Monitoring Wyoming's Birds: 2007 Field Season Report

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In Cooperation With:

ROCKY MOUNTAIN BIRD OBSERVATORY

The mission of the Rocky Mountain Bird Observatory (RMBO) is the conservation of birds of the Rocky Mountains, Great Plains, and Intermountain West, and the habitats on which they depend. *RMBO practices a multi-faceted approach to bird conservation that integrates scientific research and monitoring studies with education and outreach programs to bring bird conservation issues to the public and other conservation partners. RMBO works closely with state and federal natural resource agencies, private landowners, schools, and other nonprofit organizations. RMBO accomplishes its mission by working in four areas:*

Research*: RMBO studies avian responses to habitat conditions, ecological processes, and management actions to provide scientific information that guides bird conservation efforts.*

Monitoring*: RMBO monitors the distribution and abundance of birds through long-term, broad-scale monitoring programs designed to track population trends for birds of the region.*

Education*: RMBO provides active, experiential, education programs for K-12 students in order to create an awareness and appreciation for birds, with a goal of their understanding of the need for bird conservation.*

Outreach*: RMBO shares the latest information in land management and bird conservation practices with private landowners, land managers, and resource professionals at natural resource agencies. RMBO develops voluntary, working partnerships with these individuals and groups for habitat conservation throughout the Great Plains and Rocky Mountains.*

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EXECUTIVE SUMMARY

Birds are excellent indicators of environmental quality and change. In addition, they are one of the most highly visible and valued components of our native wildlife. Monitoring birds provides data needed not only to effectively manage bird populations, but also to understand the effects of human activities on ecosystems and to gauge their sustainability. Because bird communities reflect a broad array of ecosystem conditions, monitoring bird communities at the habitat level offers a cost-effective means for monitoring biological integrity at a variety of scales.

In 2007, Rocky Mountain Bird Observatory (RMBO), in conjunction with its funding partners, the USDI Bureau of Land Management, USDA. Forest Service (USFS), and the Wyoming Game and Fish Department (WGFD), implemented Year Six of *Monitoring Wyoming's Birds* (MWB), as delineated by Leukering et al. (2001). RMBO designed this program to provide statistically rigorous, long-term trend data for populations of most diurnal, regularly breeding landbird species in Wyoming. This program provides information needed to effectively manage and conserve bird populations in Wyoming, including the spatial distribution, abundance, and relationship to important habitat characteristics for each species. It also contributes to RMBO's broader landscape-scale breeding-bird monitoring program.

In 2007, RMBO staff conducted 1,922 point counts along 135 transects in six different habitats statewide. We also conducted 370 point counts along 28 transects in three habitats in the Shoshone National Forest. RMBO staff detected a total of 17,576 individual birds on the statewide transects, surveyed between 12 May and 12 July. We recorded 164 different species on the point-count transects, 77 of which were detected in sufficient numbers to estimate density in at least one habitat. We obtained sufficient data on several other species to monitor their populations across habitat types, although in some cases, these species may be better monitored with additional transects in certain habitats or with alternative techniques. The USFS, Partners in Flight, the United States Fish and Wildlife Service, and the WGFD list many of these as priority species.

This year, in a departure from our usual analytical methods, we pooled the 2002-2007 point-count data to determine density estimates for each year. This allowed us to calculate density estimates for some low-density species that did not have large enough sample sizes to calculate density estimates using only the 2007 data. The pooled 2002-2007 data yielded robust density estimates (CV < 50%) for 61 species and moderately robust estimates (CV = 50-75%) for 16 additional species.

We are currently in the process of redesigning our web site so that data can be queried and results can be displayed on a variety of scales (i.e. management unit, county, state). Access to the raw data and habitat relationships will allow managers to apply the data to local management issues. In addition, we are working with the Cornell Laboratory of Ornithology's Avian Knowledge Network and the U.S. Geological Survey to compile and merge results from a variety of sources. This effort will identify monitoring programs, integrate information, and conduct analyses on regional datasets that can help inform management decisions.

ACKNOWLEDGEMENTS

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INTRODUCTION

Program History

In 2002, the Rocky Mountain Bird Observatory (RMBO), in cooperation with the USDA Forest Service (USFS), USDI Bureau of Land Management (BLM), Wyoming Game and Fish Department (WGFD), and Wyoming Partners in Flight (WY-PIF) initiated a statewide program, entitled Monitoring Wyoming's Birds (MWB), to monitor most breeding landbird populations. Modeled after Colorado's bird monitoring program, MWB is structured to obtain count-based data for most diurnal, regularly breeding landbird species in the state using a randomized and habitat-stratified design. Using the Wyoming GAP Analysis Land Cover GIS layer, blocks of habitat (stands) large enough to support a 3.5 km MWB transect were randomly selected within six habitats throughout the state. We also established additional transects in the Bighorn and Shoshone National Forests.

This program is consistent with the goals emphasized in the Partners in Flight National Landbird Monitoring Strategy (Bart et al. 2001). In addition to monitoring bird populations, the program also generates information useful in managing birds (e.g., habitat associations and spatial distribution).

Reasons for Monitoring

Birds can be excellent indicators of biological integrity and ecosystem health. They comprise a diverse group of niche specialists, occupy a broad range of habitats, are sensitive to both physical and chemical impacts on the environment, and often reflect the abundance and diversity of other organisms with which they coexist. Therefore, birds can be useful barometers of environmental change and the sustainability of human activities on ecosystems (Morrison 1986, Croonquist and Brooks 1991, Bureau of Land Management 1998, Hutto 1998, O'Connell et al. 2000, Rich 2002, U.S. EPA 2002, Birdlife International 2003).

The response of bird communities to changes in the environment can be examined at a variety of spatial scales, making bird monitoring a powerful and practical tool for evaluating the broader effects of resource management, conservation and restoration activities, or other environmental changes. Because birds are generally abundant, conspicuous, and relatively easy to identify, their monitoring offers tremendous logistical and economic advantages over that of other taxonomic groups. Also, birds are popular with the public, and there is strong and growing interest, both nationally and internationally, to manage and conserve bird populations, many of which are exhibiting long-term population declines (Sauer et al. 2003).

Without current monitoring data, conservation efforts are likely to be misguided and inefficient. For these and other reasons, monitoring is mandated by legislation such as the National Environmental Policy Act (1969), Endangered Species Act (ESA; 1973), and the National Forest Management Act (1976), as

well as by various state laws, Forest Plans, preserve-management plans, and other long-range plans (Sauer 1993, Manley et al. 1993).

Given the well-publicized declines of many species of North American breeding birds, there is an urgent need for monitoring programs that serve as an "early-warning" system to identify declining species so that natural resource managers can attempt to prevent further declines. The MWB Program is part of a broader, regional scale monitoring effort. It is designed to be repeatable, data rich, long-term, multi-scale, and efficient, so that managers can make informed decisions to effectively conserve birds and their habitats.

Monitoring Objectives

The Monitoring Wyoming Birds Program is designed to provide population status and trend data on most regularly occurring breeding landbird species within Wyoming. Initially, we expect to collect data to provide "early-warning" information for all species that can be monitored through a habitat-based approach. After establishing this monitoring framework, we anticipate collecting demographic information and testing *a priori* hypotheses to determine the possible reasons for any observed declines and to better inform management decisions. Herein we discuss the initial surveillance monitoring framework, the monitoring goals, and progress to date. In the future, with the initial trend information, we will develop and establish the second phase of the program to gather demographic and other information to address specific management issues.

The specific objectives of the Monitoring Wyoming Birds Program are:

1.) To integrate existing bird-monitoring efforts in the region to provide better information on distribution and abundance of all breeding-bird species, and especially for species of concern;
2.) To provide basic habitat-association data for most bird species to address habitat-management issues;
3.) To provide long-term status and trend data on most regularly occurring breeding species in the state, with a target of detecting a minimum rate of population change of ± 3.0% per year over a maximum time period of 30 years with a statistical significance of $p \leq 0.1$ and power ≤ 0.8;
4.) To maintain a high-quality database that is accessible to all of our collaborators as well as the public on the Internet in the form of raw and summarized data; and,
5.) To generate decision-support tools, such as population-estimate models, that help guide conservation efforts and provide a better measure of conservation success.

METHODS

Study Area

Habitats

In 2002, RMBO in coordination with Wyoming Partners in Flight (WY-PIF), selected six high-priority habitats in which to place point-count transects, with additional habitats to be added in future years as funding became available. The goal was to place 30 transects in each of the six habitats: aspen, grassland, juniper woodland, mid-elevation conifer, montane riparian, and shrubsteppe. In addition, we established ten montane grassland transects and ten montane riparian transects in Shoshone National Forest. Ten of the randomly selected statewide mid-elevation conifer transects fell within the Shoshone National Forest and we analyze these transects with those for Shoshone National Forest.

Aspen

Aspen habitat (AS) consists of stands dominated by quaking aspen (*Populus tremuloides*). However, these stands are rarely homogeneous and are often intermixed with coniferous trees. This habitat is widespread in all of the major mountain ranges with the most extensive tracts occurring in the Medicine Bow National Forest along the Colorado border and the southern reaches of the Bridger-Teton National Forest in western Wyoming. GAP code: 4100.

Grassland

Grassland habitat (GR) can include shortgrass prairie, mixed-grass prairie, and Great Basin foothills grassland. This program uses Grassland for the habitat name instead of Shortgrass Prairie as specified in the Wyoming Partners in Flight Bird Conservation Plan (Nicholoff 2003). Random stand selection did not allocate any transects in stands of Great Basin Foothills grassland, which is primarily found in the southwest quadrant of the state. This habitat designation does include the other two grassland types, and is primarily restricted to east of the continental divide. GAP codes: 31001, 31002.

Juniper Woodland

Juniper Woodland habitat (JW) is dominated by juniper (*Juniperus* spp.), although there can be a strong shrubsteppe component in low-lying areas. This habitat's stronghold is in the southwest corner of the state, but large, isolated patches occur to the Montana border through the center of the state, along the western foothills of the Bighorn Mountains. GAP code: 42015.

Mid-elevation Conifer

Mid-elevation Conifer habitat (MC) generally contains several conifer species in either pure or mixed stands. Tree species include Douglas-fir (*Pseudotsuga menziesii*), blue spruce (*Picea pungens*), lodgepole pine (*Pinus contorta*), limber

pine (*Pinus flexilis*), ponderosa pine (*Pinus ponderosa*), and occasionally has an aspen component. This is the dominant forest habitat (6.38% of land area; Nicholoff 2003) in Wyoming and occurs in all major mountain ranges, except in the far northeast corner of the state. GAP codes: 42003, 42004, 42009, 42016, 42001 (between 7,000 and 8,500 feet).

Montane Riparian

Montane Riparian habitat (MR) is associated with higher-elevation (i.e., montane) rivers and streams where willow (*Salix* spp.) is the dominant woody cover. The transects in this habitat focus on the suite of bird species dependent on willows as a nesting substrate (e.g., Veery, Wilson's Warbler, and Fox Sparrow). However, these areas tend to be linear and narrow in nature, so the surrounding forest type usually influences species recorded. GAP codes: 61001, 62001, 62003 (above 7,500 feet).

Shrubsteppe

Shrubsteppe (SS) habitat is dominated by sagebrush (*Artemisia* spp.), greasewood (*Sarcobatus vermiculatus*), saltbush (*Altriplex* spp.), and rabbitbrush (*Chrysothamnus* spp.) and can include a grass component and extensive bare ground. This is the most extensive habitat in Wyoming (42.74% of land area; Nicholoff 2003) and is found in low-elevation settings throughout the state. GAP codes: 32002, 32006, 32007, 32008, 32009, 32010, 32011, 32012, 32013.

Field Personnel

One field crew leader and 10 experienced biological technicians with excellent aural and visual bird-identification skills comprised the RMBO staff that executed the field component of MWB in 2007. Each technician completed a training program at the beginning of the field season to ensure full understanding of the field protocols and to practice bird identification and distance estimation in a variety of habitats. Four of the technicians had previous experience conducting bird monitoring for RMBO, bringing with them considerable experience with the protocol and knowledge of local birds.

Site Selection

Stands were selected using GAP Analysis Land Cover data with secondary ground-truthing during the field season. Nathan Nibbelink performed the GIS stand selection through a contract with the Bighorn National Forest. His final report to the Bighorn NF describing the selection process and selection criteria is available upon request.

For each habitat, 60 stands were randomly selected that were of at least 100 ha and within one mile of a road. We randomly chose 30 of these stands as study sites, and the remaining 30 stands were held as alternates in case any of the 30 selected stands were unsuitable (i.e., wrong habitat, not accessible, dangerous

topography, etc.). In cases where an alternate was not available, the nearest suitable stand was used.

