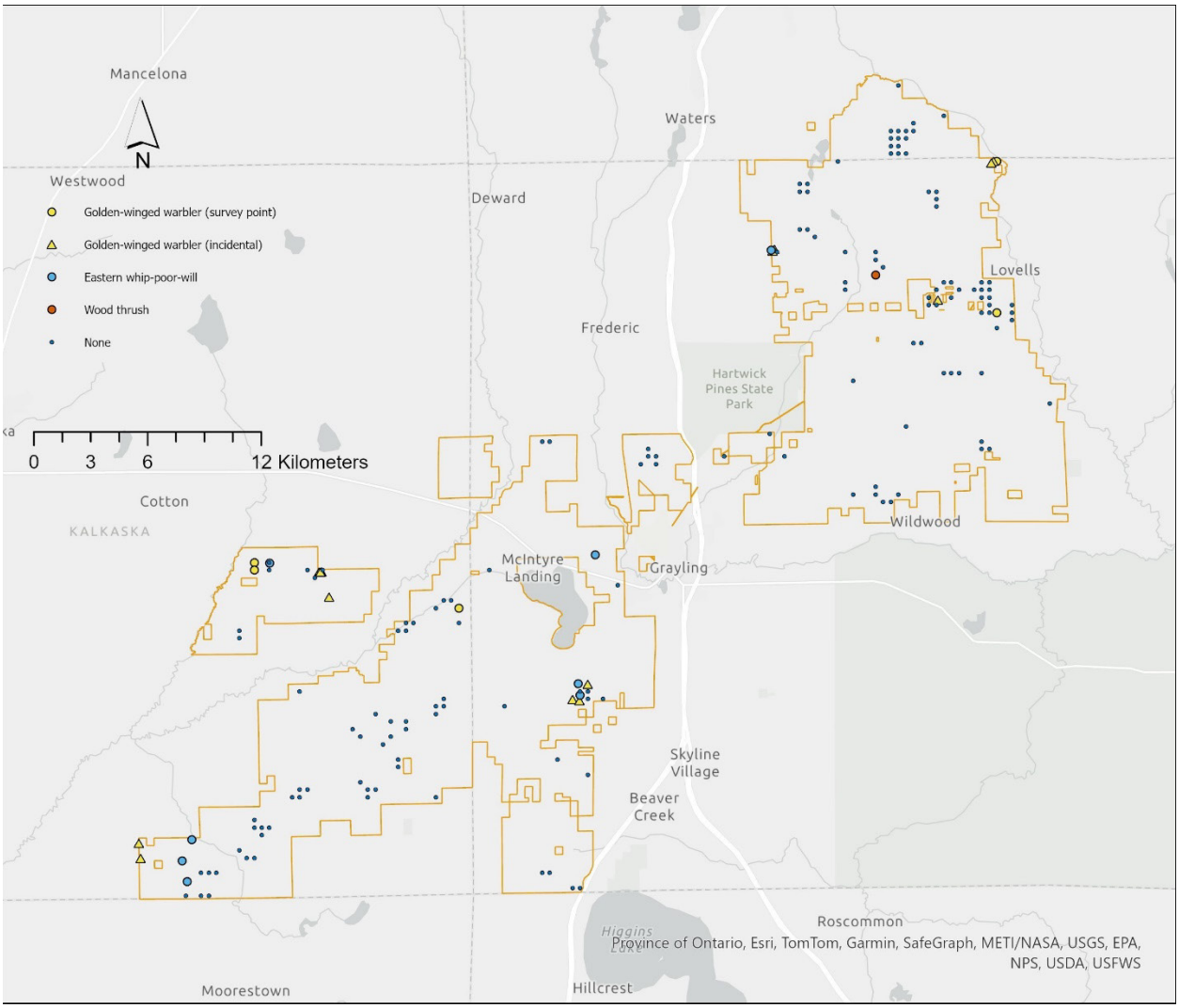

Figure 9. Golden-winged warbler point-count stations where surveys were conducted within Camp Grayling in 2025.

