

GRANT-KOHR'S RANCH NATIONAL HISTORIC SITE
BIRD MONITORING PROJECT

2013



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Executive Summary

Birds are an important part of the landscape. They can be helpful in determining the health of the ecosystem. Due to contamination from past mining activities in the Upper Clark Fork River Basin it is crucial to carefully monitor bird communities in the riparian and wetland areas to ensure that recovery of the area is occurring. To document the current pre-restoration bird community at Grant-Kohrs Ranch NHS and establish a baseline we conducted two types of surveys in summer 2013: we established two point count transects and searched for active nests in a small nest plot.

The area chosen for the nest searching portion of the study was a polygon set 100 meters around the net lanes used by the banding project. Nest searching is best completed over a small area, as it is an intensive study method. Because of the more productive nature of the riparian areas, the polygon was chosen to encompass this habitat. Point counts cover large areas in a short amount of time. Two point count transects, each with 16 points in a square km, were randomly selected following standard procedures. One transect encompassed grassland and agricultural ground and the other was composed primarily of riparian and wetland habitats. This allowed for comparisons both between the replicate transects and point counts previously surveyed by the Rocky Mountain Bird Observatory (RMBO) in 2004.

The method used for nest searching involved closely observing pairs of birds for any behavior that would indicate whether a nest was either present or being built. Through watching the pairs closely we were often able to locate the nest and assess the stage. The 12 days of nest searching resulted in a total of 13 nests discovered. Each nest was only approached once to determine nesting stage.

The point counts followed protocol designed by the Integrated Monitoring by Bird Conservation Region Program (IMBCR) meaning we walked to marked points using a GPS unit and recorded all the birds observed (aurally and visually) during a six minute count. The total number of birds detected on counts in 2013 was 321. The total number of species observed on the two transects combined was 42 species. Of these species, three are listed as Montana Species of Concern and eight listed by Partners in Flight. The agricultural transects had the highest diversity interestingly, followed by riparian and grassland. The wetland points had the lowest diversity but this may be simply because fewer wetland points were surveyed.

Comparing to the data collected in 2004 by the RMBO, the diversity was slightly higher (ASC) on the grassland but lower on riparian points. The RMBO also observed 14 species listed by Partners in Flight, six more species than observed in 2013. This may be due to the fact that we surveyed fewer riparian points in 2013, but riparian bird communities should be closely monitored to determine whether priority species are declining. When we compared point count data with mist-net capture and area search data collected at the bird banding station, we see that all six priority species missed by our point count surveys have been detected in recent years. We recommend that in future years a special effort be made to survey the maximum number of wetland-riparian points on the GK1 transect sited in these habitats.

Repeating the established point count transects annually is recommended in order to build a long term dataset that can be used to monitor the health of the ecosystem and track the avian response to restoration and remediation work that will begin in 2015.

Introduction

The Grant-Kohrs Ranch National Historical site is crossed by the Clark Fork River. The habitat along this river consists of willow, alder, cottonwood and marshy areas dominated by cattails. This riparian vegetation is important for breeding birds. In the early 1900s, a series of floods washed heavy metals from the mines in the Butte and Anaconda areas down the river. This in conjunction with the contamination through the air has caused severe habitat degradation. In this project we conducted bird surveys to assess the current bird community, make comparisons with data collected in previous years, and to establish a baseline for future comparisons. In 2015 the riparian area is slated to be removed in order to dig up soils containing heavy metals and toxins; riparian vegetation will be replanted after remediation work is completed. It will be important to have as much data as possible before the restoration so the bird community can be monitored and compared to previous years.

The project at the Grant-Kohrs National Historical Site consisted of two field parts: point count surveys and nest searching in a designated polygon around the bird banding station. Our objectives were to set up two point count transects that can be revisited annually and to document the breeding bird community and make comparisons with bird banding data.

