

Monitoring Passerine Birds in Denali National Park and Preserve, Alaska:

2007 Progress Report

Central Alaska Network, Vital Signs Monitoring Program



East Fork of the Toklat and the Alaska Range from the Tributary Creek minigrid, 17 June 2007.

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SUMMARY

We conducted 10-minute point transect surveys in Denali National Park and Preserve, Alaska, as part of the Central Alaska Network's Vital Signs monitoring program. Surveys were conducted between 1 and 26 June between 0300 and 0900 hours. All birds detected (seen or heard) at each sampling point were recorded during a 10-minute sampling period in one of four time intervals (0 to 3 min, $>3 \leq 5$ min, $>5 \leq 8$ min, and $>8 \leq 10$ min) and one of 13 distance intervals (10-m intervals up to 100 m, 25-m intervals to 150 m, and >150 -m). The survey crew sampled 187 points on 8 minigrids in 2007, and detected 1,941 birds (1,982 detection events). The number of detections per grid ranged from 55 to 396 birds and detections per point ranged from 3.9 to 16.5 birds. Species richness ranged from 14 to 23 species per minigrid and 2.6 to 7.6 species per point. Fifty-eight species were detected on minigrids (47 species during the 10-minute counts and 11 species on the minigrids but not during the 10-minute counts). Members of two families, *Emberizidae* (Sparrows) and *Parulidea* (Warblers), comprised approximately 84% of all detections. White-crowned Sparrow was the most commonly detected species, occurring at approximately 81% of all points and comprising 28.2% of all detections. Approximately 87% of all the detections were of singing birds. Less than 9% of all detections were made within the 10 to 50 meter distance intervals and approximately 46% of detections were in the >150 meter interval. Sixty-seven percent of all detections were made in the 0-3 minute interval.

INTRODUCTION

The Central Alaska Network (CAKN) adopted a holistic view of network ecosystems and through the Vital Signs monitoring program, CAKN tracks the major physical drivers of ecosystem change and responses of the two major components of the biota: plants and animals (MacCluskie and Oakley 2005). CAKN identified *Fauna Distribution and Abundance* as one of its top three Vital Signs. Overall, CAKN wants to describe the distribution of fauna across the park's landscapes and track changes in both their distribution and abundance.

The *Fauna Distribution and Abundance* Vital Sign includes monitoring efforts for a suite of vertebrate species including birds. Birds make up >75% of the terrestrial vertebrates in CAKN and exhibit numerous characteristics that suggest their potential as ecological indicators at large scales (O'Connell et al. 2000) including high body temperature, rapid metabolism, and high ecological position in most food webs (Fancy and Sauer 2000, Peitz et al. 2002). Landbirds make up >70% of the bird species in CAKN. Of all the landbirds that occur in CAKN, *Passeriformes* (or passerines) are relatively easy and economical to detect and a single survey can cover many common species. The order *Passeriformes* includes well-known songbirds such as kinglets, flycatchers, thrushes, warblers, and sparrows. Two goals of the CAKN integrated monitoring program are to quantify the relationships between environment, vegetation, and songbird distributions across Denali's landscape and to detect changes in these distributions in response to ecological changes over time.

We developed a sampling design for CAKN where repeated measurements of the physical environment, vegetation and birds are made at randomly selected points (Roland et al. 2003). This design allows for detection of changes in the ecosystem at a landscape-scale over time. The sampling design is comprised of five rows of five points, all 500 meters apart, arranged in a grid

pattern at each study site. These “minigrids” are arranged on a macro-grid with 10 or 20 km spacing (Figure 1). By utilizing a randomized site selection procedure, the program provides unbiased data about the status and trend of park resources over large spatial scales.

Passerine monitoring objectives. The passerine bird monitoring component of the CAKN Vital Signs monitoring program has three primary objectives:

1. Estimate the density of common passerines,
2. Describe the breeding season distribution of passerines, and,
3. Assess the response of passerine birds to changes in their habitat.

The purpose of this annual report is to describe fieldwork conducted in 2007 and to provide a summary of the data collected in 2007.

METHODS

The sampling frame for the CAKN passerine monitoring in Denali consists of 24 minigrids located between the Parks Highway (eastern boundary) and the Kantishna area (western boundary) on the north side of the Alaska Range (Figure 1). These minigrids are accessible by foot travel from the Denali park road. During the first three-year period, 2006 to 2008, we will sample 24 minigrids located along the Denali park road (Figure 1) by sampling points on 8 unique minigrids each year. The second sampling rotation is expected to begin in 2009.