Figure 10. Shrub-dominated wetland in Camp Grayling where golden-winged warbler was detected in 2025. Photograph by E.C. Branch.

We recorded 86 bird species while conducting surveys for golden-winged warbler (Table 2). Ovenbird, blue jay, rose-breasted grosbeak, American robin, and red-eyed vireo were the most common species observed at these survey points. We recorded ovenbird at 91% of the points, whereas the other four species were observed at 51-70% of the points. We detected the following nine species at 25-50% of the points: Nashville warbler, hermit thrush, eastern towhee, scarlet tanager, black-capped chickadee, mourning dove, common raven, American redstart, and eastern wood-pewee. Sixteen species were recorded at 10-25% of the points, and the remaining species were uncommon and observed at < 10% of the points surveyed.

In addition to golden-winged warbler, we recorded two other State Threatened species, common loon and Kirtland's warbler, and six species of special concern, bald eagle, common nighthawk, red-headed woodpecker, red-shouldered hawk, trumpeter swan, and wood thrush. Aside from wood thrush, each of these are also species of greatest conservation need (SGCN). Golden-winged warbler, Kirtland's warbler, Wilson's snipe, wood thrush, and red-headed woodpecker are focal species for conservation planning and implementation within the JV region due to declining populations (Soulliere et al. 2020). We detected three DoD Tier 2 species during these surveys, black-billed cuckoo, red-headed woodpecker, and wood thrush. Most Tier 2 species have been experiencing long-term declines and have some potential to impact future missions if federally listed (DoD 2021). Although Tier 2 species are not considered a high priority based on current review criteria, proactive monitoring and management is encouraged when and where appropriate (DoD 2021). Several of these species are also considered DNR featured species for habitat management, as are black-throated-blue warbler, Canada goose, pileated woodpecker, ruffed grouse, wild turkey, and wood duck.

Red-headed woodpecker

We surveyed all 52 points identified in the Year 2 panel of our red-headed woodpecker survey stations, all of which were in the South Camp. Red-headed woodpeckers were observed at four (8%) of the points with five individuals recorded. Seven additional red-headed woodpeckers were recorded while traveling between survey stations or while conducting point counts for other target species/groups (Figure 11). The proportion of points with red-headed woodpecker detections was the lowest recorded since monitoring began in 2021, with the previous low being 16% in 2023, and the total number of individuals was lower than 2024 (16 individuals). Most of our observations (60%) occurred in oak forests, with the remainder occurring in aspen or aspen dominated stands containing oak. No new element occurrences were documented for red-headed woodpecker, but both existing occurrences were updated with new data (EO IDs 25026 and 26812).

We recorded 55 bird species while conducting point counts for red-headed woodpeckers in 2025 (Table 2). Ovenbird and American robin were the most common species observed and were detected at 81% and 77% of the points, respectively. Blue jay, eastern wood-pewee, and red-eyed vireo were detected at about half to 60% of the points surveyed, and the following six species were regularly observed at 25-50% of the points: rose-breasted grosbeak, scarlet tanager, hermit thrush, eastern towhee, black-capped chickadee, and field sparrow. Ten species

were recorded at about 10-25% of the points and the remaining 34 species were uncommon and detected at less than 10% of the points (Table 2).