Point Transect Protocol

RMBO staff conducted point transects (Buckland et al. 1993) in order to sample bird populations in each habitat selected for monitoring. Each transect was surveyed by one observer following protocol established by Leukering (2000) and modified by Panjabi et al. (2006). RMBO technicians conducted all transects in the morning, between ½-hour before sunrise and 11 AM; most were completed before 10 AM. To maximize efficiency, observers located the selected stand on the ground prior to the morning of the survey. For new transects, observers used this pre-survey visit to establish an access point for each stand, and a random distance (between 0-400 m) and bearing from the access point at which the first point count station would be located. On the morning of the survey, the observer began the point transect at the first count station and then continued along the pre-selected bearing for the fourteen remaining points, if possible. In many cases, the pre-selected bearing eventually would lead the transect out of the target habitat or to some obstruction (e.g., cliff or edge of habitat), forcing the observer to change the bearing of the transect. When this happened, the observer back-tracked to the last point and randomly turned the transect right or left, at an angle perpendicular to the original bearing, and then alternated right or left if additional turns were necessary. In some small or linear stands (e.g., riparian sites), the size and shape of the stand dictated the location and course of the transect.

Observers conducted up to 15 five-minute point counts at stations located at 250-m intervals along each point transect, recording all bird detections on standardized forms. Each one-minute interval of every point count was noted on the datasheet so that bird detections were recorded as part of a specific one-minute interval. Birds flying over but not using the immediate surrounding landscape (flyovers) were recorded but excluded from analyses of density. For each bird detected, observers recorded the species, sex, how it was detected (visual, calling, singing, drumming, or other aural detection) and distance from the observation point. Whenever possible, observers measured distances using laser rangefinders. When it was not possible to directly measure the distance to a bird, observers used rangefinders to estimate distance by measuring to an object close to the location of the bird. Observers treated the 250-m intervals between count stations as parts of a line transect, and recorded individuals of a short list of low-density species (all grouse, raptors, woodpeckers, and a few other rare or uncommon species), measuring the distance and bearing to each from where it was detected along the transect line. They also recorded bearings and distances to individuals of the same low-density species when they were detected at count stations. Birds initially detected on points that were again detected while moving between points were not included in the line-transect data. However, birds detected between points, but then again during the subsequent

point count, were removed from the line-transect data, and included only on the point count.

Beginning in 2004, we considered all non-independent detections of individual birds as part of a 'cluster' together with the first independently observed bird, rather than as separate independent observations. This means that if the detection of an individual bird is dependent upon the previous detection of another individual, both observations are recorded as one detection (as when birds are in a flock). We then record a cluster size of *C*, where *C* is the original individual detected plus the sum of any additional individuals detected as a result of the first individual.

Observers recorded atmospheric data (i.e., temperature in degrees Fahrenheit, cloud cover, precipitation, and wind speed using the Beaufort scale) and the time at the start and end of each transect. They measured distances between count stations using hand-held Global Positioning System units. All GPS data were logged in Universal Transverse Mercator (UTM) North American Datum 1927. At each count station, observers recorded UTM coordinates, whether or not the station was within 100 m of a road, and vegetation data, including the structural stage and canopy closure of the forest, mean canopy height, the types and relative proportions of overstory trees, the sub-canopy volume and tree species composition, and the percent coverage and types of shrubs within a 50-m radius of the point. Observers recorded these data prior to beginning each bird count.

Data Analysis

We used Program DISTANCE (Thomas et al. 2006) to generate density estimates (*D*) using only data collected at point count stations. In Distance analysis, a unique detection function is fit to each distribution of distances associated with a species in a given habitat (Buckland et al. 1993). Because the detection function is unique to each species in each habitat, Distance analysis avoids some serious problems inherent in traditional analyses of point count data, such as unquantifiable differences in detectability among habitats, species, and years. Distance analysis relies on three assumptions, all of which are reasonably well met by MWB: 1) all birds at distance = 0 are detected, 2) distances of birds close to the point are measured accurately, and 3) birds do not move in response to the observer's presence.

This year, in a departure from our usual analyses methods, we pooled the 2002-2007 point-count transect data to determine density estimates for each year the MWB program has collected point count data. This allowed us to calculate density estimates for some low-density species that would not have had large enough sample sizes if we had used only one year of data. As a general rule, density estimates were generated only for species which had a minimum of 60 independent detections across all years (2002-2007), as recorded from count stations in a given habitat (not including flyovers or between-point observations, and prior to truncation or removal of outliers). Because we considered only

independent detections in our analyses, the number of independent detections used to estimate density (*n*) reported for each species may be lower than the number of *individuals* (*N*) observed. This is especially true for species that tend to associate in groups (e.g., swifts, swallows, crossbills, etc.) Note that (*n*) reflects only the number of independent detections used to estimate density (i.e., after any truncation or removal of outliers), and may be less than the total number of independent detections or the total number of individuals observed. Both numbers may be useful, especially for low-density species, thus both are reported in the "Species Accounts" section. Total number of individuals recorded in each habitat on statewide and Shoshone NF transects, including between point detections of low-density species, is provided in Appendix B and Appendix C, respectively.

RESULTS

Wyoming Statewide Monitoring

In 2007, our sixth year of statewide bird monitoring in Wyoming, we conducted a total of 1,922 point counts along 135 point-count transects in six different habitats (Figure 1). We surveyed all transects between 12 May and 12 July (Table 1).

Table 1. Bird sampling periods and effort in Wyoming statewide habitats, summer 2007.

Habitat	Dates sampled	# point-count transects	# point counts
Aspen	4 June – 8 July	25	354
Grassland	25 May – 12 June	24	356
Juniper Woodland	23 May – 29 June	15	218
Mid-elevation Conifer	19 May – 8 July	27	366
Montane Riparian	3 June – 12 July	25	354
Shrubsteppe	12 May – 13 June	19	274
All Habitats	**12 May – 12July**	**135**	**1,922**

We detected a total of 17,576 individual birds of 164 species on statewide point-count transects (Table 2). Seventy-seven species were detected in sufficient numbers to estimate density in at least one habitat.

The total number of species detected in each habitat in 2007 ranged from 115 in Montane Riparian to 48 in Juniper Woodland (Table 2). Of the six habitats surveyed in 2007, the average number of species detected per transect was highest in Aspen and lowest in Grassland (Table 2). Note that some species were detected in very low numbers outside of their primary habitat(s).

The pooled 2002-2007 data yielded robust density estimates (CV < 50%) for 61 species and moderately robust estimates (CV = 50-75%) for 16 additional species. We should be able to continue to monitor these 77 species, which represent 47% of all species detected on point-count transects on the MWB program during 2007, but represent about 92% of all *individual birds* observed during this time.

Table 2. Counts of birds detected, by habitat, on Wyoming statewide transects, summer 2007.

Habitat	# birds detected	Avg. # birds per point	# species detected	Avg. # species per transect
Aspen	3,752	11	98	30
Grassland	2,940	8.3	59	11
Juniper Woodland	1,397	6.4	48	18
Mid-elevation Conifer	3,366	9.2	86	25
Montane Riparian	3,741	11	115	29
Shrubsteppe	2,380	8.7	66	13
All Habitats	**17,576**	**9.1**	**164**	**22**

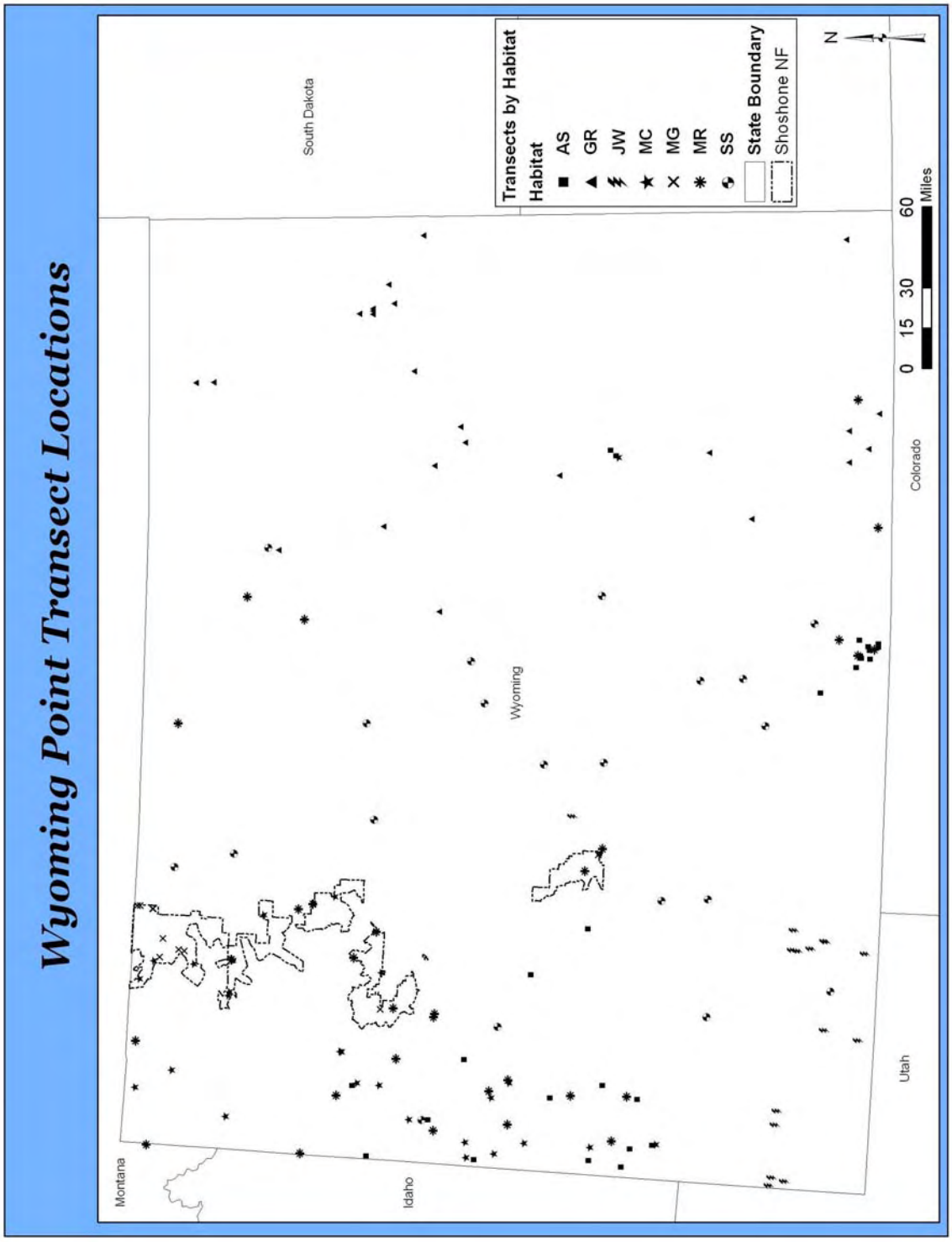

Figure 1. RMBO point-transect locations in Wyoming, 2007.

Aspen (AS)

We conducted 354 point counts along 25 transects in Aspen between 4 June and 8 July 2007. We detected a total of 3,752 individual birds, with an average of 11 birds per point count (Table 2). We detected a total of 98 species with an average of 30 species per transect (Table 2).

The point-count transect data from Aspen yielded robust density estimates (CV < 50%) for 35 species and moderately robust estimates (CV = 50-75%) for nine additional species (Table 3). We should be able to continue to monitor these 44 species in the future.

Pine Siskin, Dark-eyed Junco, Warbling Vireo, Broad-tailed Hummingbird, and House Wren had the highest estimated densities of all species detected in Aspen (listed in order of highest to lowest density). Twenty species – Dusky Grouse, Downy Woodpecker, Northern Flicker, Western Wood-Pewee, Dusky Flycatcher, Warbling Vireo, Common Raven, Tree Swallow, Black-capped Chickadee, Red-breasted Nuthatch, House Wren, Hermit Thrush, American Robin, Orange-crowned Warbler, Yellow-rumped Warbler, Green-tailed Towhee, Lincoln's Sparrow, Dark-eyed Junco, Black-headed Grosbeak, and Pine Siskin – had higher estimated densities in Aspen than in the other five statewide habitats surveyed.

Table 3. Estimated densities of breeding birds in Aspen habitat in Wyoming, 2002-2007[1].