The 2007 survey team consisted of Jeremy Mizel (NPS biological technician), Lila Tauzer (Alaska Bird Observatory [ABO] biologist), Prescott Welton (ABO intern) and Jake Norton (ABO intern). All team members completed an intensive two-week distance sampling and bird identification training program from 14 to 25 May 2007 in Denali.

Two 2-person field crews completed the surveys in 2007. Each two-person field crew consisted of one observer, who conducted the survey, and one recorder, who recorded the detections of the observer and other environmental data on standardized data sheets. Jeremy Mizel (NPS) and Lila Tauzer (ABO) served as the observers and Prescott Weldon (ABO) and Jake Norton (ABO) served as recorders.

Surveys were conducted only under conditions of good visibility, little or no precipitation, and light winds. Surveys were completed between 0300 and 0900 from 1 and 26 June and corresponded with peak singing times for most species of passerines in interior Alaska.

We used point transect sampling (Buckland et al. 2001) for all surveys. At each sampling point, the observer estimated the horizontal distance to each detection using a laser rangefinder and identified each detected bird to species during a 10-minute sampling period. All birds seen or heard at each sampling point were recorded during one of four time intervals (0 to 3 min, $>3 \leq 5$ min, $>5 \leq 8$ min, and $>8 \leq 10$ min) and one of 13 distance intervals (10 m intervals from 0 to 100-m, 25 m intervals from 100 to 150-m, and >150 m). Additionally, the type of detection (e.g., singing, calling, and visual) was recorded. For most species, each individual bird was recorded as a separate observation. For species that occurred in clusters or flocks, the observer estimated the distance to the cluster or flock, not the individual bird.

During the 10-minute surveys, we attempted to get an “instantaneous count” of the birds present. Our survey method took into account the fact that birds closer to the observer had a higher probability of detection (if they were not flushed) than birds farther from the observer and that different species had different detection functions (i.e., the probability of detecting a bird at different distances from the observer).

After completing each 10-minute survey, characterized the habitat within 50-m of the sampling point center using level III of the Alaska Vegetation Classification System (Vioreck et al. 1992). At each sampling point, we recorded the percent coverage for each level III category within 50 meters of the center of the point. After completing the habitat characterization, the observers navigated to the next sample point using a map, compass, and hand-held Global Positioning System (GPS). Crew members recorded all species observed between points on standardized data sheets.

Scientific names of species mentioned in this report are listed in Appendix A and not within the text of this report. This list incorporates changes made in the 42nd, 43rd, 44th, 45th, 46th, and 47th Supplements to the Check-list, as published in *The Auk* 117: 847-858 (2000); 119:897-906 (2002); 120:923-932 (2003); 121:985-995 (2004); 122:1026-1031 (2005); 123:926-936 (2006).

RESULTS AND DISCUSSION

This was the second year of the three year sampling rotation for this project. Our sampling target for 2007 was 8 minigrids (n = 200 points). We sampled 187 points on 8 minigrids (93.5% sampling success). We were unable to sample 13 points due to the presence of bears, proximity of a sampling point to an occupied Golden Eagle nest, unstable terrain, and because points were centered in ponds or rivers (Table 1). No days were lost to inclement weather and all but one of the minigrids required two days to sample all accessible points. Trip reports and photographs characterizing each grid are presented in Appendix B, passerine monitoring field sampling trip reports (a separate document).

We detected 1,941 birds (1982 total detection events) on 8 minigrids in 2007, ranging from 55 birds on the Gorge Creek minigrid to 396 birds on the Sanctuary Flats minigrid (Table 2). The Gorge Creek minigrid also had the lowest mean number of birds per point (3.9) and the lowest mean number of species per point (2.6). The Sanctuary Flats minigrid had the highest mean number of birds per point (16.5) and the highest mean number of species per point (7.6). Fifty-eight species were detected on the minigrids, including 47 species on the 10-minute point counts and 11 species on the minigrids but not on the 10-minute counts (Table 3 and 4). Four species were detected on all of the minigrids including White-crowned Sparrow (*Zonotrichia leucophrys*), Fox Sparrow (*Passerella iliaca*), American Tree Sparrow (*Spizella arborea*), and Savannah Sparrow (*Passerculus sandwichensis*) and comprised approximately 63.5% of all detections. White-crowned Sparrows made up 28.2% of all detections (Table 3) and were the most commonly detected species occurring at approximately 81% of all points.