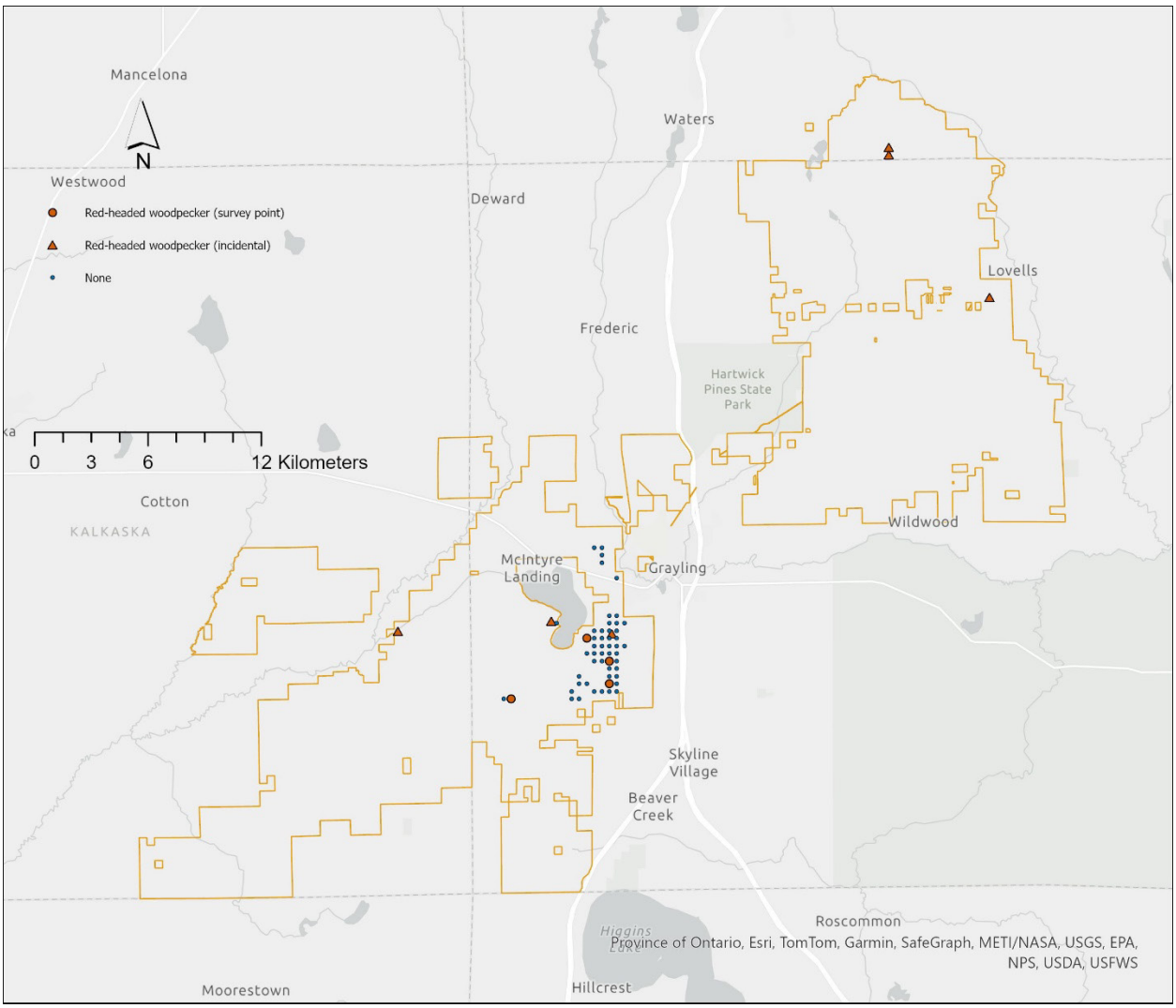

Figure 11. Red-headed woodpecker point count stations where surveys were conducted within Camp Grayling in 2025. Points with red-headed woodpecker observations are shaded red and incidental observations are indicated by red triangles.

In addition to being a Michigan species of special concern and a DoD Tier 2 species, red-headed woodpecker is a SGCN, a featured species for habitat management by the DNR's Wildlife Division, and a regional focal species for the JV Landbird Habitat Conservation Strategy due to long-term population declines within the upper Midwest and Great Lakes region (Soulliere et al. 2020). Black-billed cuckoo, another DoD Tier 2 species, was also detected during red-headed woodpecker surveys. Golden-winged warbler (State Threatened) and red-shouldered hawk (State Special Concern) were recorded at several survey locations. Both species are SGCN and DNR featured species, and golden-winged warbler is a DoD mission-sensitive species and a JV focal species. We also observed three additional DNR featured species during these surveys, Canada goose, pileated woodpecker, and ruffed grouse.