Methods: *Study Design*

We established two point count transects within the Grant-Kohrs Ranch boundary and these transects will become part of the Integrated Bird Monitoring Program (IMBCR) – a regional program implemented statewide in Montana and in parts of 12 other western states. IMBCR was initiated in 2008 by Rocky Mountain Bird Observatory (RMBO) in cooperation with numerous federal agencies and other partners who worked collaboratively to develop the program. The IMBCR design uses the Bird Conservation Region (BCR) as the sampling frame; within each BCR, strata are established based on landownership (e.g. BLM district, USFWS refuge system, etc.). Within each strata sample units are selected using a spatially-balanced sampling algorithm (GRTS). Samples are labeled by stratum and are surveyed by GRTS order (i.e. rank). The Grant-Kohrs Ranch will be an “overlay strata” imposed over the existing stratification of BCR 10 and Montana’s statewide bird monitoring program. This design will allow us to leverage bird detections from hundreds of points in the program in order to generate species specific detection functions used to adjust raw abundance estimates. This is ideal because one of the challenges in surveying small areas is obtaining a sufficient number of detections; by participating in this larger program we should be able to calculate density for most species detected on counts. Density estimates will be once all IMBCR data have been proofed and analyzed, RMBO expects these estimates to be available by April 2014.

After consultation with statisticians at RMBO we decided to sample two grids once, rather than one grid two times throughout the season, as specified in the contract. Calculating density estimates requires a minimum of two transects be surveyed in each strata. Kristina Smucker performed the transect selection and followed IMBCR’s GRTS procedures to the extent possible given the small size of Grant-Kohrs Ranch.

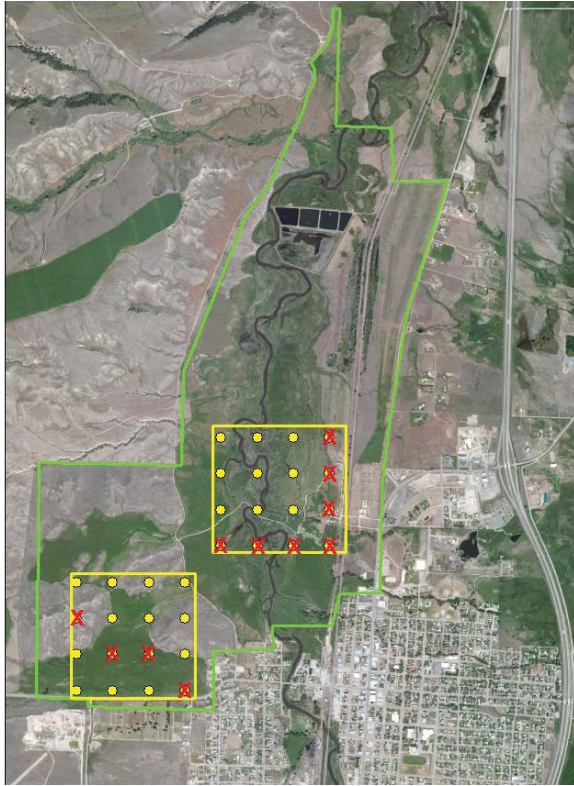


Figure 1. Location of two point count transects established at Grant-Kohrs Ranch NHS. Points Xed out were not surveyed in 2013 due to time constraints.

For the nest searching area I created a 100 meter buffer around each of our mist-nets. This created a polygon centered on our banding station and measuring approximately 300m x 500m (Figure2).

I used the perimeter of the park as the strata boundary and clipped the layer of grid centers generated for BCR 10 and provided by RMBO. I then used a fishnet procedure to create a 1 km grid with 16 points, spaced 250m apart, around each center point. Grids with less than eight points within the park boundary were excluded, leaving seven grids from which to draw a randomized sample. Each grid was randomly assigned a rank; because we only planned to survey two transects we wanted them to be spaced apart, rather than clumped. The GRTS design uses a sophisticated spatial balancing algorithm to avoid clumping. Due to the small size of the park strata we aimed for spatial balance by choosing the first rank and the next non-adjacent rank. We selected GK1, which is located in the south-central portion of the park, straddles the Clark Fork River, and includes both the ranch compound and our bird banding station, and GK 3 in the south-west portion of the park and includes irrigated hayfields grassland & habitat (Figure 1).

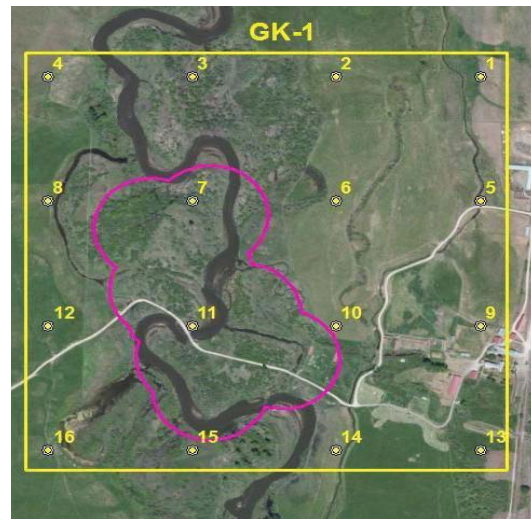


Figure 2. The nest search grid, shown in pink, fell within point count transect GK-1.