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Dusky Grouse	2002	4.5	1.1	18.5	98	1
	2003	59.3	16.3	215.0	87	14
	2004	89.8	29.6	272.6	72	6
	2005	22.0	11.3	42.9	41	5
	2006	7.8	2.7	22.7	69	2
	2007	29.8	17.0	52.3	34	7
Red-tailed Hawk	2002	0.6	0.4	1.2	37	8
	2003	0.5	0.2	1.4	64	7
	2004	1.1	0.6	2.1	37	11
	2005	0.6	0.3	1.2	40	8
	2006	1.1	0.6	2.0	34	15
	2007	0.4	0.2	0.9	51	5
Mourning Dove	2002	1.1	0.5	2.2	46	12
	2003	1.0	0.5	1.8	38	12
	2004	6.0	3.0	11.9	43	51
	2005	2.1	1.0	4.1	42	24
	2006	5.0	3.1	7.9	28	64
	2007	4.0	2.4	6.7	32	48
Broad-tailed Hummingbird	2002	15.1	7.4	31.2	45	5
	2003	51.1	26.7	97.6	40	18
	2004	87.2	51.8	147.0	32	29
	2005	47.1	24.4	90.9	41	16
	2006	47.2	25.4	87.8	38	18
	2007	54.2	29.5	99.6	38	19

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Red-naped Sapsucker	2002	10.6	5.3	20.9	42	11
	2003	21.6	12.1	38.7	36	24
	2004	67.8	47.4	96.9	22	70
	2005	25.2	16.3	39.0	27	27
	2006	36.6	22.0	60.9	31	44
	2007	20.8	11.7	37.0	35	23
Downy Woodpecker	2002	2.8	1.1	7.4	61	4
	2003	12.5	7.1	22.2	35	19
	2004	21.0	12.9	34.0	30	27
	2005	13.0	6.8	24.7	40	18
	2006	11.6	6.7	20.0	34	19
	2007	11.3	5.5	23.0	44	16
Hairy Woodpecker	2002	3.1	1.4	6.8	48	8
	2003	5.5	3.3	9.2	31	15
	2004	13.3	7.7	23.0	34	33
	2005	5.3	2.9	10.0	38	14
	2006	7.1	4.5	11.4	29	21
	2007	21.1	12.8	34.9	31	55
Northern Flicker	2002	4.2	2.0	9.0	46	26
	2003	6.7	4.3	10.4	26	44
	2004	10.5	7.9	13.9	17	63
	2005	10.6	7.7	14.7	19	67
	2006	18.7	14.3	24.5	16	131
	2007	18.2	12.7	26.1	21	119
Western Wood-Pewee	2002	11.9	7.6	18.8	27	54
	2003	5.1	3.2	8.2	29	29
	2004	18.5	12.8	26.7	22	80
	2005	4.8	3.2	7.4	25	72
	2006	13.0	8.8	19.4	24	99
	2007	16.2	11.4	23.0	21	79
Hammond's Flycatcher	2002	1.2	0.4	3.3	69	2
	2003	3.8	1.6	8.7	52	7
	2004	22.3	14.7	34.1	25	39
	2005	7.9	2.9	21.3	64	14
	2006	12.0	6.3	22.8	39	24
	2007	4.3	1.9	10.1	53	8
Dusky Flycatcher	2002	47.0	29.0	76.2	29	78
	2003	12.0	6.6	21.7	37	38
	2004	54.7	30.8	97.1	36	105
	2005	11.6	7.2	18.5	29	92
	2006	28.3	19.3	41.5	23	99
	2007	41.5	15.5	111.3	65	135
Warbling Vireo	2002	212.0	119.3	376.5	36	160
	2003	86.7	63.2	118.9	19	171
	2004	195.0	162.2	234.4	11	335
	2005	207.8	121.6	354.9	33	234
	2006	48.5	36.1	65.1	18	237
	2007	61.2	51.6	72.6	10	361
Clark's Nutcracker	2002	0.4	0.1	0.9	62	4
	2003	1.1	0.5	2.7	54	14
	2004	2.2	1.1	4.3	42	17

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Clark's Nutcracker (cont'd)	2005	3.0	1.0	8.6	69	32
	2006	2.4	1.3	4.5	39	27
	2007	3.1	1.8	5.3	34	33
Common Raven	2002	1.2	0.6	2.4	42	14
	2003	0.5	0.3	0.9	40	6
	2004	1.7	1.1	2.8	30	19
	2005	0.6	0.2	1.5	57	5
	2006	1.1	0.6	2.2	40	13
	2007	2.6	1.4	4.8	38	28
Tree Swallow	2002	9.5	5.3	17.1	36	19
	2003	21.1	14.3	31.0	23	45
	2004	5.0	2.3	10.6	47	14
	2005	7.8	4.0	15.1	40	14
	2006	12.6	6.9	22.9	37	21
	2007	16.0	9.4	27.2	32	26
Violet-green Swallow	2002	1.7	0.7	4.0	54	6
	2003	0.8	0.2	2.8	85	3
	2004	8.0	5.0	12.8	28	26
	2005	7.4	4.5	12.1	30	27
	2006	3.2	1.6	6.3	42	12
	2007	4.2	1.7	10.6	58	11
Black-capped Chickadee	2002	19.8	10.4	37.6	40	55
	2003	1.0	0.2	5.1	121	3
	2004	4.3	1.8	9.9	53	11
	2005	4.5	2.0	10.4	52	13
	2006	7.2	3.4	15.0	46	22
	2007	11.9	5.9	23.9	43	32
Mountain Chickadee	2002	20.8	12.5	34.6	31	75
	2003	44.8	31.2	64.4	22	86
	2004	63.5	44.6	90.4	21	100
	2005	39.5	25.7	60.7	26	66
	2006	28.1	17.5	45.1	29	78
	2007	23.2	16.2	33.2	22	84
Red-breasted Nuthatch	2002	7.5	5.2	10.9	22	43
	2003	10.6	7.9	14.4	18	65
	2004	11.5	7.6	17.2	24	64
	2005	8.8	5.7	13.6	26	52
	2006	5.0	2.8	8.9	35	33
	2007	6.3	3.8	10.3	30	38
House Wren	2002	28.5	19.0	42.8	24	104
	2003	82.5	59.4	114.4	20	151
	2004	148.4	110.0	200.1	18	233
	2005	166.6	108.5	255.9	26	251
	2006	50.7	33.3	77.3	26	184
	2007	42.2	26.7	66.7	27	167
Ruby-crowned Kinglet	2002	22.9	15.8	33.3	22	126
	2003	27.1	18.0	40.8	25	130
	2004	46.8	31.4	69.8	24	129
	2005	66.6	23.0	193.0	71	120
	2006	10.9	6.8	17.6	29	79
	2007	10.2	6.3	16.4	29	79

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Mountain Bluebird	2002	12.7	6.0	26.9	46	30
	2003	10.7	6.5	17.7	31	27
	2004	20.2	12.1	33.9	32	35
	2005	10.3	5.8	18.5	36	23
	2006	25.0	14.1	44.2	35	64
	2007	8.8	4.6	16.8	40	22
Swainson's Thrush	2002	1.1	0.5	2.4	52	8
	2003	2.1	0.8	5.7	63	17
	2004	4.6	1.9	11.2	56	35
	2005	2.2	1.0	4.7	48	17
	2006	3.1	1.2	8.2	63	27
	2007	3.8	1.4	10.0	63	30
Hermit Thrush	2002	2.8	1.6	5.1	36	34
	2003	1.2	0.6	2.3	41	15
	2004	4.6	2.4	9.0	41	56
	2005	4.5	2.6	7.6	32	55
	2006	3.0	1.7	5.6	37	42
	2007	4.3	2.5	7.4	33	55
American Robin	2002	53.0	18.1	155.2	72	134
	2003	81.2	59.2	111.5	19	157
	2004	112.2	85.9	146.6	16	213
	2005	173.4	115.4	260.4	25	158
	2006	87.5	65.4	117.0	18	319
	2007	37.7	30.7	46.4	12	283
Orange-crowned Warbler	2002	4.2	1.7	10.5	57	13
	2003	4.0	2.0	7.8	41	13
	2004	10.4	5.5	19.5	38	32
	2005	12.4	7.5	20.3	30	39
	2006	15.3	9.7	24.0	27	53
	2007	21.2	14.7	30.6	22	69
Yellow Warbler	2002	14.6	5.9	36.1	57	27
	2003	17.2	6.9	42.5	57	34
	2004	16.6	10.2	27.2	30	31
	2005	15.0	9.1	24.4	30	29
	2006	17.8	9.2	34.1	40	38
	2007	36.1	23.6	55.1	26	70
Yellow-rumped Warbler	2002	75.7	51.0	112.5	24	175
	2003	35.3	23.8	52.3	24	76
	2004	94.4	68.2	130.7	20	127
	2005	189.6	135.1	266.0	21	113
	2006	45.6	33.1	62.9	19	171
	2007	32.4	15.6	66.9	46	154
MacGillivray's Warbler	2002	11.4	6.5	19.9	34	26
	2003	12.7	8.9	18.1	21	31
	2004	16.9	11.5	25.0	23	39
	2005	20.8	12.2	35.6	32	49
	2006	20.1	13.4	29.9	24	53
	2007	15.7	8.7	28.2	36	38
Western Tanager	2002	4.3	2.3	8.2	39	25
	2003	4.7	2.4	9.1	40	29
	2004	11.5	7.8	17.1	24	67

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Western Tanager (cont'd)	2005	9.8	6.6	14.4	23	58
	2006	12.7	8.7	18.6	23	84
	2007	10.4	7.1	15.4	23	64
Green-tailed Towhee	2002	8.7	5.0	15.0	33	34
	2003	9.4	5.2	16.9	36	39
	2004	18.3	12.8	26.3	21	71
	2005	18.0	11.3	28.7	28	72
	2006	31.1	23.7	40.8	16	139
	2007	38.4	25.2	58.7	25	159
Chipping Sparrow	2002	101.3	39.7	258.5	61	66
	2003	32.2	18.6	55.7	34	51
	2004	138.5	102.8	186.7	18	204
	2005	179.5	113.0	285.0	28	120
	2006	15.8	10.0	25.0	28	48
	2007	14.7	9.3	23.4	28	99
Brewer's Sparrow	2002	2.6	0.9	7.2	66	8
	2003	12.1	5.6	26.1	48	40
	2004	21.4	12.5	36.8	33	67
	2005	10.7	5.1	22.4	46	34
	2006	24.3	13.7	43.0	35	86
	2007	14.6	8.3	25.6	34	48
Vesper Sparrow	2002	2.4	1.0	5.7	54	15
	2003	1.4	0.5	3.9	69	9
	2004	1.3	0.4	3.9	74	8
	2005	3.9	2.0	7.5	40	25
	2006	6.8	3.7	12.5	37	46
	2007	3.9	1.6	10.0	59	26
Song Sparrow	2002	3.3	1.3	8.5	60	9
	2003	7.6	1.7	34.6	109	22
	2004	3.3	1.4	7.6	52	9
	2005	4.7	2.5	8.9	39	13
	2006	7.7	4.5	13.2	33	24
	2007	4.5	2.2	9.2	44	13
Lincoln's Sparrow	2002	2.0	0.6	7.0	83	5
	2003	7.3	4.0	13.1	36	19
	2004	13.4	7.8	22.8	33	31
	2005	27.3	15.1	49.4	37	69
	2006	17.3	9.4	31.7	38	49
	2007	30.7	18.8	50.2	30	80
White-crowned Sparrow	2002	13.5	5.9	30.9	51	22
	2003	19.0	9.9	36.6	40	33
	2004	29.9	18.8	47.8	28	48
	2005	10.2	5.0	20.7	43	17
	2006	9.1	3.9	21.0	52	17
	2007	13.9	7.1	27.3	41	24
Dark-eyed Junco	2002	289.8	65.1	1289.3	112	123
	2003	97.0	52.1	180.6	39	78
	2004	208.3	160.3	270.7	16	192
	2005	243.7	138.7	428.0	35	114
	2006	79.2	52.9	118.7	25	159
	2007	109.9	67.7	178.2	30	178