Grassland and Pine Barrens Birds

We surveyed all 27 points in the year 2 panel targeting rare grassland and pine barrens bird species. Upland sandpiper was the only grassland-dependent species recorded during these surveys, with 10 individuals observed at 10 (37%) of the points, resulting in updates to two existing EOs (EO IDs 26805 and 26806). We detected eight Kirtland's warblers at four (15%) points and another five individuals while traveling between survey stations or while conducting point counts for other target species/groups. These data were used to update three existing EOs (EO IDs 5616, 11180, and 26821). A single common nighthawk was recorded at one (4%) point and an additional five individuals were recorded incidentally (Figure 12), providing information to create one new (EO ID 28240) and update three existing (EO IDs 25023, 25025, and 26824) occurrences. Occurrences of common nighthawk were widely scattered across the installation, whereas upland sandpiper was primarily detected in the Pine Barrens Management Unit. Kirtland's warbler was observed in both the North and South Camp but detections were concentrated in two general areas: the northern portion of the South Camp (STA04, Small Arms Range) and the Pine Barrens Management Unit (Figure 12).

We recorded 55 bird species while conducting surveys targeting rare bird species of grasslands and pine barrens (Table 2). Blue jay was the most common species recorded, being detected at 85% of points, while field sparrow, Nashville warbler, brown thrasher, and common raven were detected at about half to two-thirds of the points surveyed. Nine species, rose-breasted grosbeak, chipping sparrow, hermit thrush, ovenbird, upland sandpiper, vesper sparrow, eastern towhee, yellow-bellied sapsucker, and sandhill crane, were detected at 25-50% of the points. We recorded 16 species at 10-25% of the points and the remaining 25 species were uncommon and observed at less than 10% of the points (Table 2).

In addition to being State Threatened, both upland sandpiper and Kirtland's warbler are focal species in the JV's regional landbird and shorebird habitat conservation strategies (Potter et al. 2007, Soulliere et al. 2020). Kirtland's warbler and common nighthawk (State Special Concern) are also considered SGCN. Wilson's snipe, a JV shorebird focal species, was also recorded during grassland and pine barrens surveys. Along with Kirtland's warbler, three additional statewide featured species of the DNR Wildlife Division were detected during these surveys: Canada goose, ruffed grouse, and wild turkey.