Approximately 87% of all the detections were of singing birds. Less than 9% of all detections were made within the 10 to 50 meter distance intervals and approximately 46% of detections were in the >150 meter interval (Figure 3). Most detections (67%) were made in the 0-3 minute time interval (Figure 2).

Most sampling points were characterized by scrub habitat (Figure 4). Scrub vegetation categories comprised 70.3% of the total percent coverage.

Seasonal Highlights and Comments

The sample season benefited from good weather, lack of biting insects, and the crew's enthusiasm. No sampling days were missed due to poor sampling weather. This was the first year that we used interns from the Alaska Bird Observatory as the data recorders. This model worked

well, providing this project with competent data recorders and the interns with hands-on experience conducting bird surveys.

High numbers of Arctic Warblers on the Divide Mountain and Upper Savage minigrids and Whimbrels on the Moose Creek Cabin North minigrids were part of this season's highlights. Somewhat surprising was the absence of Lapland Longpurs (*Calcarius lapponicus*). A single Lapland Longspur was observed on the Moose Creek Cabin North (MCCN) minigrid while the crew was returning to camp.

Housing issues for the ABO crew continue to plague this project in 2007, and need to be resolved in the future. The Denali Education Center provided their research cabin about seven miles north of the park entrance during pre-season training in May. This worked out well, but is not a long-term solution to the housing situation. There was no park housing available for the three ABO crew members during June, and they were forced to use the project leaders cabin about 20 miles north of the park entrance on their days off. It would be very beneficial to the ABO crew members if we could restore park housing.

We also plan to review our sampling protocol in the winter 2007 - 2008 to address a few critical issues including:

1. *Implications for long-term monitoring with a high proportion of detections that are strictly aural.* Results of a recent study on distance measurement error in auditory avian point count surveys suggested that observers could not differentiate distances of singing or calling birds beyond 65-meters (Alldredge et al. 2007). This resulted in biased data and Alldredge et al. (2007) recommended avoiding distance sampling methods on avian point counts when most detections are auditory. This is a bit troubling because most (>80%) of our detections are auditory and are made at greater than 60 meters. We will consult with Colleen Handel (USGS),

Steve Matsuoka (FWS) who are working with distance sampling on songbird surveys and Bill Thompson (NPS) to review solutions to this potential problem, including assessing the use of different methods to assess the detection probabilities of each species including double-observer (Nicols et al. 2000) and removal methods (Farnsworth et al. 1999).

2. *Power to detect 3% annual change in density of the most common passerines.* An analysis project with UAF biometricians is planned for January to April 2008 to assess if our current monitoring design has the power to detect a 3% annual change in abundance (density) over a 30-year period (following recommendations by Partners in Flight).

ACKNOWLEDGMENTS

We thank Lila Tauzer, Jake Norton, and Prescott Weldon for their enthusiasm and persistence; their hard work made this a successful survey season. Big thanks to the Denali Education Center (aka the Denali Foundation) for providing housing for the three ABO crew members in May. Thanks also to Jon Payner, GIS specialist, Denali, for helping with obtaining coordinates for survey points, Mel Flamme for helping with the upper Savage minigrid sampling, and Sue Guers, Alaska Bird Observatory, for hiring a great ABO field crew.

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TABLE 1. Sampling schedule for Central Alaska Network passerine monitoring project, Denali National Park and Preserve, Alaska, 2007.

Minigrid name	Access type	Sample dates	# points sampled		
			Day 1	Day 2	Day 3
Reindeer Hill	Foot travel	1 to 2 June	15	9	0
Moose Creek Cabin	Foot travel	4 to 5 June	16	9	1
Gorge Creek	Foot travel	7 June	16	N/A	0
Mount Healy	Foot travel	12 to 13 June	16	9	0
Sanctuary Flats East	Foot travel	15 to 16 June	19	5	0
Tributary Creek	Foot travel	17 to 18 June	15	9	0
Divide Mountain	Foot travel	23 to 24 June	16	8	0
Upper Savage	Foot travel	25 to 26 June	15	10	0

TABLE 2. Summary statistics for birds detected on 10-minute point transect surveys by minigrid, Central Alaska Network passerine monitoring program, Denali National Park and Preserve, Alaska, 2007.