Point Count Protocol

Both point count transects were surveyed by one intern, Katie Atkinson. I attended the Montana-Idaho IMBCR program's field training in May and followed the IMBCR field protocol (Hanni et al. 2013). At each point count station I took a vegetation overview within a 50 m radius around the point. It consisted of four parts: the primary habitat, overstory, shrub layer, and ground cover. The primary habitat was determined following the IMBCR habitat key. I recorded the percentage of each species present in the overstory and shrub layers and for the ground cover layer I determined the amount of bare ground, plants (splitting herbaceous and grass), and water. The vegetation survey was done first at each point, giving the birds time to calm down and become accustomed to me.

The IMBCR bird survey protocol requires spending six minutes at each point and recording the bird species heard and seen, along with the distance from the point and how they were detected i.e. by song, call, visual or other sound. I then used a watch timer to count down each minute, recording the birds I observed during the minute in which it was first detected. The IMBCR protocol requires that a minimum of six points be surveyed on each transect. Birds not recorded on transect but observed while walking between points were recorded as "88 birds". This way a bird, particularly those of special interest, will not be missed on the final birds detected list. The protocol requires that surveys be completed by 1100.

Nest Searching Surveys

We used the BBIRD protocol for nest searching. We began within the study area to observe the resident birds for any nesting behavior. These behaviors include: a bird carrying food, nest material or fecal sacs in their mouths; a female or male chipping in an agitated tone, or a chip as they fly toward a possible nest; nervous or aggressive behavior towards us; and flying to and from the same location. Once one of these behaviors was seen, the next step was to observe the bird quietly and watch for them to steadily visit one location; sometimes it took almost an hour for a behavioral pattern to emerge. In this way the tree, ground, bush or grass clump, a bird visits repeatedly can be examined closely and the nest often found. It is important to know the nesting habits, materials and the calls different species use when feeding or defending their nests to successfully find a nest.

Results

Survey Effort

I surveyed each point count transect once. Surveys were completed on June 12 (GK3) and June 20 (GK1). For the time of year and location, the birds quieted down significantly earlier than other areas, so I decided to finish counts by 1000 rather than 1100. At transect GK3, 12 points were successfully surveyed; at transect GK1, 10 points were completed before time ran out. It was slower to survey the GK1 transect due to crossing or going around the river numerous times.

We were able to increase the number of nest searching days from seven, as specified in the contract, to 12 days by enlisting the assistance of a second ASC intern, Kellyn Fusfield. Two of the days had suboptimal weather, but nest searching was completed later in the day and the effort was still accomplished. Only a few very small areas were inaccessible due to very wet and muddy marshes. The nest searching was spread between the dates of June 12th and July 25th.

Habitat and Vegetation

The primary habitats recorded in this project were: wetland, grassland, agriculture, and riparian. The type of agriculture recorded in the GK3 transect was flood irrigated hayfield (includes ditches which occasionally had some willow and cattail components), and the agriculture in the GK1 transect was heavily grazed pasture (Table 1).

Table 1. Number of points count stations in each primary habitat type.

Habitat Type	GK1	GK3	Total
Agriculture	1	8	9
Grassland	1	4	5
Riparian	5	0	5
Wetland	3	0	3
Total	10	12	22

Point Count Surveys

The total number of bird detections recorded on the combined transects was 321. Split into transects, I recorded 122 birds on GK3 and 211 on GK1 (Appendix A). The difference is to be expected as riparian areas generally support greater bird density and diversity due to greater productivity. Plotting the mean number of detections per point shows the number of birds detected averaged highest on riparian and wetland points. The number of detections was very similar between grassland and agriculture points (Figure 3).