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Black-headed Grosbeak	2002	3.0	1.4	6.0	44	16
	2003	1.2	0.5	2.7	49	7
	2004	4.6	2.4	8.9	41	24
	2005	2.3	1.2	4.7	43	13
	2006	3.8	2.3	6.3	30	23
	2007	2.1	0.8	5.2	58	12
Western Meadowlark	2002	0.4	0.1	1.2	68	7
	2003	0.8	0.3	2.0	60	14
	2004	0.7	0.3	1.7	55	12
	2005	0.6	0.2	1.8	67	11
	2006	0.6	0.3	1.2	46	11
	2007	0.9	0.3	2.6	68	16
Brewer's Blackbird	2002	2.7	0.7	11.3	99	5
	2003	4.6	2.1	10.0	48	9
	2004	23.4	11.6	47.3	44	17
	2005	12.3	4.6	32.3	62	15
	2006	13.3	6.3	28.1	47	18
	2007	5.2	1.6	16.9	79	10
Brown-headed Cowbird	2002	5.2	2.3	11.9	51	17
	2003	4.0	1.8	9.1	51	14
	2004	9.5	5.2	17.1	36	29
	2005	13.2	6.8	25.5	41	43
	2006	5.9	2.9	11.7	43	22
	2007	5.9	3.2	10.8	37	21
Cassin's Finch	2002	6.5	3.7	11.4	34	12
	2003	5.6	2.6	12.0	47	11
	2004	13.5	8.0	22.8	32	22
	2005	14.3	8.5	24.1	32	19
	2006	5.7	3.0	10.6	39	11
	2007	4.1	1.9	8.9	48	8
Red Crossbill	2002	0	--	--	--	0
	2003	0.5	0.2	1.3	63	6
	2004	1.9	0.7	5.2	66	12
	2005	9.6	4.9	18.7	42	45
	2006	2.2	1.2	4.3	41	21
	2007	3.8	1.7	8.5	50	16
Pine Siskin	2002	73.6	33.7	161.1	49	23
	2003	36.0	19.3	67.2	39	12
	2004	496.5	300.8	819.6	31	65
	2005	367.8	186.9	723.9	42	35
	2006	55.5	27.5	111.9	44	18
	2007	126.8	62.6	257.0	44	34
Red Squirrel	2002	0.9	0.3	2.5	68	2
	2003	0.8	0.3	2.3	68	2
	2004	2.6	0.9	7.5	68	6
	2005	22.2	13.6	36.0	29	52
	2006	16.3	8.2	32.5	42	42
	2007	23.1	12.9	41.6	36	52

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

Grassland (GR)

We conducted 356 point counts along 24 transects in Grassland between 25 May and 12 June 2007. We detected a total of 2,940 birds, with an average of 8.3 birds per point count (Table 2). We detected a total of 59 species with an average of 11 species per transect (Table 2).

The point-count transect data from Grassland yielded robust density estimates (CV < 50%) for ten species and moderately robust estimates (CV = 50-75%) for eight additional species (Table 4). We should be able to continue to monitor these 18 species in the future.

Western Meadowlark, Horned Lark, Lark Bunting, Brewer's Sparrow, and McCown's Longspur had the highest estimated densities of all species detected in Grassland (listed in order of highest to lowest density). Seven species – Killdeer, Lark Bunting, Grasshopper Sparrow, McCown's Longspur, Chestnut-collared Longspur, Red-winged Blackbird, and Western Meadowlark – had higher estimated densities in Grassland than in the other five statewide habitats surveyed.

Table 4. Estimated densities of breeding birds in Grassland habitat in Wyoming, 2002-2007[1].

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Killdeer	2002	1.3	0.7	2.5	40	14
	2003	1.5	0.9	2.6	33	14
	2004	1.8	1.1	2.9	29	24
	2005	1.9	1.2	3.0	28	24
	2006	2.4	1.4	4.0	31	34
	2007	2.3	1.1	4.6	42	21
Mourning Dove	2002	0.8	0.4	1.7	46	14
	2003	0.9	0.3	2.4	62	13
	2004	3.8	1.8	8.1	48	39
	2005	1.3	0.6	2.7	47	26
	2006	2.2	1.0	5.2	54	47
	2007	1.5	0.7	3.4	51	25
Common Raven	2002	0	--	--	--	
	2003	0.1	0.1	0.1	98	2
	2004	0.1	0.1	0.4	69	8
	2005	0.2	0.1	0.4	45	13
	2006	0.2	0.1	0.4	44	15
	2007	0.2	0.1	0.4	42	17
Horned Lark	2002	80.5	36.4	177.9	51	275
	2003	91.8	71.3	118.2	15	572
	2004	80.5	63.1	102.7	15	811
	2005	66.7	51.5	86.4	16	864
	2006	64.9	52.2	80.8	13	827
	2007	65.0	48.5	87.1	17	474
Cliff Swallow	2002	1.8	0.7	4.5	57	6
	2003	3.8	1.2	11.7	72	11

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Cliff Swallow (cont'd)	2004	4.2	2.1	8.4	43	15
	2005	4.7	2.7	8.1	33	18
	2006	5.2	2.7	10.2	41	20
	2007	6.1	2.8	13.5	50	13
Rock Wren	2002	0.1	0.1	0.4	56	3
	2003	0.4	0.1	1.7	102	7
	2004	0.6	0.3	1.3	49	17
	2005	1.0	0.6	1.6	29	29
	2006	0.6	0.3	1.1	39	16
	2007	0.5	0.2	1.3	55	11
Sage Thrasher	2002	0.3	0.1	0.8	72	5
	2003	0.6	0.2	2.1	82	10
	2004	0.3	0.1	1.0	69	6
	2005	1.0	0.4	2.3	52	27
	2006	0.7	0.3	1.7	50	19
	2007	0.4	0.1	1.4	77	8
Brewer's Sparrow	2002	28.4	15.0	54.0	39	69
	2003	27.4	12.2	61.8	50	131
	2004	25.5	16.3	40.0	27	233
	2005	17.0	10.5	27.6	30	213
	2006	19.3	11.5	32.7	32	179
	2007	24.7	15.0	40.6	30	117
Vesper Sparrow	2002	20.3	10.0	41.3	44	71
	2003	17.8	9.3	34.0	40	112
	2004	14.8	9.3	23.6	28	218
	2005	7.3	5.1	10.4	21	241
	2006	8.5	5.6	12.8	25	159
	2007	9.6	5.1	18.2	40	66
Lark Sparrow	2002	6.6	2.2	19.2	70	16
	2003	3.8	1.1	12.6	79	8
	2004	3.3	1.3	8.5	61	7
	2005	0.1	0.1	0.1	76	3
	2006	1.5	0.4	5.4	85	5
	2007	11.8	5.1	27.6	53	30
Lark Bunting	2002	36.7	23.1	58.3	28	329
	2003	53.1	33.3	84.6	27	571
	2004	77.4	47.2	127.0	31	622
	2005	22.0	13.5	36.1	30	408
	2006	51.5	32.6	81.3	28	719
	2007	46.1	29.0	73.2	28	368
Savannah Sparrow	2002	3.3	1.3	8.5	60	15
	2003	1.3	0.4	3.7	69	5
	2004	0.3	0.1	1.0	72	2
	2005	5.9	2.5	14.0	54	36
	2006	3.3	1.0	11.4	84	20
	2007	0.4	0.2	1.3	70	2
Grasshopper Sparrow	2002	1.6	0.6	4.1	58	9
	2003	4.2	2.1	8.3	42	20
	2004	3.6	1.4	9.3	62	27

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Grasshopper Sparrow (cont'd)	2005	4.0	1.0	15.2	94	31
	2006	9.2	3.9	22.0	55	67
	2007	9.7	4.5	20.7	47	53
McCown's Longspur	2002	25.3	7.6	84.5	83	63
	2003	10.4	4.8	22.7	48	68
	2004	11.1	5.2	23.6	47	98
	2005	21.6	12.8	36.3	32	187
	2006	12.8	7.2	22.6	35	204
	2007	13.8	7.4	26.0	38	103
Chestnut-collared Longspur	2002	10.9	4.6	25.5	53	66
	2003	13.9	6.7	28.9	45	114
	2004	7.5	3.0	19.1	60	35
	2005	11.5	4.6	28.8	59	84
	2006	6.1	2.6	14.2	53	72
	2007	2.1	0.7	6.5	74	15
Red-winged Blackbird	2002	1.6	0.7	3.8	54	21
	2003	2.2	0.7	6.3	68	25
	2004	1.0	0.5	2.2	46	18
	2005	5.1	2.1	12.3	56	57
	2006	4.3	2.1	8.9	45	62
	2007	1.5	0.7	3.2	50	14
Western Meadowlark	2002	9.2	6.7	12.7	19	201
	2003	25.0	17.8	35.1	20	399
	2004	34.5	27.2	43.9	14	1044
	2005	22.4	18.1	27.7	13	949
	2006	50.7	40.1	64.1	14	1214
	2007	72.9	51.7	102.8	21	524
Brewer's Blackbird	2002	1.3	0.6	2.8	45	11
	2003	0.7	0.3	1.9	63	5
	2004	2.4	1.3	4.4	38	25
	2005	1.8	0.8	4.3	54	10
	2006	5.6	2.5	12.6	51	45
	2007	3.2	1.5	6.9	48	16
Brown-headed Cowbird	2002	1.1	0.5	2.3	47	12
	2003	2.0	1.0	4.3	46	20
	2004	2.6	1.5	4.6	35	37
	2005	3.9	2.3	6.6	32	54
	2006	1.6	0.9	2.7	32	23
	2007	0.2	0.1	0.5	67	2

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

Juniper Woodland (JW)

We conducted 218 point counts along 15 transects in Juniper Woodland between 23 May and 29 June 2007. We detected a total of 1,397 birds, with an average of 6.4 birds per point count (Table 2). We detected a total of 48 species with an average of 18 species per transect (Table 2). Ten species that are commonly

detected each year in Juniper Woodland habitat were removed from analyses this year due to observer identification error. This habitat was not surveyed by RMBO field staff, but contracted out to Wyoming Game and Fish Department.

The point-count transect data from Juniper Woodland yielded robust density estimates (CV < 50%) for 12 species and moderately robust estimates (CV = 50-75%) for three additional species (Table 5). We should be able to continue to monitor these 15 species in the future.

Blue-gray Gnatcatcher, Chipping Sparrow, Horned Lark, Mountain Bluebird, and Green-tailed Towhee had the highest estimated densities of all species detected in Juniper Woodland (listed in order of highest to lowest density). Six species – Pinyon Jay, Black-billed Magpie, Blue-gray Gnatcatcher, Mountain Bluebird, Chipping Sparrow, and Vesper Sparrow – had higher estimated densities in Juniper Woodland than in the other five statewide habitats surveyed.

Table 5. Estimated densities of breeding birds in Juniper Woodland habitat in Wyoming, 2002-2007[1].

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Mourning Dove	2002	4.2	3.0	5.9	20	74
	2003	9.7	6.6	14.4	24	94
	2004	6.6	4.8	9.2	20	117
	2005	9.0	6.7	12.0	18	133
	2006	16.5	12.3	22.0	18	228
	2007	3.5	1.8	6.6	40	53
Northern Flicker	2002	1.0	0.5	2.1	47	11
	2003	0.7	0.3	1.5	49	10
	2004	1.0	0.6	1.9	38	17
	2005	1.4	0.9	2.4	30	25
	2006	2.5	1.6	3.8	27	44
	2007	1.6	0.8	3.4	45	13
Dusky Flycatcher	2002	1.8	0.6	5.4	70	4
	2003	2.8	1.0	8.1	68	8
	2004	17.5	9.7	31.8	37	56
	2005	11.0	5.7	21.5	41	37
	2006	4.6	2.4	8.9	41	16
	2007	8.3	4.9	14.2	32	14
Pinyon Jay	2002	2.5	1.0	6.5	59	25
	2003	4.6	2.4	8.6	39	48
	2004	8.1	3.1	21.1	62	27
	2005	4.8	2.6	8.8	38	26
	2006	4.8	2.3	10.0	46	50
	2007	2.3	1.1	4.6	44	13
Black-billed Magpie	2002	2.0	0.7	5.6	67	16
	2003	3.0	1.7	5.0	32	31
	2004	2.7	1.6	4.5	31	28
	2005	3.3	2.1	5.2	28	40
	2006	4.2	2.5	7.2	33	55
	2007	9.5	5.2	17.3	37	47
Common Raven	2002	0.6	0.3	1.3	50	8