Minigrid name	Points			Mean number of birds per point	Mean number of species per point
	surveyed	# birds	# species		
Reindeer Hill	24	268	17	11.1	5.9
Moose Creek Cabin	25	318	22	12.5	7.1
Gorge Creek	16	55	15	3.9	2.6
Mount Healy	25	66	15	5.9	3.8
Sanctuary Flats East	24	396	23	16.5	7.6
Tributary Creek	24	249	14	10.6	5.2
Divide Mountain	24	325	21	13.8	6.4
Upper Savage	25	264	17	11.8	5.9

TABLE 3. Species detected on 10-minute counts on 8 minigrids, Central Alaska Network passerine monitoring program, Denali National Park and Preserve, Alaska, 2007.

Common name	Detections		Minigrids		Points	
	n	%	n	%	n	%
Willow Ptarmigan	17	0.86	6	75.0	16	8.56
Rock Ptarmigan	4	0.20	2	25.0	2	1.07
Horned Grebe	2	0.10	1	12.5	2	1.07
Northern Harrier	1	0.05	1	12.5	1	0.53
Merlin	4	0.20	4	50.0	4	2.14
American Golden Plover	5	0.25	1	12.5	3	1.60
Lesser Yellowlegs	1	0.05	1	12.5	1	0.53
Spotted Sandpiper	1	0.05	1	12.5	1	0.53
Upland Sandpiper	1	0.05	1	12.5	1	0.53
Whimbrel	35	1.77	3	37.5	29	15.51
Surfbird	8	0.40	2	25.0	7	3.74
Wilson's Snipe	3	0.15	2	25.0	6	3.21
Long-tailed Jaeger	4	0.20	2	25.0	4	2.14
Mew Gull	4	0.20	4	50.0	4	2.14
Short-eared Owl	1	0.05	1	12.5	1	0.53
Northern Flicker	1	0.05	1	12.5	1	0.53
Alder Flycatcher	1	0.05	1	12.5	1	0.53
Northern Shrike	1	0.05	1	12.5	1	0.53
Gray Jay	4	0.20	2	25.0	4	2.14
Black-billed Magpie	11	0.55	5	62.5	10	5.35
Common Raven	4	0.20	2	25.0	4	2.14
Horned Lark	6	0.30	3	37.5	6	3.21
Ruby-crowned Kinglet	3	0.15	1	12.5	2	1.07
Arctic Warbler	59	2.98	3	37.5	29	15.51
Northern Wheatear	1	0.05	1	12.5	1	0.53
Gray-cheeked Thrush	29	1.46	5	62.5	23	12.30
Swainson's Thrush	1	0.05	1	12.5	1	0.53
Hermit Thrush	66	3.33	5	62.5	45	24.06
American Robin	21	1.06	2	25.0	17	9.09
Varied Thrush	2	0.10	2	25.0	2	1.07
American Pipit	12	0.61	4	50.0	11	5.89
Orange-crowned Warbler	99	4.99	7	87.5	71	37.97
Yellow Warbler	1	0.05	1	12.5	1	0.53

TABLE 3 (cont'd). Summary of species detected on the 10-minute counts on 8 minigrids, Central Alaska Network passerine monitoring program, Denali National Park and Preserve, Alaska, 2007.

Common name	Detections		Minigrids		Points	
	n	%	N	%	n	%
Yellow-rumped Warbler	2	0.10	2	25.0	2	1.07
Blackpoll Warbler	4	0.20	1	12.5	4	2.14
Northern Waterthrush	3	0.15	1	12.5	3	1.60
Wilson's Warbler	187	9.43	7	87.5	103	55.08
American Tree Sparrow	247	12.46	8	100.0	101	54.01
Savannah Sparrow	201	10.14	8	100.0	97	51.87
Fox Sparrow	251	12.66	8	100.0	138	73.80
Lincoln's Sparrow	22	1.11	3	37.5	17	9.09
White-crowned Sparrow	559	28.20	8	100.0	152	81.28
Golden-crowned Sparrow	12	0.61	3	37.5	9	4.81
Dark-eyed Junco	19	0.96	5	62.5	13	6.95
Gray-crowned Rosy Finch	4	0.20	3	37.5	4	2.14
White-winged Crossbill	1	0.05	1	12.5	1	0.53
Redpoll sp. ^a	54	2.72	7	87.5	52	27.81

^a All redpolls are recorded as unknown redpoll species since we cannot identify redpolls to species (i.e., Common Redpoll or Hoary Redpoll).