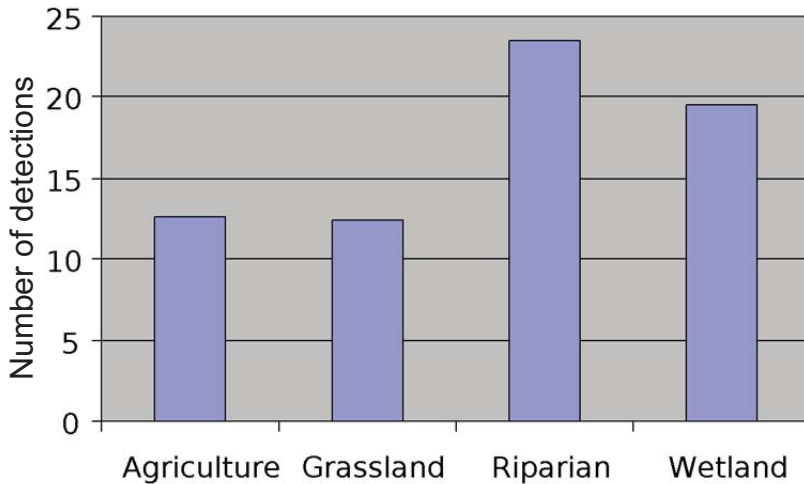


Figure 3. Mean number of bird detections/point in four primary habitats: agriculture, grassland, riparian, & wetland.

The number of species detected on the two point count transects combined was 42 species. GK1 had the higher diversity with 35 species, and GK3 was lower with 27. Species diversity also differed among habitat types. Interestingly the agriculture points had the highest diversity, followed by grassland and

riparian, and lastly the wetland habitats (Figure 4). The data could be like this because of the difference in numbers of points. Agriculture accounted for 9 of the points while grassland and riparian were only 5 points each; to further analyze this more points would need to be surveyed.

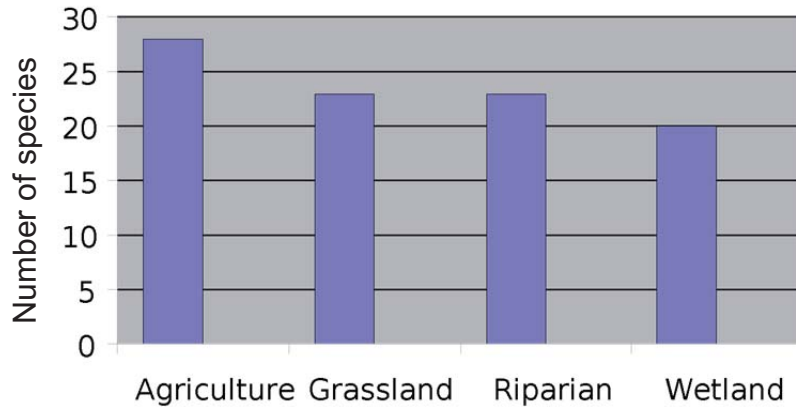


Figure 4. Number of species detected by primary habitat, combining the two point count transects.

Out of the 41 species I observed, 3 are listed as Montana species of concern: Great Blue Heron, Bobolink and Long-Billed Curlew. Among the species found there were also 8 that are listed by Partners in Flight conservation assessment. These are: Willow Flycatcher, Song Sparrow, Red-winged Blackbird, Northern Harrier, MacGillivray’s Warbler, Long-billed Curlew, Killdeer, and Bobolink.

During surveys conducted in 2004, RMBO recorded 14 species listed as Partners in Flight priority species as opposed to the 8 observed in 2013. PIF Species not observed in 2013 that had been in 2004 are as follows: Red-naped Sapsucker, Downy Woodpecker, Least Flycatcher, Gray Catbird, Clay-colored Sparrow, Yellow-headed Blackbird and Brewers Blackbird. Given the relatively small sample size and the fact that we visited points only once during the breeding season, it is not too surprising that some previously recorded species were not detected on our counts. Northern Harrier, observed in 2013, was not seen in 2004.

In 2004, RMBO technicians observed a total of 54 species on the 34 point counts they conducted in riparian and grassland habitat types. A direct comparison between the two data sets is challenging because of differences in effort and count duration (RMBO used 5 minute counts). Given that we surveyed fewer points, species diversity was actually slightly higher in 2013, but the 6 minute count duration would also inflate species diversity. To compare species diversity among habitats we combined the 2013 agriculture and grassland points and the riparian and wetland points (Figure 5). The species diversity recorded by RMBO for riparian points was higher, while the diversity recorded for the grassland was much lower. Again, direct comparisons are challenging because of differences in effort (i.e. I surveyed 8 riparian/wetland points in 2013, while RMBO surveyed 20 points in 2004) and differences in habitat that cannot be quantified.