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Common Raven (cont'd)	2003	1.2	0.8	2.0	30	21
	2004	0.7	0.4	1.3	37	14
	2005	1.2	0.7	1.9	29	24
	2006	0.9	0.5	1.6	36	19
	2007	1.2	0.4	3.2	63	7
Horned Lark	2002	3.5	1.5	8.2	52	9
	2003	7.3	2.3	23.1	76	24
	2004	21.7	10.0	47.0	48	63
	2005	9.4	4.8	18.6	42	23
	2006	9.4	4.8	18.4	42	36
	2007	23.9	14.0	41.0	31	47
Violet-green Swallow	2002	4.4	1.5	12.7	68	14
	2003	11.5	2.9	45.9	97	47
	2004	6.9	3.0	16.0	54	19
	2005	8.0	3.3	19.4	56	28
	2006	17.3	8.4	35.6	45	70
	2007	12.2	5.1	29.0	53	32
Mountain Chickadee	2002	5.3	2.1	13.2	57	15
	2003	2.7	1.2	6.4	53	10
	2004	2.2	1.0	4.7	48	9
	2005	4.4	2.5	7.7	34	18
	2006	4.7	2.6	8.5	36	21
	2007	6.0	1.4	25.1	99	6
Blue-gray Gnatcatcher	2002	44.2	27.8	70.2	27	36
	2003	32.4	18.5	56.6	34	34
	2004	60.7	42.4	86.8	21	66
	2005	91.5	69.2	120.8	17	112
	2006	86.3	62.1	119.8	20	109
	2007	138.0	107.5	177.1	15	82
Mountain Bluebird	2002	4.5	2.8	7.4	29	46
	2003	40.3	28.2	57.6	22	100
	2004	46.6	30.4	71.5	26	150
	2005	145.4	96.4	219.4	25	165
	2006	27.9	21.5	36.1	16	226
	2007	17.8	12.0	26.5	24	82
Sage Thrasher	2002	0.7	0.3	1.4	49	4
	2003	3.6	1.7	7.5	46	28
	2004	2.1	1.2	3.8	35	19
	2005	3.7	2.2	6.2	32	34
	2006	1.6	0.8	3.3	46	14
	2007	3.0	1.5	6.2	44	14
Green-tailed Towhee	2002	22.6	13.3	38.4	32	105
	2003	16.0	8.0	32.0	43	80
	2004	8.6	5.4	13.7	28	130
	2005	38.8	23.2	64.7	32	126
	2006	13.8	8.4	22.7	30	131
	2007	16.8	6.9	40.6	55	48
Chipping Sparrow	2002	40.1	16.6	96.8	57	79
	2003	150.0	100.9	222.8	24	199
	2004	182.8	125.0	267.5	23	241
	2005	411.3	311.3	543.3	17	378

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Chipping Sparrow (cont'd)	2006	39.4	29.6	52.4	17	142
	2007	76.4	39.2	149.1	42	90
Vesper Sparrow	2002	10.3	5.3	19.8	40	66
	2003	2.1	1.1	3.9	38	38
	2004	6.9	4.2	11.1	29	68
	2005	22.3	12.8	39.0	34	75
	2006	20.2	13.4	30.5	25	136
	2007	16.1	9.9	26.4	29	68
Sage Sparrow	2002	4.0	1.6	10.3	60	17
	2003	1.3	0.5	3.4	63	7
	2004	0.8	0.4	1.7	46	5
	2005	2.8	1.2	6.2	51	18
	2006	7.3	2.7	20.2	66	49
	2007	3.4	1.5	7.5	49	11

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

Mid-elevation Conifer (MC)

We conducted 366 point counts along 27 transects in Mid-elevation Conifer between 19 May and 8 July 2007. We detected a total of 3,366 birds, with an average of 9.2 birds per point count (Table 2). We detected 86 species with an average of 25 species per transect (Table 2).

The point-count transect data from Mid-elevation Conifer yielded robust density estimates (CV < 50%) for 27 species and moderately robust estimates (CV = 50-75%) for ten additional species (Table 6). We should be able to continue to monitor these 37 species in the future.

Dark-eyed Junco, Pine Siskin, Mountain Chickadee, American Robin, and Cassin's Finch had the highest estimated densities of all species detected in Mid-elevation Conifer (listed in order of highest to lowest density). Twelve species – Hairy Woodpecker, Hammond's Flycatcher, Gray Jay, Steller's Jay, Clark's Nutcracker, Mountain Chickadee, Golden-crowned Kinglet, Ruby-crowned Kinglet, Townsend's Solitaire, Western Tanager, Cassin's Finch, and Red Crossbill – had higher estimated densities in Mid-elevation Conifer than in the other statewide habitats surveyed.

Table 6. Estimated densities of breeding birds in Mid-elevation Conifer habitat in Wyoming, 2002-2007[1].

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Red-tailed Hawk	2002	0.5	0.2	1.2	53	5
	2003	0.9	0.4	1.7	43	9
	2004	0.8	0.4	1.7	45	9
	2005	1.1	0.6	2.2	41	12
	2006	1.0	0.5	2.0	40	11
	2007	0.7	0.3	1.7	51	8

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Broad-tailed Hummingbird	2002	10.0	3.2	30.6	73	3
	2003	62.8	27.6	142.7	51	21
	2004	33.7	14.5	78.7	53	12
	2005	61.6	32.4	117.1	39	23
	2006	14.8	7.6	28.8	40	5
	2007	17.5	8.1	38.1	48	6
Red-naped Sapsucker	2002	2.6	1.0	6.8	61	4
	2003	8.1	4.4	15.1	38	14
	2004	12.6	7.7	20.6	30	22
	2005	8.3	4.7	14.7	35	16
	2006	6.9	4.2	11.3	30	12
	2007	14.8	8.1	27.1	37	25
Hairy Woodpecker	2002	3.3	1.5	7.4	49	7
	2003	6.9	4.0	11.6	32	16
	2004	8.5	5.1	14.0	30	21
	2005	8.1	5.3	12.2	25	21
	2006	11.5	7.3	17.9	27	27
	2007	23.0	15.1	35.1	25	52
Northern Flicker	2002	3.7	2.2	6.4	33	15
	2003	4.3	2.5	7.3	33	19
	2004	7.6	4.8	11.9	27	36
	2005	12.4	8.3	18.6	25	62
	2006	14.4	9.4	22.1	26	64
	2007	14.2	8.5	23.8	31	65
Olive-sided Flycatcher	2002	0.5	0.2	1.1	49	5
	2003	0.8	0.4	1.6	44	9
	2004	1.6	0.9	2.9	35	20
	2005	2.0	1.1	3.9	40	26
	2006	1.9	1.2	3.0	28	22
	2007	0.3	0.1	0.8	54	4
Hammond's Flycatcher	2002	5.1	2.4	10.7	46	8
	2003	19.0	8.6	42.1	49	33
	2004	8.7	4.5	16.7	40	15
	2005	22.2	12.4	39.8	36	43
	2006	10.9	5.7	20.7	40	19
	2007	10.7	4.9	23.6	49	17
Dusky Flycatcher	2002	8.1	4.9	13.5	31	24
	2003	9.2	4.9	17.3	39	30
	2004	15.8	10.4	24.0	25	55
	2005	9.3	5.0	17.4	38	34
	2006	17.0	10.6	27.1	28	55
	2007	12.5	8.1	19.4	26	42
Warbling Vireo	2002	5.7	2.2	14.6	60	14
	2003	10.8	5.9	19.7	37	60
	2004	16.2	7.8	33.5	46	86
	2005	21.1	13.3	33.7	28	54
	2006	12.6	8.2	19.3	26	52
	2007	12.9	3.8	43.9	85	98
Gray Jay	2002	1.1	0.4	2.6	57	3
	2003	3.8	2.1	6.8	35	12
	2004	4.5	2.0	10.1	51	11

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Gray Jay (cont'd)	2005	4.0	1.7	9.1	52	11
	2006	3.8	1.7	8.2	49	10
	2007	7.4	3.4	16.3	50	14
Steller's Jay	2002	6.2	3.2	12.1	40	26
	2003	3.5	2.0	6.0	33	16
	2004	1.0	0.5	2.0	40	5
	2005	0.8	0.4	1.6	45	4
	2006	2.8	1.5	5.0	36	11
	2007	4.2	2.1	8.5	43	18
Clark's Nutcracker	2002	2.2	1.2	3.9	36	21
	2003	5.3	2.1	13.4	59	26
	2004	5.8	3.7	9.0	27	58
	2005	3.7	2.5	5.7	26	41
	2006	6.3	4.4	8.9	21	58
	2007	6.0	4.1	8.8	23	60
Common Raven	2002	1.5	0.9	2.7	33	25
	2003	0.7	0.4	1.4	39	13
	2004	1.4	0.8	2.4	35	24
	2005	0.2	0.1	0.5	44	5
	2006	2.3	1.2	4.2	39	30
	2007	1.5	0.7	3.4	50	26
Mountain Chickadee	2002	69.3	46.5	103.5	25	186
	2003	39.2	22.0	69.8	36	135
	2004	42.8	32.7	56.0	16	126
	2005	168.0	122.1	231.1	19	188
	2006	40.3	24.0	67.6	32	127
	2007	39.1	28.3	54.0	20	179
Red-breasted Nuthatch	2002	15.2	9.4	24.6	29	88
	2003	5.7	4.2	7.6	17	61
	2004	31.1	23.3	41.4	17	121
	2005	18.2	12.8	25.7	21	65
	2006	3.1	2.2	4.4	20	34
	2007	5.5	3.7	8.3	24	58
Rock Wren	2002	0	--	--	--	0
	2003	0.1	0.1	0.4	58	3
	2004	0.4	0.1	1.0	63	8
	2005	0.4	0.1	1.3	75	9
	2006	1.5	0.8	2.9	39	31
	2007	0.3	0.1	0.8	57	7
House Wren	2002	1.2	0.6	2.6	46	4
	2003	3.8	1.9	7.6	42	14
	2004	2.8	1.5	5.2	38	11
	2005	3.9	2.3	6.6	33	15
	2006	6.2	3.1	12.5	43	23
	2007	4.5	2.6	7.8	33	17
Golden-crowned Kinglet	2002	4.9	1.7	13.6	66	9
	2003	9.8	4.5	21.2	49	17
	2004	9.6	3.5	26.8	66	17
	2005	1.7	0.4	8.3	110	2
	2006	3.9	1.5	9.8	59	8
	2007	9.1	3.9	20.8	52	19

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Ruby-crowned Kinglet	2002	32.6	18.0	59.1	37	189
	2003	28.7	20.8	39.7	19	144
	2004	56.6	40.5	79.0	20	193
	2005	228.6	178.1	293.4	15	209
	2006	28.2	19.1	41.8	24	149
	2007	19.3	12.5	29.7	26	120
Mountain Bluebird	2002	1.2	0.4	3.8	76	3
	2003	5.7	2.8	11.7	44	16
	2004	7.1	3.7	13.4	40	18
	2005	7.7	4.1	14.5	39	23
	2006	6.4	3.2	12.6	42	18
	2007	4.2	1.9	9.2	49	11
Townsend's Solitaire	2002	3.1	1.9	5.2	30	16
	2003	0.4	0.1	1.6	106	2
	2004	5.3	3.1	9.0	32	29
	2005	1.3	0.6	2.8	50	8
	2006	3.7	2.1	6.5	34	21
	2007	2.9	1.5	5.6	40	16
Swainson's Thrush	2002	0.7	0.2	3.0	99	5
	2003	5.8	3.1	10.8	38	45
	2004	6.3	3.1	13.0	44	52
	2005	3.2	1.7	6.0	38	28
	2006	3.1	1.7	5.5	36	24
	2007	3.1	1.5	6.5	44	25
Hermit Thrush	2002	1.0	0.6	1.8	34	22
	2003	2.0	1.3	3.3	29	49
	2004	3.7	2.5	5.4	23	93
	2005	3.4	2.2	5.3	26	90
	2006	3.6	2.4	5.5	24	88
	2007	2.7	1.8	4.1	25	66
American Robin	2002	38.8	23.4	64.2	31	105
	2003	41.1	29.1	58.2	21	120
	2004	65.5	46.9	91.6	20	155
	2005	193.8	149.3	251.6	16	207
	2006	48.8	36.7	65.0	17	209
	2007	28.9	16.2	51.7	36	269
Orange-crowned Warbler	2002	2.2	1.0	5.1	51	12
	2003	1.4	0.5	3.9	68	8
	2004	1.4	0.6	3.3	53	9
	2005	0.2	0.1	0.6	97	1
	2006	1.3	0.4	4.2	75	8
	2007	3.3	1.4	7.6	52	20
Yellow-rumped Warbler	2002	102.2	70.1	148.9	23	255
	2003	25.0	17.7	35.3	21	147
	2004	42.5	31.2	57.8	19	190
	2005	337.3	218.3	521.1	27	164
	2006	51.1	35.2	74.2	23	192
	2007	17.0	12.1	23.9	20	125
MacGillivray's Warbler	2002	3.2	1.5	6.5	44	7
	2003	20.8	10.9	39.6	39	51
	2004	12.6	6.5	24.4	40	31