TABLE 4. Species detected on minigrids, but not on the 10-minute point counts, Central Alaska Network passerine monitoring program, Denali National Park and Preserve, Alaska, 2007.

Common Name	Minigrids
Mallard	1
Northern Shoveler	1
Green-winged Teal	2
Long-tailed Duck	1
Willow Ptarmigan	1
Rock Ptarmigan	1
Horned Grebe	1
Northern Harrier	2
Golden Eagle	2
Gyr Falcon	1
American Golden Plover	1
Semipalmated Plover	1
Upland Sandpiper	2
Mew Gull	1
Alder Flycatcher	1
Northern Shrike	1
Common Raven	2
Black-capped Chickadee	1
Boreal Chickadee	1
American Dipper	1
Arctic Warbler	1
Northern Wheatear	1
Yellow Warbler	1
Blackpoll Warbler	1
Lapland Longspur	1

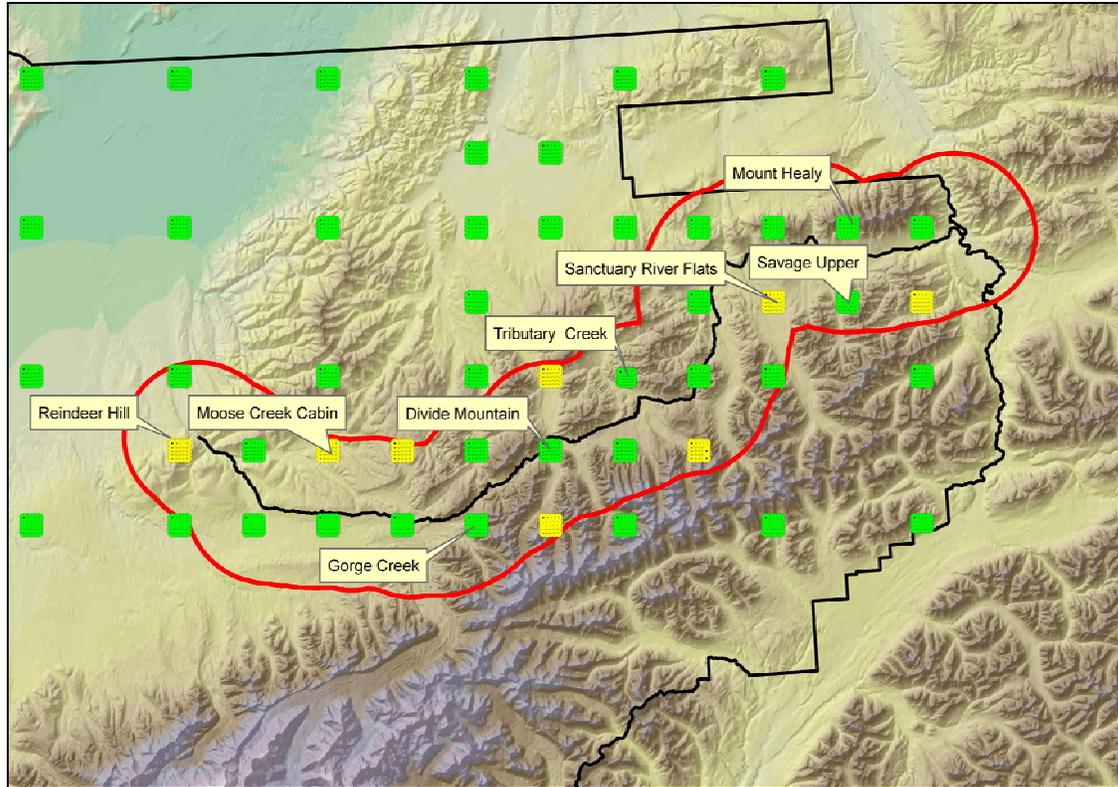


Figure 1. General location of minigrids sampled in 2007, CAKN passerine monitoring program, Denali National Park and Preserve, Alaska. The area within the red line shows the sampling area. The green minigrids within the red lines are sampled by both the songbird and vegetation monitoring programs. The yellow minigrids are sampled by the passerine monitoring program.