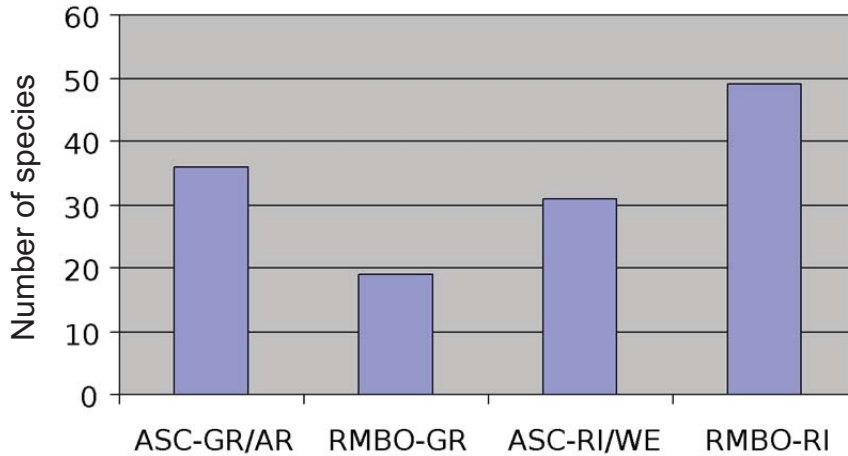


Figure 5. Mean number of species detected in different habitats by ASC surveys in 2013 and RMBO surveys in 2004. ASC-GR/AR is grassland and agriculture points combined, RMBO-GR is grassland points, ASC-RI/WE is riparian and wetland points combined, RMBO-RI is riparian points.

In order to provide the most complete species list for Grant-Kohrs ranch we compiled point count, mist-net capture, and area search data to produce a list of 110 bird species (Appendix B). Point count data come from our counts in 2013 and RMBO’s counts in 2004. Mist-net capture and area search data come from 2007, 2010, 2011, and 2012; bird banding data from the 2013 season had not been compiled as of this report date. Compiling these data reveal that both point count surveys and the bird banding program are valuable in a comprehensive bird monitoring program: 37 species were observed only on point counts while an additional 23 species were captured only in mist-nets. Just 29 species were recorded with both methods. Area searches conducted on banding dates added 21 species; this data is collected throughout the morning, by all technicians present, and is a record of all species observed visually or aurally within 0.5 km of the bird banding station. When we compared our point count data with data collected in 2004 by RMBO we were concerned that six priority bird species were not detected on our point count surveys in 2013. However, when we review mist-net capture and area search data collected at the bird banding station, we see that all six species have been detected in recent years and this confirms their persistence on the Grant-Kohrs Ranch.

It is not surprising that the area search method produced the most comprehensive species list, with 106 species recorded in four years of bird banding activities. The disadvantage of area search data is that it is impossible to record the numbers of individuals accurately. To estimate bird density and track bird populations over time, quantitative methods, such as point count or capture-recapture banding data are required.

Nest Searching

There were a total of 13 nests found in the 12 days of effort. The species and stages of the nests are located in the table below (Table 2). All nests were observed to determine the stage of nesting.

Table 2. Nests were located for 10 bird species, the number and nesting stage are reported.

Species	Number of Nests	Stage
Northern Flicker	1	Feeding Nestlings
Black-billed Magpie	1	Just Fledged
American Crow	1	Incubating
Bank Swallow	2	Building
Black-capped Chickadee	1	Feeding Nestlings
American Robin	1	Incubating
Yellow Warbler	2	Laying, feeding nestlings
Common Yellowthroat	1	Feeding Nestlings
Savannah Sparrow	1	Feeding Nestlings
Red-winged Blackbird	2	Feeding Nestlings

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Literature Cited

ASC Birds-eye View Education Program-A Training Manual. Unpublished Report. 2012. Avian Science Center, University of Montana, Missoula, Montana, USA.

The Birds of North America Online. 2013. Cornell Lab of Ornithology and the American Ornithologists Union. Website.