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
MacGillivray's Warbler (cont'd)	2005	9.8	6.0	16.2	30	27
	2006	9.3	4.7	18.4	42	23
	2007	6.4	2.7	14.9	53	16
Western Tanager	2002	17.0	8.8	32.8	40	45
	2003	16.1	9.9	26.0	29	79
	2004	25.2	15.7	40.3	29	75
	2005	23.0	13.3	39.8	34	25
	2006	18.9	12.2	29.4	27	78
	2007	13.9	8.3	23.2	31	102
Green-tailed Towhee	2002	1.3	0.5	3.2	56	5
	2003	8.6	4.1	18.0	46	36
	2004	7.0	3.6	13.3	40	31
	2005	2.6	1.3	5.1	42	12
	2006	7.1	3.4	14.8	46	30
	2007	9.8	4.7	20.6	46	42
Chipping Sparrow	2002	44.1	18.6	104.5	55	57
	2003	29.6	11.1	78.7	64	50
	2004	45.4	27.6	74.5	30	118
	2005	349.9	234.9	521.2	24	173
	2006	54.1	35.0	83.7	27	101
	2007	20.3	14.0	29.2	22	122
Brewer's Sparrow	2002	0	--	--	--	
	2003	0.2	0.1	1.0	117	1
	2004	4.6	2.2	9.7	46	24
	2005	0	--	--	--	0
	2006	3.6	1.8	7.3	43	18
	2007	4.4	2.2	8.8	44	22
Song Sparrow	2002	2.8	1.2	6.9	56	6
	2003	1.7	0.6	4.7	65	4
	2004	2.8	1.0	7.5	64	7
	2005	6.9	2.4	19.7	69	18
	2006	5.5	2.6	11.7	47	13
	2007	4.2	1.4	12.1	70	9
Lincoln's Sparrow	2002	0.7	0.2	2.9	99	3
	2003	6.6	3.8	11.2	32	31
	2004	6.2	3.0	12.7	44	29
	2005	4.0	2.3	6.8	33	21
	2006	9.0	6.1	13.3	23	42
	2007	5.4	2.6	11.0	44	25
White-crowned Sparrow	2002	0.2	0.1	0.8	100	1
	2003	8.1	3.8	17.2	47	43
	2004	6.8	3.3	14.2	45	40
	2005	3.9	2.5	6.3	29	24
	2006	5.6	3.2	9.8	33	31
	2007	6.4	3.7	11.3	34	35
Dark-eyed Junco	2002	366.3	153.6	873.7	56	189
	2003	93.9	51.9	170.0	37	183
	2004	110.2	82.2	147.7	18	242
	2005	399.6	249.5	640.0	29	217
	2006	120.6	86.8	167.5	20	285
	2007	86.1	67.4	110.0	15	339

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Cassin's Finch	2002	38.9	20.0	75.7	41	16
	2003	50.4	24.6	103.4	45	23
	2004	59.7	25.4	140.2	54	15
	2005	180.5	93.7	348.0	41	51
	2006	28.2	12.9	62.0	49	11
	2007	27.8	12.0	64.5	53	12
Red Crossbill	2002	1.8	0.5	6.0	81	4
	2003	4.8	2.3	10.3	47	12
	2004	19.7	9.1	42.6	49	21
	2005	39.0	12.5	121.4	76	17
	2006	20.4	11.1	37.3	38	28
	2007	8.3	4.2	16.2	42	20
Pine Siskin	2002	28.9	17.2	48.3	31	83
	2003	53.0	31.6	88.8	32	58
	2004	179.8	123.6	261.6	23	98
	2005	877.8	634.5	1214.3	20	138
	2006	55.6	31.7	97.6	35	121
	2007	81.2	60.3	109.2	18	203
Red Squirrel	2002	4.6	1.6	13.0	66	12
	2003	10.0	4.9	20.2	43	29
	2004	11.3	4.6	27.6	56	35
	2005	20.0	12.0	33.5	31	65
	2006	11.3	5.9	21.6	40	33
	2007	31.9	20.7	49.3	26	95

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

Montane Riparian (MR)

We conducted 354 point counts along 25 transects in Montane Riparian between 3 June and 12 July, 2007. We detected a total of 3,741 birds, with an average of 11 birds per point count (Table 2). We detected 115 species with an average of 29 species per transect (Table 2).

The point-count transect data from Montane Riparian yielded robust density estimates (CV < 50%) for 36 species and moderately robust estimates (CV = 50-75%) for 13 additional species (Table 7). We should be able to continue to monitor these 49 species in the future.

Broad-tailed Hummingbird, Pine Siskin, Yellow warbler, White-crowned Sparrow, and MacGillivray's Warbler had the highest estimated densities of all species detected in Montane Riparian (listed in order of highest to lowest density). Twenty-one species – Common Merganser, Sandhill Crane, Spotted Sandpiper, Wilson's Snipe, Broad-tailed hummingbird, Red-naped Sapsucker, Olive-sided Flycatcher, Willow Flycatcher, Cordilleran Flycatcher, Gray Catbird, Cedar Waxwing, Yellow Warbler, MacGillivray's Warbler, Wilson's Warbler, Savannah Sparrow, Fox Sparrow, Song Sparrow, White-crowned Sparrow, Lazuli Bunting,

Brewer's Blackbird, and American Goldfinch – had higher estimated densities in Montane Riparian than in the other statewide habitats surveyed.

Table 7. Estimated densities of breeding birds in Montane Riparian habitat in Wyoming, 2002-2007[1].

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Common Merganser	2002	0.1	0.1	0.5	104	1
	2003	0.9	0.2	3.3	93	8
	2004	2.0	0.7	5.4	65	9
	2005	1.1	0.4	3.4	72	7
	2006	0.9	0.3	2.8	78	8
	2007	1.4	0.4	4.7	80	8
Red-tailed Hawk	2002	0.5	0.2	0.9	40	10
	2003	0.3	0.1	0.8	58	8
	2004	0.2	0.1	0.6	68	4
	2005	0.4	0.2	0.8	40	10
	2006	0.6	0.3	1.0	35	16
	2007	0.5	0.3	1.0	39	14
Sandhill Crane	2002	0.2	0.1	0.7	70	4
	2003	0.2	0.1	0.7	100	3
	2004	0.7	0.3	1.6	51	8
	2005	0.5	0.2	1.3	65	10
	2006	0.6	0.3	1.2	49	9
	2007	0.5	0.2	1.4	63	12
Spotted Sandpiper	2002	11.1	5.9	20.9	38	42
	2003	14.2	6.8	29.6	45	60
	2004	11.7	5.9	23.4	42	40
	2005	4.4	1.8	10.8	56	19
	2006	11.5	6.5	20.3	34	61
	2007	12.2	6.8	21.8	35	50
Wilson's Snipe	2002	0	--	--	--	0
	2003	1.1	0.5	2.4	49	19
	2004	1.2	0.5	2.6	48	19
	2005	2.0	1.0	4.2	45	36
	2006	1.0	0.6	1.8	34	22
	2007	0.4	0.2	1.0	56	8
Mourning Dove	2002	0.4	0.2	1.2	64	4
	2003	0.7	0.3	1.7	60	7
	2004	2.8	1.4	5.5	42	24
	2005	0.8	0.2	2.4	78	6
	2006	1.8	1.0	3.3	36	20
	2007	2.3	1.3	3.8	32	26
Broad-tailed Hummingbird	2002	45.2	19.6	103.9	52	24
	2003	76.2	44.7	130.1	33	45
	2004	80.1	46.0	139.5	34	43
	2005	103.1	61.5	172.9	31	62
	2006	68.8	38.9	121.6	35	49
	2007	96.2	51.1	181.0	39	63
Red-naped Sapsucker	2002	12.2	5.9	25.3	45	12
	2003	25.6	16.1	40.7	28	28
	2004	30.2	18.3	49.7	30	29

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Red-naped Sapsucker(cont'd)	2005	28.7	18.7	44.2	26	30
	2006	25.8	14.9	44.4	33	34
	2007	22.2	12.3	40.1	36	26
Northern Flicker	2002	2.8	1.7	4.6	30	26
	2003	3.4	2.2	5.3	26	36
	2004	4.1	2.6	6.4	27	37
	2005	3.6	2.3	5.4	26	37
	2006	5.7	4.0	8.2	22	71
	2007	5.3	3.7	7.5	22	60
Olive-sided Flycatcher	2002	0.6	0.2	1.3	54	4
	2003	0.6	0.3	1.5	58	5
	2004	2.1	1.0	4.0	42	15
	2005	2.3	1.1	4.8	45	19
	2006	1.3	0.7	2.6	42	13
	2007	1.0	0.4	2.8	66	9
Western Wood-Pewee	2002	0.5	0.2	1.1	57	5
	2003	0.8	0.4	1.8	48	10
	2004	0.7	0.3	1.6	51	8
	2005	3.0	1.6	5.7	38	38
	2006	2.2	1.4	3.7	30	33
	2007	2.2	1.2	4.2	39	30
Willow Flycatcher	2002	3.6	1.4	8.9	57	13
	2003	3.2	1.6	6.4	42	13
	2004	6.0	3.2	11.1	38	22
	2005	5.6	2.6	12.1	48	23
	2006	5.9	2.3	15.2	60	28
	2007	4.9	2.1	11.5	54	20
Hammond's Flycatcher	2003	2.0	0.9	4.6	50	5
	2004	4.5	1.9	10.6	53	10
	2005	6.8	3.4	13.6	42	17
	2006	6.8	2.8	16.4	56	20
	2007	6.3	2.7	14.5	52	17
Dusky Flycatcher	2002	9.1	4.7	17.5	40	37
	2003	12.1	8.3	17.7	23	55
	2004	25.2	17.1	37.1	23	104
	2005	13.8	9.1	21.0	25	64
	2006	11.0	7.2	16.8	26	60
	2007	13.5	9.2	19.6	22	68
Cordilleran Flycatcher	2002	1.0	0.3	3.7	87	4
	2003	2.7	1.5	4.9	36	12
	2004	3.0	1.3	6.9	52	12
	2005	4.9	2.7	8.9	37	22
	2006	2.8	1.6	5.1	36	15
	2007	1.4	0.5	4.5	75	7
Warbling Vireo	2002	12.0	6.5	22.3	38	32
	2003	15.2	7.8	29.7	41	45
	2004	37.2	22.0	62.8	32	97
	2005	29.5	18.1	48.0	30	89
	2006	23.8	13.5	41.8	35	84
	2007	25.6	15.3	42.7	32	84
Clark's Nutcracker	2002	0.3	0.1	0.6	48	11

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Clark's Nutcracker(cont'd)	2003	0.1	0.1	0.3	50	6
	2004	0.8	0.5	1.5	36	22
	2005	0.6	0.3	1.1	45	15
	2006	0.5	0.3	0.9	31	23
	2007	0.8	0.5	1.3	29	35
Common Raven	2002	1.6	0.9	2.8	36	22
	2003	1.0	0.5	1.7	37	15
	2004	1.3	0.7	2.2	32	18
	2005	0.6	0.3	1.1	39	8
	2006	0.9	0.4	1.9	45	16
	2007	0.8	0.4	1.6	42	14
Tree Swallow	2002	11.2	5.0	25.2	51	24
	2003	7.6	3.4	16.9	51	18
	2004	9.3	4.4	19.9	48	18
	2005	9.9	4.6	21.3	49	16
	2006	7.7	3.5	16.8	50	14
	2007	12.5	6.1	25.6	45	28
Violet-green Swallow	2002	12.6	5.8	27.1	47	18
	2003	4.4	1.6	12.0	64	7
	2004	25.5	14.0	46.6	37	24
	2005	23.4	13.8	39.7	32	26
	2006	16.6	9.4	29.5	35	19
	2007	11.9	5.6	25.1	47	17
Mountain Chickadee	2002	7.0	4.0	12.3	34	18
	2003	12.2	6.3	24.0	41	35
	2004	17.9	11.6	27.6	26	47
	2005	13.7	8.2	22.9	31	39
	2006	12.2	8.1	18.4	25	40
	2007	12.0	6.7	21.4	35	37
House Wren	2002	6.6	2.8	15.9	54	14
	2003	20.1	9.7	41.6	45	47
	2004	11.3	5.1	24.8	49	24
	2005	19.7	11.6	33.5	32	47
	2006	10.6	5.4	21.0	42	30
	2007	8.1	3.8	17.2	46	21
Ruby-crowned Kinglet	2002	6.8	3.8	12.2	35	51
	2003	18.6	11.9	28.9	27	115
	2004	30.4	19.8	46.6	26	145
	2005	22.0	15.3	31.4	22	108
	2006	9.4	5.8	15.1	29	70
	2007	3.7	2.1	6.6	34	44
Mountain Bluebird	2002	1.7	0.7	3.7	50	4
	2003	6.7	3.5	13.1	41	18
	2004	6.6	3.4	12.9	41	14
	2005	4.8	2.5	9.1	39	13
	2006	3.7	1.4	9.6	61	11
	2007	3.0	1.1	8.5	67	8
Swainson's Thrush	2002	2.4	1.0	5.5	51	20
	2003	0.9	0.3	2.4	67	8
	2004	1.7	0.7	3.9	53	14
	2005	3.4	1.6	7.0	44	32