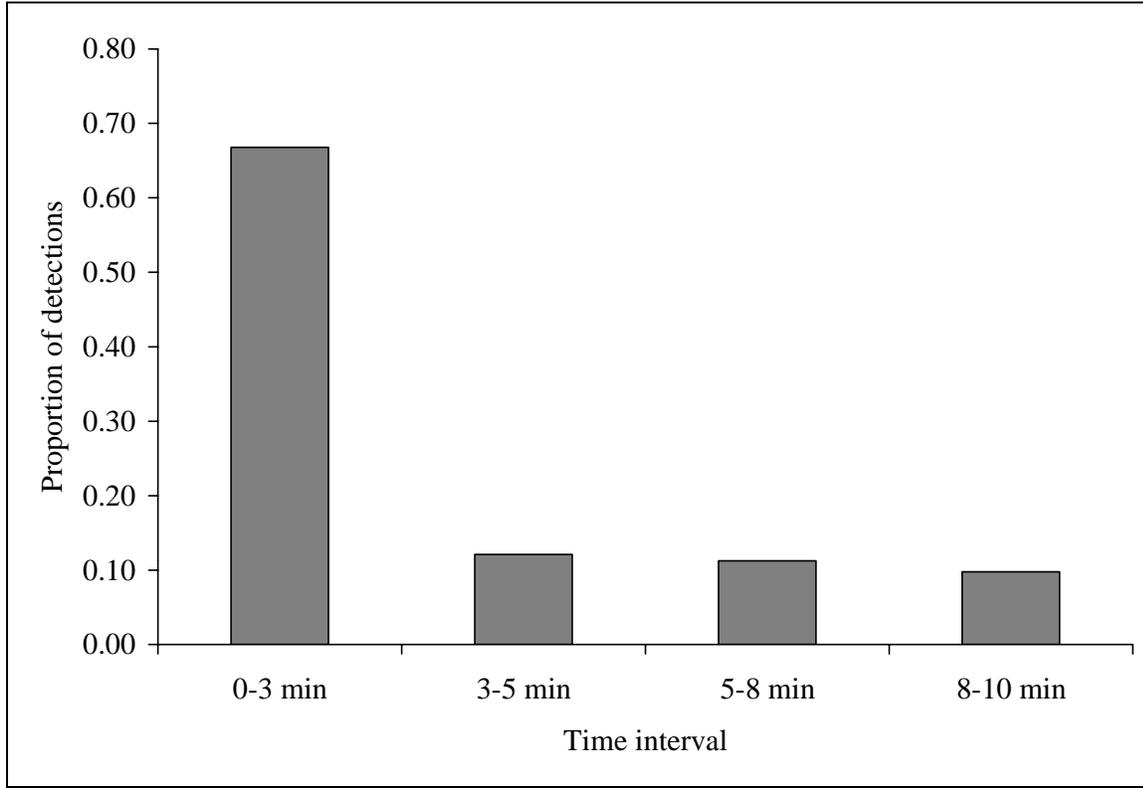


FIGURE 2. Distribution of detections of birds by time interval, Central Alaska Network passerine monitoring program, Denali National Park and Preserve, Alaska, 2007.