Giroir, G. and Beason, J. 2005. Report on the General Avian Inventory of Grant-Kohrs Ranch National Historic Site, Montana. Rocky Mountain Bird Observatory, Colorado, USA.

Hanni, D. J., C. M. White, N.J. Van Lanen, J. J. Birek, J.M. Berven, and M.A. McLaren. 2013. Integrated Monitoring of Bird Conservation Regions (IMBCR): Field protocol for spatially-balanced sampling of landbird populations. Unpublished report. Rocky Mountain Bird Observatory, Brighton, Colorado, USA.

Martin, T.E., C.R. Paine, C.J. Conway, W.M. Hochachka, P. Allen, and W. Jenkins. 1997. BBIRD Field Protocol. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana, USA.

Appendix A. Number of individuals detected on points classified as grassland-agriculture or riparian-wetland at Grant-Kohrs Ranch NHS in summer 2013. Species in bold are listed as either a Partners in Flight priority species or MT Species of Concern. Data presented here are the raw number of detections; density estimates will be produced by RMBO in conjunction with the 2013 report, available April 2014.

Species	Grassland-Agriculture	Riparian-Wetland	Total	MT SOC	PIF priority
Double-crested Cormorant ^a		1	1		
Great Blue Heron^a		2	2	S3	
Mallard	3	1	4		
Blue-winged Teal	1		1		
Lesser Scaup	1		1		
Northern Harrier	1		1		III
Red-tailed Hawk ^a	1		1		
Sandhill Crane	1		1		
Killdeer		1	1		III
Spotted Sandpiper		2	2		
Long-billed Curlew	2	1	3	S3B	II
Wilson's Snipe	4	7	11		
California Gull	1	1	2		
Mourning Dove		1	1		
Common Nighthawk	2		2		
Northern Flicker	1	2	3		
Western Wood-Pewee	2		2		
Willow Flycatcher	1	1	2		II
Eastern Kingbird	1	1	2		
Black-billed Magpie	10	21	31		
Common Raven	5	1	6		
Horned Lark	1		1		
Tree Swallow	7	1	8		
Northern Rough-winged Swallow	3	10	13		
Barn Swallow	2	3	5		
Black-capped Chickadee	2	2	4		
Mountain Chickadee	1		1		
Mountain Bluebird	2		2		
American Robin	1		1		
European Starling	2	1	3		
Yellow Warbler	6	10	16		
MacGillivray's Warbler		2	2		III
Common Yellowthroat	2	5	7		

Species	Grassland-Agriculture	Riparian-Wetland	Total	MT SOC	PIF priority
Vesper Sparrow	14		14		
Savannah Sparrow	46	26	72		
Song Sparrow		4	4		III
Black-headed Grosbeak	1	3	4		
Bobolink	4	1	5	S3B	III
Red-winged Blackbird	25	15	40		III
Western Meadowlark	15	11	26		
Common Grackle	1		1		
Brown-headed Cowbird	3	9	12		
<i>Total number of individuals</i>	<i>175</i>	<i>146</i>	<i>321</i>		

^a This species detected only while walking between points

Appendix B. Species observed at Grant-Kohrs Ranch by various survey methods: point counts, mist-netting and banding, area searches conducted while bird banding. Point counts were conducted by the ASC in 2013 and by RMBO in 2004. Mist-netting and banding took place in 4 years, in 2007 and from 2010-2012 (2013 data not available at this time). Evidence of breeding is indicated for species that were either captured in breeding condition (i.e. brood patch or cloacal protuberance) or exhibited breeding behavior (e.g. feeding nestlings, carrying nesting material, territorial display, etc.).

Species	ASC 2013 point counts	RMBO 2004 point counts	Captured in mist-nets	Years observed	Evidence of breeding
American White Pelican				2	
Double-crested Cormorant	X			3	
Great Blue Heron	X			3	
Canada Goose		X		4	
Wood Duck ^b		X		1	
Gadwall ^a		X		- ^c	
American Wigeon				2	
Mallard	X	X		4	
Blue-winged Teal	X			- ^c	
Cinnamon Teal				1	
Northern Shoveler				2	
Canvasback				1	
Lesser Scaup	X			- ^c	
Common Merganser				2	
Ruddy Duck ^a		X		- ^c	
Osprey		X		4	YES
Bald Eagle				4	
Northern Harrier	X			1	
Red-tailed Hawk	X	X		4	
American Kestrel		X		3	
Merlin				1	
Gray Partridge				1	
Sora		X		2	
Sandhill Crane	X			3	
Killdeer	X	X		4	
American Avocet				1	
Greater Yellowlegs				1	
Spotted Sandpiper	X	X		4	
Long-billed Curlew	X	X		2	
Wilson's Snipe	X	X		4	YES
Ring-billed Gull				2	