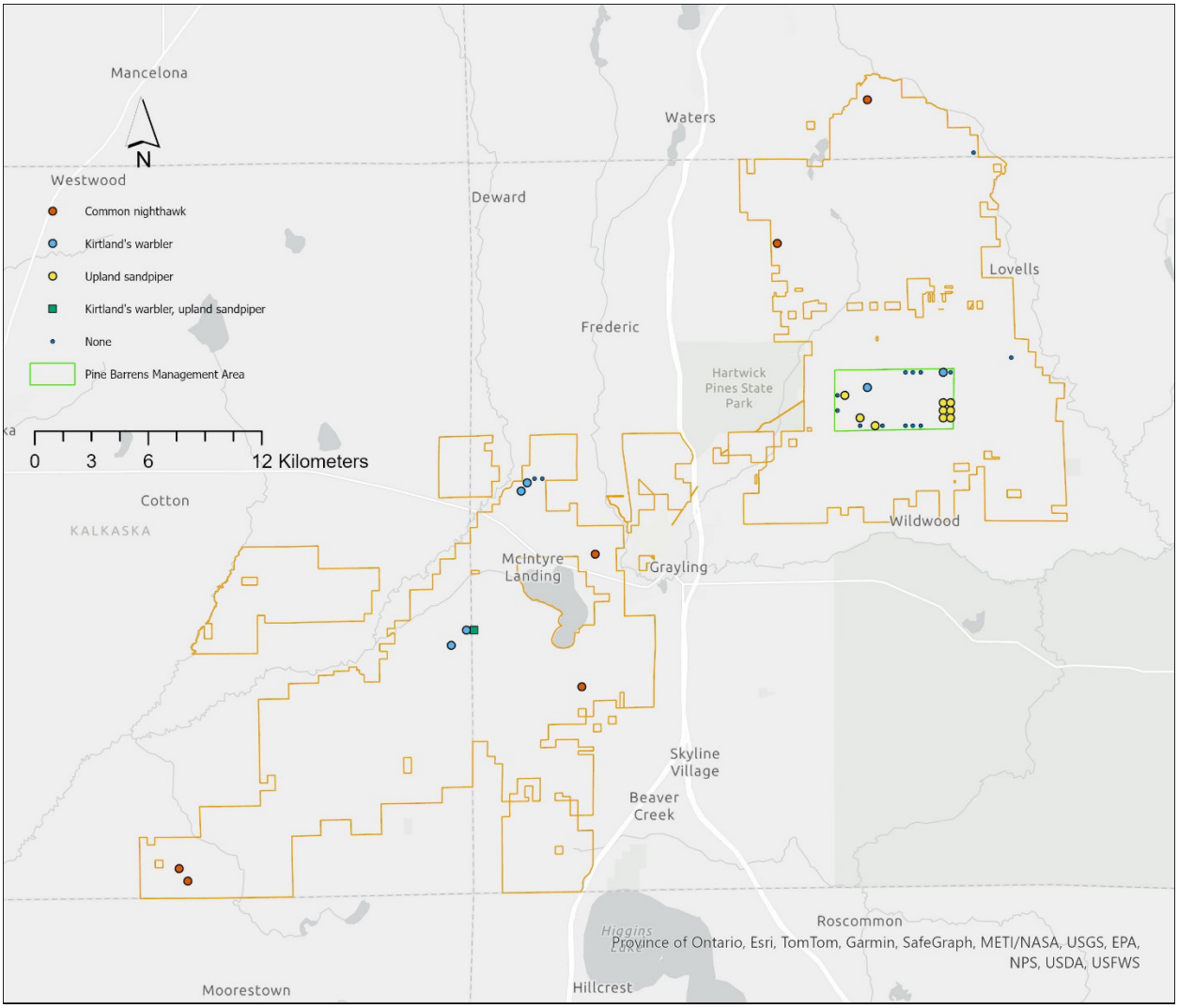

Figure 12. Point count stations where surveys for rare grassland and pine barrens bird species were conducted in Camp Grayling in 2025.

DISCUSSION

Working in partnership with the DMVA, MNFI successfully implemented the fifth year of what is intended to be a long-term monitoring program. After completing three years of surveys during 2021-2023, we modified our sample design in 2024 to be a five-year panel design to reduce annual survey costs. Under the modified design, approximately 20% of our raptor, golden-winged warbler, red-headed woodpecker, grassland, and pine barrens points will be visited each year, thus all points will be surveyed over a five-year period. In 2025, we completed the second year of the five-year survey panel rotation.

In cooperation with DMVA staff, we conducted 305 point counts for rare raptors, secretive marsh birds, and other birds of conservation concern. Data collected in 2025 resulted in four new element occurrences for four bird species and allowed us to update 30 existing occurrences of 13 bird species. We documented 99 bird species using CGJMTC across all surveys, highlighting the facility's value as habitat for breeding and migrating birds. Twenty-three of these species had one or more special status designations, such as endangered, threatened, and special concern species, SGCN, DNR featured species, and focal species of the Upper Mississippi / Great Lakes Joint Venture.