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Swainson's Thrush (cont'd)	2006	3.5	2.0	6.1	34	39
	2007	3.7	1.9	7.1	40	38
Hermit Thrush	2002	0.1	0.1	0.3	55	3
	2003	0.6	0.3	1.4	50	16
	2004	1.1	0.6	2.0	35	25
	2005	0.2	0.1	0.5	45	6
	2006	0.1	0.1	0.2	58	3
	2007	0.4	0.2	0.7	45	10
American Robin	2002	47.6	31.6	71.5	25	129
	2003	73.5	49.1	109.8	25	213
	2004	124.6	88.9	174.7	21	226
	2005	148.7	111.0	199.3	18	225
	2006	63.4	48.3	83.1	16	367
	2007	25.6	19.5	33.7	16	247
Gray Catbird	2002	0.5	0.1	3.1	136	1
	2003	1.5	0.5	4.4	72	3
	2004	3.2	1.0	10.0	74	6
	2005	7.1	2.5	20.5	68	15
	2006	9.2	4.5	19.1	45	23
	2007	9.2	4.2	19.8	48	21
Cedar Waxwing	2002	3.6	1.6	8.1	50	6
	2003	0	--	--	--	0
	2004	10.2	2.3	44.0	104	8
	2005	9.1	3.7	22.0	56	9
	2006	14.0	4.9	39.5	68	20
	2007	12.0	6.6	21.7	37	23
Yellow Warbler	2002	165.6	70.7	388.0	55	138
	2003	46.9	24.9	88.6	39	95
	2004	106.2	69.0	163.5	26	165
	2005	462.1	268.5	795.4	33	208
	2006	86.9	58.9	128.3	23	264
	2007	60.6	43.9	83.6	19	252
Yellow-rumped Warbler	2002	10.6	4.0	27.8	60	30
	2003	21.3	14.0	32.5	25	67
	2004	30.1	19.6	46.3	26	82
	2005	22.2	14.9	33.1	24	70
	2006	22.1	13.5	36.3	30	83
	2007	25.8	15.6	42.7	30	90
MacGillivray's Warbler	2002	18.7	10.3	33.8	36	29
	2003	11.6	6.3	21.4	37	20
	2004	35.0	23.1	53.2	25	54
	2005	39.2	26.1	59.1	24	69
	2006	39.8	23.1	68.8	33	83
	2007	33.9	21.2	54.3	28	65
Wilson's Warbler	2002	59.9	32.0	112.1	38	82
	2003	37.2	24.2	57.3	26	60
	2004	47.9	29.4	78.0	29	64
	2005	100.8	57.0	178.5	34	77
	2006	24.7	13.8	44.1	36	53
	2007	5.1	2.8	9.4	37	36
Western Tanager	2002	0.5	0.1	2.0	104	4

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Western Tanager (cont'd)	2003	0.8	0.4	1.6	39	8
	2004	1.7	1.0	2.8	30	14
	2005	4.2	2.6	6.8	29	41
	2006	2.8	1.6	4.8	34	32
	2007	2.2	1.1	4.1	39	22
Green-tailed Towhee	2002	4.4	1.6	12.4	65	17
	2003	10.3	6.7	15.8	25	44
	2004	11.1	6.8	18.0	29	41
	2005	9.0	5.5	14.6	29	39
	2006	10.3	6.5	16.4	28	53
	2007	21.1	11.3	39.4	38	100
Chipping Sparrow	2002	11.8	5.8	24.1	44	21
	2003	24.3	13.8	42.8	34	48
	2004	39.6	23.2	67.5	33	68
	2005	43.3	25.6	73.2	32	86
	2006	17.2	11.7	25.3	24	41
	2007	16.4	10.3	26.3	29	34
Brewer's Sparrow	2002	2.6	0.9	7.7	70	8
	2003	11.4	4.8	27.2	54	39
	2004	17.4	9.3	32.4	37	52
	2005	4.6	2.2	9.8	46	16
	2006	22.1	10.1	48.3	49	86
	2007	25.3	14.2	45.0	35	92
Vesper Sparrow	2002	1.9	0.8	4.6	56	8
	2003	1.7	0.5	5.5	78	8
	2004	2.3	1.1	4.8	44	10
	2005	2.9	1.6	5.3	36	14
	2006	4.5	2.2	9.4	45	26
	2007	2.5	1.1	5.6	51	13
Savannah Sparrow	2002	1.1	0.3	3.4	76	7
	2003	6.4	2.5	16.2	59	47
	2004	3.7	1.4	10.3	64	25
	2005	5.5	1.7	18.2	79	41
	2006	4.5	1.9	10.8	55	38
	2007	5.6	2.3	13.9	57	45
Fox Sparrow	2002	2.4	1.1	5.4	50	7
	2003	2.5	1.2	5.2	45	8
	2004	3.4	1.2	9.4	65	7
	2005	4.6	1.4	14.9	78	15
	2006	5.7	2.5	12.9	52	22
	2007	2.2	0.9	5.7	59	8
Song Sparrow	2002	143.9	82.3	251.5	34	192
	2003	32.3	19.9	52.3	29	83
	2004	65.4	41.6	102.8	28	110
	2005	76.9	47.1	125.7	30	113
	2006	61.8	40.2	94.8	26	181
	2007	30.6	20.9	44.6	23	174
Lincoln's Sparrow	2002	108.8	39.5	299.7	67	116
	2003	39.5	22.1	70.8	36	103
	2004	67.4	42.1	107.7	28	155
	2005	18.8	9.0	39.2	46	109

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Lincoln's Sparrow (cont'd)	2006	38.5	25.7	57.5	24	189
	2007	22.3	15.5	31.9	22	178
White-crowned Sparrow	2002	125.3	66.9	234.4	38	134
	2003	56.6	34.1	94.0	31	107
	2004	41.7	25.5	68.0	29	110
	2005	100.0	61.2	163.5	30	94
	2006	36.1	21.3	61.1	32	139
	2007	41.4	24.1	71.2	33	132
Dark-eyed Junco	2002	19.3	8.1	45.8	55	27
	2003	19.2	8.7	42.3	50	48
	2004	120.8	75.1	194.3	29	74
	2005	35.5	19.4	64.9	37	61
	2006	25.6	16.0	40.9	29	96
	2007	22.5	13.9	36.2	29	79
Lazuli Bunting	2002	3.3	1.7	6.6	42	11
	2003	3.8	1.7	8.5	50	14
	2004	3.0	1.0	8.9	70	10
	2005	4.0	1.7	9.5	54	15
	2006	3.8	1.5	9.8	60	17
	2007	4.9	1.9	12.4	59	20
Brewer's Blackbird	2002	5.2	2.2	12.0	52	12
	2003	4.7	2.2	9.8	46	12
	2004	18.8	9.1	38.7	45	19
	2005	8.0	3.6	17.8	50	12
	2006	16.1	7.8	33.0	45	34
	2007	12.2	6.2	24.0	42	29
Brown-headed Cowbird	2002	2.1	0.8	5.0	55	12
	2003	1.4	0.8	2.6	37	9
	2004	4.7	2.2	10.0	46	22
	2005	4.7	2.6	8.4	35	30
	2006	3.6	1.6	8.0	50	27
	2007	5.7	3.3	9.7	32	40
Red Crossbill	2002	0.5	0.2	1.5	74	6
	2003	0.4	0.2	1.1	56	6
	2004	0.2	0.1	0.7	74	3
	2005	2.6	0.8	9.0	83	31
	2006	0.6	0.3	1.3	49	10
	2007	0.6	0.3	1.6	56	4
Pine Siskin	2002	29.8	15.0	59.5	42	46
	2003	25.1	15.7	40.1	28	43
	2004	105.9	66.7	168.2	28	76
	2005	75.0	51.2	110.0	23	90
	2006	44.0	27.7	69.8	28	65
	2007	86.2	57.9	128.4	24	130
American Goldfinch	2002	0.2	0.1	0.9	100	1
	2003	0.2	0.1	0.8	100	1
	2004	2.7	1.0	7.3	64	12
	2005	3.6	1.4	9.1	59	18
	2006	5.9	2.7	12.9	49	29
	2007	3.6	1.5	9.0	58	19
Red Squirrel	2002	1.4	0.7	2.8	43	5

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Red Squirrel (cont'd)	2003	2.8	0.9	8.2	70	11
	2004	9.7	4.8	19.8	44	35
	2005	10.7	6.2	18.3	33	43
	2006	4.0	2.1	7.7	41	19
	2007	7.7	4.6	12.9	31	34

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

Shrubsteppe (SS)

We conducted 274 point counts along 19 transects in Shrubsteppe between 12 May and 13 June, 2007. We detected a total of 2,380 birds, with an average of 8.7 birds per point count (Table 2). We detected 66 species with an average of 13 species per transect (Table 2).

The point-count transect data from Shrubsteppe yielded robust density estimates (CV < 50%) for nine species and a moderately robust estimate (CV = 50-75%) for four additional species (Table 8). We should be able to continue to monitor these 13 species in the future.

Brewer's Sparrow, Horned Lark, Cliff Swallow, Western Meadowlark, and Sage Sparrow had the highest estimated densities of all species detected in Shrubsteppe (listed in order of highest to lowest density). Four species – Cliff Swallow, Sage Thrasher, Brewer's Sparrow, and Sage Sparrow – had higher estimated densities in Shrubsteppe than in the other statewide habitats surveyed.

Table 8. Estimated densities of breeding birds in Shrubsteppe habitat in Wyoming, 2002-2007[1].

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Mourning Dove	2002	0.1	0.1	0.1	68	2
	2003	0.4	0.2	0.6	33	18
	2004	0.6	0.4	1.1	33	27
	2005	0.7	0.4	1.1	31	26
	2006	0.7	0.4	1.1	32	26
	2007	1.1	0.6	1.8	31	33
Common Raven	2002	0.2	0.1	0.4	56	8
	2003	0.4	0.2	0.6	29	20
	2004	0.3	0.2	0.5	31	16
	2005	0.6	0.3	1.0	34	24
	2006	0.6	0.4	1.0	30	32
	2007	1.0	0.6	1.7	32	31
Horned Lark	2002	26.8	19.5	37.0	19	236
	2003	68.2	53.2	87.5	15	418
	2004	89.7	68.7	117.0	16	588
	2005	583.2	406.0	837.8	22	570
	2006	109.0	86.2	137.8	14	843
	2007	65.1	45.5	93.2	22	373
Cliff Swallow	2002	0.5	0.1	2.1	103	1

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Cliff Swallow (cont'd)	2004	11.6	2.9	46.1	98	9
	2005	0.8	0.2	2.8	82	2
	2006	2.4	0.5	10.2	106	6
	2007	25.7	6.1	107.7	101	37
Rock Wren	2002	0.4	0.2	0.8	41	9
	2003	0.8	0.4	1.7	43	22
	2004	0.7	0.4	1.4	38	19
	2005	1.3	0.6	2.5	41	32
	2006	1.7	0.9	3.1	38	44
	2007	0.8	0.4	1.6	39	13
American Robin	2002	0.3	0.1	0.9	69	10
	2003	0.4	0.2	1.2	64	17
	2004	0.6	0.3	1.5	54	23
	2005	0.3	0.1	0.8	70	10
	2006	0.2	0.1	0.7	71	9
	2007	0.6	0.2	1.8	76	13
Sage Thrasher	2002	3.3	1.6	6.8	45	42
	2003	14.3	10.4	19.7	19	183
	2004	9.0	5.6	14.4	29	160
	2005	51.5	32.6	81.5	28	203
	2006	13.9	10.3	18.7	18	342
	2007	13.4	9.2	19.5	22	164
Green-tailed Towhee	2002	3.0	0.9	9.7	79	24
	2003	6.6	3.4	12.7	40	65
	2004	4.9	2.2	10.9	50	49
	2005	5.6	2.4	13.1	53	54
	2006	4.7	2.1	10.6	51	48
	2007	4.0	1.7	9.3	53	24
Brewer's Sparrow	2002	69.1	50.8	94.0	19	227
	2003	108.2	81.8	143.2	17	435
	2004	138.6	107.5	178.8	15	534
	2005	132.0	99.9	174.4	17	501
	2006	164.4	123.6	218.7	17	662
	2007	175.2	134.7	228.0	16	427
Vesper Sparrow	2002	16.6	9.9	27.7	32	136
	2003	9.7	6.2	15.1	27	150
	2004	14.3	9.6	21.2	24	221
	2005	29.3	9.5	90.3	77	173
	2006	18.0	12.5	26.0	22	252
	2007	5.8	3.3	10.3	35	72
Lark Sparrow	2002	7.4	3.8	14.5	41	31
	2003	7.3	3.6	14.7	44	37
	2004	5.3	2.6	10.6	44	25
	2005	6.6	3.6	12.0	37	33
	2006	1.7	0.6	5.2	74	9
	2007	4.8	1.6	14.5	72	15
Sage Sparrow	2002	11.7	5.2	26.3	51	51
	2003	18.9	10.9	32.8	34	87
	2004	11.2	6.5	19.2	33	96
	2005	67.1	40.5	111.2	31	102
	2006	12.1	5.0	29.3	58	153