Species	ASC 2013 point counts	RMBO 2004 point counts	Captured in mist-nets	Years observed	Evidence of breeding
California Gull	X			2	
Eurasian Collared-Dove				1	
Mourning Dove	X	X		3	
Great Horned Owl				1	
Common Nighthawk	X			4	
Calliope Hummingbird			X	2	
Rufous Hummingbird			X	2	
Belted Kingfisher				3	
Red-naped Sapsucker		X	X	4	
Downy Woodpecker		X	X	4	
Hairy Woodpecker				2	
Northern Flicker	X	X	X	1	YES ^d
Western Wood-Pewee	X	X	X	4	YES
Willow Flycatcher	X	X	X	4	YES
Least Flycatcher		X	X	2	
Hammond's Flycatcher			X	1	
Dusky Flycatcher			X	1	
Cordilleran Flycatcher			X	1	
Western Kingbird ^a		X		- ^c	
Eastern Kingbird	X	X	X	4	YES
Cassin's Vireo			X	2	
Warbling Vireo				2	
Red-eyed Vireo			X	1	
Black-billed Magpie	X	X	X	4	YES ^d
American Crow		X		4	^d
Common Raven	X	X		1	
Horned Lark	X	X		1	
Tree Swallow	X	X		3	
Violet-green Swallow				2	
Northern Rough-winged Swallow	X	X	X	4	YES
Bank Swallow		X		3	^d
Cliff Swallow		X		2	
Barn Swallow	X			4	
Black-capped Chickadee	X	X	X	4	YES ^d
Mountain Chickadee	X		X	1	YES
Red-breasted Nuthatch			X	1	

Species	ASC 2013 point counts	RMBO 2004 point counts	Captured in mist-nets	Years observed	Evidence of breeding
House Wren		X	X	4	YES
Marsh Wren		X	X	4	
Ruby-crowned Kinglet			X	1	
Mountain Bluebird	X			- ^c	
Veery			X	1	
Swainson's Thrush			X	2	
Hermit Thrush			X	1	
American Robin	X	X	X	4	YES ^d
Gray Catbird		X	X	4	YES
European Starling	X	X		3	YES
Cedar Waxwing		X	X	4	YES
Tennessee Warbler			X	1	
Orange-crowned Warbler			X	4	YES
Yellow Warbler	X	X	X	4	YES ^d
Yellow-rumped Warbler			X	1	
Townsend's Warbler ^b			X	1	
Northern Waterthrush		X	X	4	
MacGillivray's Warbler	X		X	4	
Common Yellowthroat	X	X	X	4	YES ^d
Wilson's Warbler			X	2	
Western Tanager			X	3	
Chipping Sparrow			X	2	
Clay-colored Sparrow		X	X	3	
Vesper Sparrow	X	X	X	3	
Savannah Sparrow	X	X	X	4	YES ^d
Fox Sparrow				1	
Song Sparrow	X	X	X	4	YES
Lincoln's Sparrow			X	1	
Dark-eyed Junco				1	
Black-headed Grosbeak	X	X	X	4	YES
Lazuli Bunting ^b			X	1	
Bobolink	X	X		1	
Red-winged Blackbird	X	X		4	YES ^d
Western Meadowlark	X	X		3	YES
Yellow-headed Blackbird		X		2	
Brewer's Blackbird		X		2	
Common Grackle	X	X	X	4	

Species	ASC 2013 point counts	RMBO 2004 point counts	Captured in mist-nets	Years observed	Evidence of breeding
Brown-headed Cowbird	X	X	X	4	YES
Bullock's Oriole		X	X	4	YES
House Finch ^b			X	1	
Pine Siskin			X	4	
American Goldfinch		X	X	4	YES
Evening Grosbeak				2	
Total number of species	42	54	53	106	27

^aThis species observed only in 2004 by RMBO point count technicians; ^bthis species not observed since 2007; ^cthis species not observed during mist-netting and banding activities; ^dnest found for this species in 2013.