In 2025 we observed one bird species considered by DoD Partners in Flight as mission-sensitive (golden-winged warbler) and five designated as Tier 2 species (black-billed cuckoo, Canada warbler, eastern whip-poor-will, red-headed woodpecker, and wood thrush; DoD 2021) across all surveys and incidental observations. This was the first Canada warbler observation since monitoring began in 2021 and wood thrush remain rare, but data collected over the last five years suggest CGJMTC is likely an important area for the other four species. We have observed golden-winged warblers at about 2-6% of our survey points annually, red-headed woodpeckers at 8-26%, and black-billed cuckoos at 5-14%. Our surveys were not designed to detect the crepuscular and nocturnal eastern whip-poor-will, so we typically only documented a few, if any, during annual surveys. However, we often encountered them in the early mornings while traveling to survey sites, and surveys implemented by DMVA during 2022-2024 using acoustic recording units indicate that the species is widespread across CGJMTC (M. Kletich, unpublished data).

In 2025 we surveyed 28 points from our Year 2 raptor survey panel, four points having rare raptor detections during 2022-2024 surveys, and nine previously active nest sites. We did not find any new nests for either target species, but we confirmed nesting activity at four previously occupied red-shouldered hawk nests and two American goshawk nests. We also documented an active osprey nest in the northern portion of the South Camp while conducting surveys for other target species/groups.

In 2024, we expanded marsh bird surveys to include seven new points in the southwestern part of the South Camp in wetlands associated with Little Cannon Creek. Based on the results of these surveys, we modified these points prior to 2025 surveys by dropping two points located in marginal habitat and moving two others to improve access. We reconfirmed the presence of American bittern within the Black Creek and Barker Creek wetland complexes and detected the

species for the first time in wetlands adjacent to Little Cannon Creek, resulting in the creation of a new EO. We also reconfirmed the presence of least bittern within the Barker Creek complex and sedge wren within the Little Cannon Creek complex, two species detected for the first time during 2024 surveys.

Surveys for at-risk bird species provided substantial data on both rare species and the overall bird assemblages using the cover types targeted. Golden-winged warblers were observed at similar rates as previous years, whereas red-headed woodpeckers were observed at the lowest rate since monitoring began in 2021. Results of our surveys in herbaceous open lands and pine barrens highlighted the value of these habitats to several species, including Kirtland's warbler, upland sandpiper, and common nighthawk. We now have five years of data on at-risk bird species routinely recorded at CGJMTC, including several state-listed and DoD mission-sensitive or Tier 2 species. We recommend working with DMVA staff to explore conducting more formal analyses (e.g., occupancy models, distance sampling, logistic regression) to answer questions related to habitat use and to evaluate trends in bird distributions and abundances.

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APPENDIX A: LIST OF BIRD SPECIES DETECTED

Table A1. Common and scientific names of bird species detected in Camp Grayling in 2025.

Common Name	Scientific Name
Alder Flycatcher	*Empidonax alnorum*
American Bittern	*Botaurus lentiginosus*
American Crow	*Corvus brachyrhynchos*
American Goldfinch	*Spinus tristis*
American Goshawk	*Astur atricapillus*
American Redstart	*Setophaga ruticilla*
American Robin	*Turdus migratorius*
Bald Eagle	*Haliaeetus leucocephalus*
Baltimore Oriole	*Icterus galbula*
Barn Swallow	*Hirundo rustica*
Bay-breasted Warbler	*Setophaga castanea*
Black-and-white Warbler	*Mniotilta varia*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Blackburnian Warbler	*Setophaga fusca*
Black-capped Chickadee	*Poecile atricapillus*
Black-throated Blue Warbler	*Setophaga caerulescens*
Black-throated Green Warbler	*Setophaga virens*
Blue Jay	*Cyanocitta cristata*
Blue-winged Warbler	*Vermivora cyanoptera*
Brewster's Warbler	*Vermivora chrysoptera x cyanoptera*
Brown Creeper	*Certhia americana*
Brown Thrasher	*Toxostoma rufum*
Brown-headed Cowbird	*Molothrus ater*
Canada Goose	*Branta canadensis*
Cedar Waxwing	*Bombycilla cedrorum*
Chestnut-sided Warbler	*Setophaga pensylvanica*
Chipping Sparrow	*Spizella passerina*
Clay-colored Sparrow	*Spizella pallida*
Common Grackle	*Quiscalus quiscula*
Common Loon	*Gavia immer*
Common Nighthawk	*Chordeiles minor*
Common Raven	*Corvus corax*
Common Yellowthroat	*Geothlypis trichas*
Dark-eyed Junco	*Junco hyemalis*
Downy Woodpecker	*Dryobates pubescens*
Eastern Bluebird	*Sialia sialis*
Eastern Kingbird	*Tyrannus tyrannus*
Eastern Towhee	*Pipilo erythrophthalmus*
Eastern Wood-Pewee	*Contopus virens*
Field Sparrow	*Spizella pusilla*