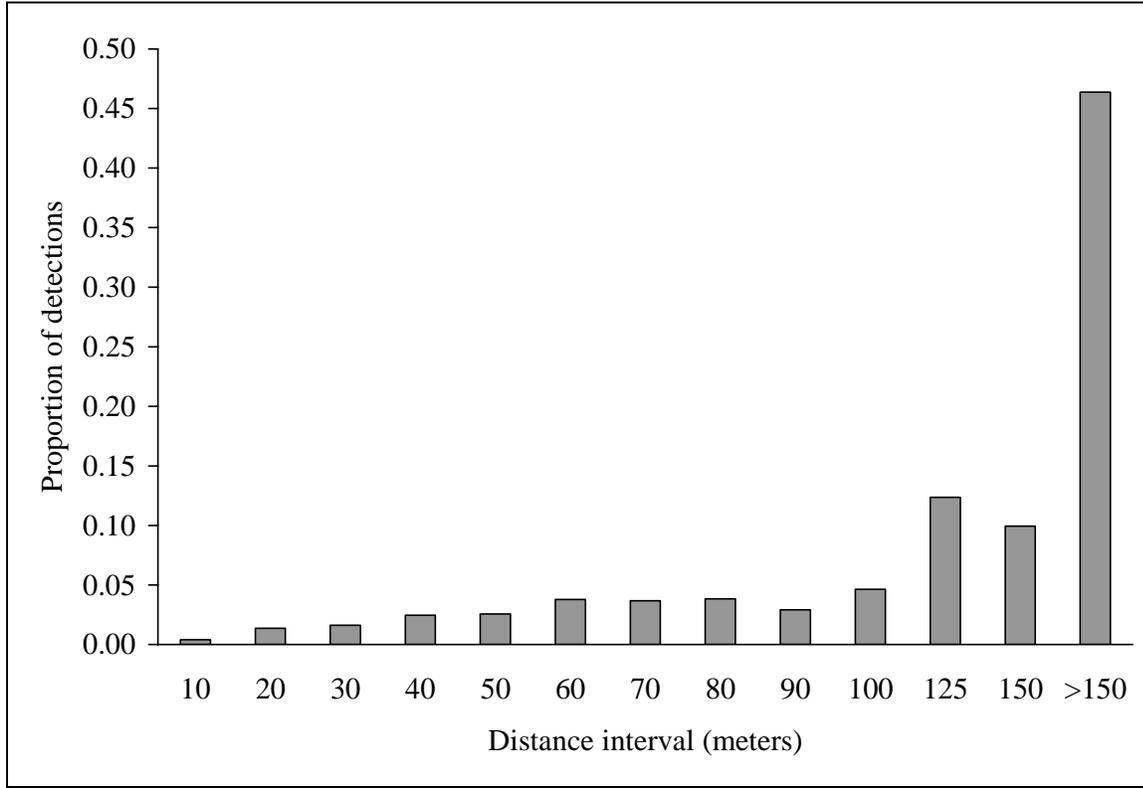


FIGURE 3. Distribution of detections of birds by distance intervals, Central Alaska Network passerine monitoring program, Denali National Park and Preserve, Alaska, 2007.