Common Name	Scientific Name
Golden-crowned Kinglet	*Regulus satrapa*
Golden-winged Warbler	*Vermivora chrysoptera*
Gray Catbird	*Dumetella carolinensis*
Great-crested Flycatcher	*Myiarchus crinitus*
Hairy Woodpecker	*Dryobates villosus*
Hermit Thrush	*Catharus guttatus*
Indigo Bunting	*Passerina cyanea*
Killdeer	*Charadrius vociferus*
Kirtland's Warbler	*Setophaga kirtlandii*
Least Bittern	*Botaurus exilis*
Least Flycatcher	*Empidonax minimus*
Lincoln's Sparrow	*Melospiza lincolnii*
Magnolia Warbler	*Setophaga magnolia*
Mourning Dove	*Zenaida macroura*
Nashville Warbler	*Leiothlypis ruficapilla*
Northern Cardinal	*Cardinalis cardinalis*
Northern Flicker	*Colaptes auratus*
Northern House Wren	*Troglodytes aedon*
Northern Parula	*Setophaga americana*
Northern Waterthrush	*Parkesia noveboracensis*
Ovenbird	*Seiurus aurocapilla*
Pileated Woodpecker	*Dryocopus pileatus*
Pine Warbler	*Setophaga pinus*
Red-bellied Woodpecker	*Melanerpes carolinus*
Red-breasted Nuthatch	*Sitta canadensis*
Red-eyed Vireo	*Vireo olivaceus*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Red-winged Blackbird	*Agelaius phoeniceus*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Ruby-throated Hummingbird	*Archilochus colubris*
Ruffed Grouse	*Bonasa umbellus*
Sandhill Crane	*Antigone canadensis*
Scarlet Tanager	*Piranga olivacea*
Sedge Wren	*Cistothorus stellaris*
Song Sparrow	*Melospiza melodia*
Sora	*Porzana carolina*
Swamp Sparrow	*Melospiza georgiana*
Tennessee Warbler	*Leiothlypis peregrina*
Trumpeter Swan	*Cygnus buccinator*
Tufted Titmouse	*Baeolophus bicolor*
Turkey Vulture	*Cathartes aura*

Common Name	Scientific Name
Upland Sandpiper	*Bartramia longicauda*
Veery	*Catharus fuscescens*
Vesper Sparrow	*Pooecetes gramineus*
Virginia Rail	*Rallus limicola*
White-breasted Nuthatch	*Sitta carolinensis*
White-throated Sparrow	*Zonotrichia albicollis*
Wild Turkey	*Meleagris gallopavo*
Wilson's Snipe	*Gallinago delicata*
Winter Wren	*Troglodytes hiemalis*
Wood Duck	*Aix sponsa*
Wood Thrush	*Hylocichla mustelina*
Yellow Warbler	*Setophaga petechia*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Yellow-billed Cuckoo	*Coccyzus americanus*
Yellow-rumped Warbler	*Setophaga coronata*
Yellow-throated Vireo	*Vireo flavifrons*