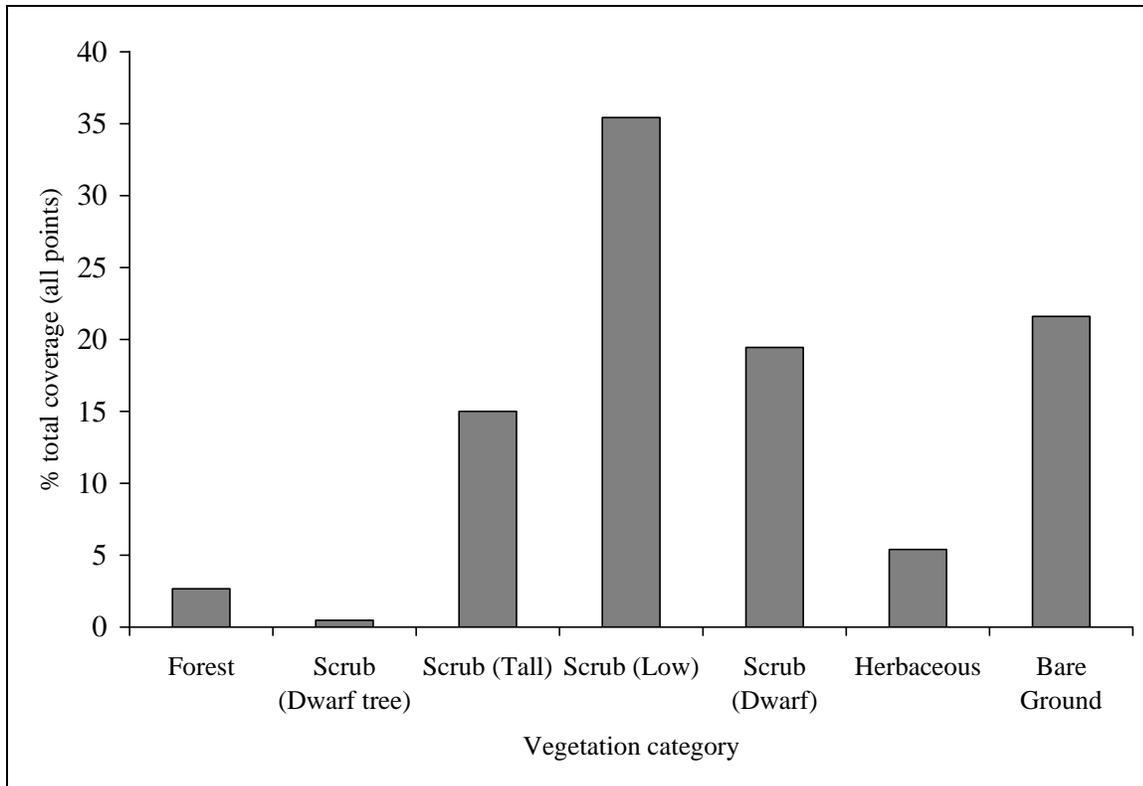


FIGURE 4. Distribution of coverage for Viereck vegetation categories (188 total points).

APPENDIX A. Common and scientific names of bird species mentioned in this report.

Common name	Genus species
Mallard	<i>Anas platyrhynchos</i>
Northern Shoveler	<i>Anas clypeata</i>
Green-winged Teal	<i>Anas crecca</i>
Long-tailed Duck	<i>Clangula hyemalis</i>
Willow Ptarmigan	<i>Lagopus lagopus</i>
Rock Ptarmigan	<i>Lagopus muta</i>
Horned Grebe	<i>Podiceps auritus</i>
Northern Harrier	<i>Circus cyaneus</i>
Golden Eagle	<i>Aquila chrysaetos</i>
Merlin	<i>Falco columbarius</i>
Gyr Falcon	<i>Falco rusticolus</i>
American Golden-Plover	<i>Pluvialis dominica</i>
Semipalmated Plover	<i>Charadrius semipalmatus</i>
Spotted Sandpiper	<i>Actitis macularius</i>
Lesser Yellowlegs	<i>Tringa flavipes</i>
Upland Sandpiper	<i>Bartramia longicauda</i>
Whimbrel	<i>Numenius phaeopus</i>
Surfbird	<i>Aphriza virgata</i>
Wilson's Snipe	<i>Gallinago delicata</i>
Mew Gull	<i>Larus canus</i>
Long-tailed Jaeger	<i>Stercorarius longicaudus</i>
Short-eared Owl	<i>Asio flammeus</i>
Northern Flicker	<i>Colaptes auratus</i>
Alder Flycatcher	<i>Empidonax alnorum</i>
Northern Shrike	<i>Lanius excubitor</i>
Gray Jay	<i>Perisoreus canadensis</i>
Black-billed Magpie	<i>Pica hudsonia</i>
Common Raven	<i>Corvus corax</i>
Horned Lark	<i>Eremophila alpestris</i>
Black-capped Chickadee	<i>Poecile atricapillus</i>
Boreal Chickadee	<i>Poecile hudsonica</i>
American Dipper	<i>Cinclus mexicanus</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>
Arctic Warbler	<i>Phylloscopus borealis</i>
Northern Wheatear	<i>Oenanthe oenanthe</i>
Gray-cheeked Thrush	<i>Catharus minimus</i>
Swainson's Thrush	<i>Catharus ustulatus</i>
Hermit Thrush	<i>Catharus guttatus</i>

APPENDIX A (cont'd). Common and scientific names of species mentioned in this report.

Common name	Genus species
American Robin	<i>Turdus migratorius</i>
Varied Thrush	<i>Ixoreus naevius</i>
American Pipit	<i>Anthus rubescens</i>
Orange-crowned Warbler	<i>Dendroica celata</i>
Yellow Warbler	<i>Dendroica petechia</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
Blackpoll Warbler	<i>Dendroica striata</i>
Northern Waterthrush	<i>Seiurus noveboracensis</i>
Wilson's Warbler	<i>Wilsonia pusilla</i>
American Tree Sparrow	<i>Spizella arborea</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
Fox Sparrow	<i>Passerella iliaca</i>
Lincoln's Sparrow	<i>Melospiza lincolnii</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Lapland Longspur	<i>Calcarius lapponicus</i>
Gray-crowned Rosy Finch	<i>Leucosticte tephrocotis</i>
White-winged Crossbill	<i>Loxia leucoptera</i>
Redpoll sp.	<i>Carduelis sp.</i>