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Sage Sparrow (cont'd)	2007	15.8	5.0	49.7	78	97
Lark Bunting	2002	5.5	2.4	12.8	53	84
	2003	0.4	0.1	1.0	67	7
	2004	15.2	6.8	34.0	51	182
	2005	1.0	0.4	2.8	67	18
	2006	1.3	0.5	3.3	63	12
	2007	13.9	6.6	29.1	46	132
Savannah Sparrow	2002	1.2	0.5	2.8	55	6
	2003	1.6	0.4	6.6	99	10
	2004	3.1	0.7	12.7	101	19
	2005	0.8	0.2	3.4	99	5
	2006	2.2	0.6	7.7	85	12
	2007	1.6	0.4	6.5	97	6
Western Meadowlark	2002	7.3	1.4	38.0	128	42
	2003	9.7	5.9	16.1	30	226
	2004	14.9	8.6	25.8	34	213
	2005	11.0	7.0	17.3	27	342
	2006	8.6	5.3	14.1	30	332
	2007	17.4	10.4	29.0	31	258
Brewer's Blackbird	2002	5.0	2.2	10.9	50	12
	2003	2.7	1.2	6.2	53	8
	2004	5.7	2.2	14.6	60	9
	2005	2.4	1.1	5.6	53	5
	2006	9.5	3.3	27.7	70	9
	2007	0.1	0.1	0.1	54	5
Brown-headed Cowbird	2002	0.1	0.1	0.6	99	1
	2003	1.0	0.4	2.1	50	8
	2004	3.0	1.2	7.2	57	14
	2005	1.4	0.6	3.0	50	11
	2006	3.9	1.9	8.1	46	22
	2007	2.2	0.9	5.1	53	11

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

Shoshone National Forest

In 2007, our sixth year of bird monitoring in Shoshone National Forest, we conducted a total of 370 point counts along 28 point-count transects in 3 different habitats (Figure 2). We conducted all transects between 6 June and 7 July (Table 9).

Table 9. Bird sampling periods and effort in Shoshone National Forest habitats, summer 2007.

Habitat	Dates sampled	# point transects	# point counts
Mid-elevation Conifer	18 June – 6 July	10	139
Montane Grassland	11 June – 27 June	10	111
Montane Riparian	6 June – 7 July	8	120
All Habitats	**6 June – 7 July**	**28**	**370**

We detected a total of 2,810 individual birds of 94 species on Shoshone National Forest point-count transects. Thirty-one species were detected in sufficient numbers to estimate density in at least one habitat, and some of those species were detected in sufficient numbers to estimate density in multiple habitats.

Total number of species detected in each habitat in 2007 ranged from 71 in Montane Riparian to 58 in Montane Grassland (Table 10). Of the three habitats surveyed in 2007, the average number of species detected per transect was highest in Montane Riparian and lowest in Montane Grassland (Table 2). Note that some species were detected in very low numbers outside of their primary habitat(s).

The pooled 2002-2007 data yielded robust density estimates (CV < 50%) for 21 species and moderately robust estimates (CV = 50-75%) for six additional species. We should be able to effectively monitor these 27 species, which represent 28% of all species detected on point-count transects in Shoshone National Forest from 2002-2007, but represent more than 80 % of all *individual birds* observed during this time.

Table 10. Counts of birds detected, by habitat in Shoshone National Forest, summer 2007.

Habitat	# birds detected	Avg. # birds per point	# species detected	Avg. # species per transect
Mid-elevation Conifer	1,056	7.9	61	23
Montane Grassland	805	7.3	58	18
Montane Riparian	949	7.9	71	25
All Habitats	**2,810**	**7.8**	**95**	**22**

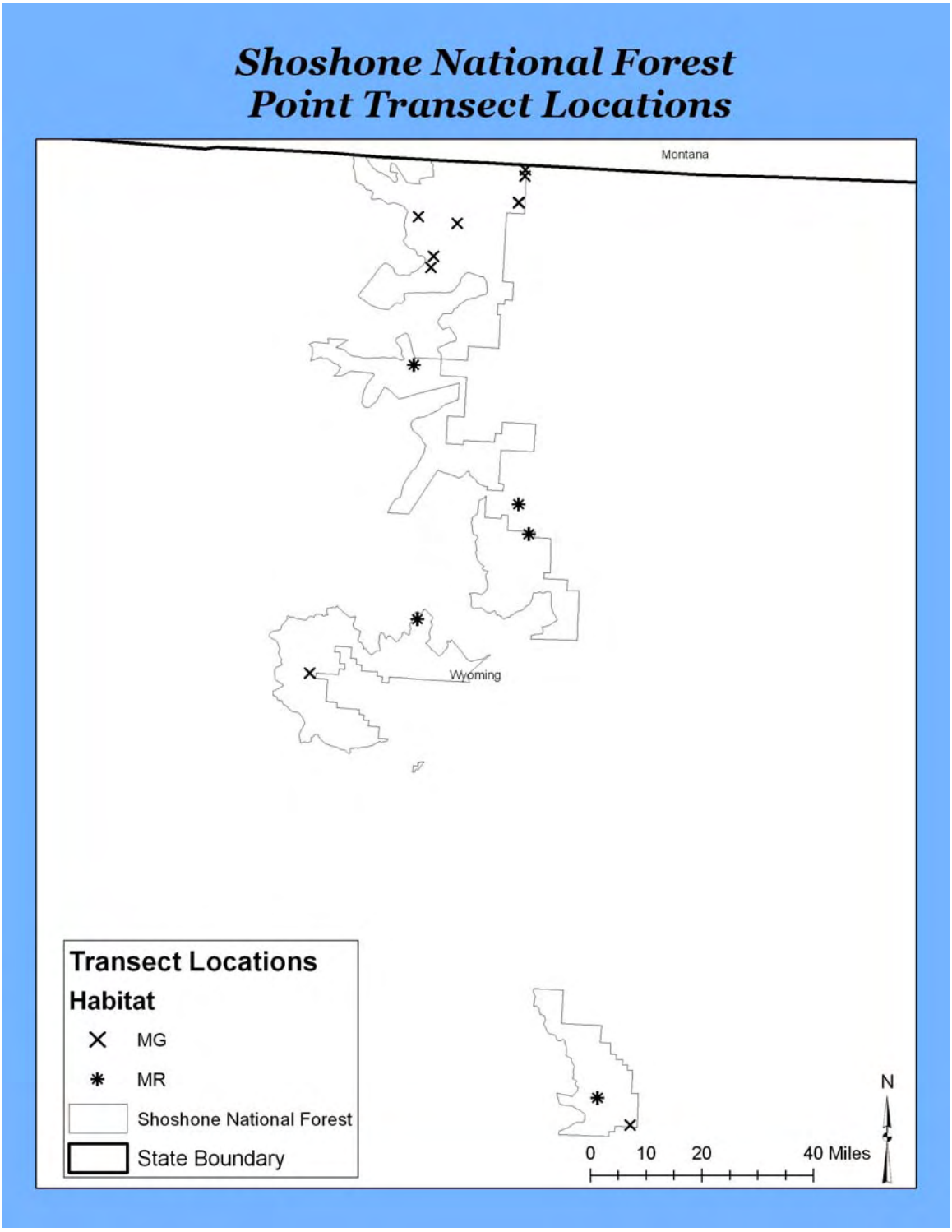

Figure 3. Map of transect locations in the Shoshone National Forest, Wyoming, 2007.

Mid-elevation Conifer (MC)

We conducted 139 point counts along ten transects in Mid-elevation Conifer between 18 June and 6 July 2007. We detected 1,056 birds, with an average of 7.9 birds per point count (Table 10). We detected 61 species with an average of 23 species per transect (Table 10).

The point-count transect data from Mid-elevation Conifer yielded robust density estimates (CV < 50%) for 13 species and moderately robust estimates (CV = 50-75%) for two additional species (Table 11). We should be able to continue to monitor these 15 species in the future.

Dark-eyed Junco, Pine Siskin, Mountain Chickadee, Chipping Sparrow, and American Robin had the highest estimated densities of all species detected in Mid-elevation Conifer (listed in order of highest to lowest density). Eleven species – Northern Flicker, Hammond's Flycatcher, Dusky Flycatcher, Clark's Nutcracker, Mountain Chickadee, Red-breasted Nuthatch, Ruby-crowned Kinglet, Hermit Thrush, Western Tanager, Chipping Sparrow, and Dark-eyed Junco – had higher estimated densities in Mid-elevation Conifer than in the other two habitats that we surveyed in Shoshone National Forest.

Table 11. Estimated densities of breeding birds in Mid-elevation Conifer habitat in Shoshone National Forest, summer 2002-2007[1]

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Northern Flicker	2002	1.0	0.3	3.2	71	3
	2003	1.9	0.5	7.2	76	5
	2004	4.5	2.4	8.4	35	16
	2005	5.3	2.7	10.2	38	20
	2006	5.7	3.5	9.1	26	18
	2007	7.8	3.4	18.0	48	26
Hammond's Flycatcher	2002	2.3	0.5	11.1	99	3
	2003	28.5	13.2	61.5	43	31
	2004	4.0	1.4	11.7	64	6
	2005	5.0	1.6	15.3	69	8
	2006	5.5	1.6	18.6	72	7
	2007	6.4	1.6	25.6	89	8
Dusky Flycatcher	2002	0	--	--	--	0
	2003	5.1	1.4	19.2	79	5
	2004	17.3	9.3	32.2	37	23
	2005	23.8	12.7	44.3	38	34
	2006	22.9	10.6	49.9	46	26
	2007	13.6	6.4	28.6	45	17
Warbling Vireo	2002	1.0	0.2	4.7	100	2
	2003	5.2	2.1	12.8	51	9
	2004	11.0	4.7	25.8	50	26
	2005	13.4	7.2	25.1	37	34
	2006	7.0	3.8	12.9	36	14
	2007	9.0	5.1	16.0	34	20

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Clark's Nutcracker	2002	4.1	2.0	8.4	40	16
	2003	3.1	1.8	5.2	30	10
	2004	6.9	4.1	11.4	30	30
	2005	5.2	3.0	9.1	33	25
	2006	4.7	2.4	9.4	39	16
	2007	7.6	4.2	13.6	34	33
Mountain Chickadee	2002	72.3	40.2	130.1	32	56
	2003	45.8	19.8	106.3	46	29
	2004	30.2	18.3	49.8	29	25
	2005	49.9	31.1	80.1	27	45
	2006	31.5	17.4	57.3	33	23
	2007	63.0	34.4	115.4	34	53
Red-breasted Nuthatch	2002	4.8	2.5	9.5	37	8
	2003	17.2	10.9	27.2	24	24
	2004	23.0	12.8	41.6	33	40
	2005	20.5	14.5	28.8	19	42
	2006	7.4	3.7	14.8	38	12
	2007	12.8	5.2	31.4	52	22
Ruby-crowned Kinglet	2002	39.9	22.3	71.4	34	57
	2003	20.9	13.0	33.5	27	46
	2004	27.4	18.9	39.9	21	59
	2005	21.5	15.0	30.9	21	58
	2006	19.7	11.2	34.6	32	45
	2007	17.6	7.8	39.7	47	36
Mountain Bluebird	2002	2.2	0.5	10.6	103	2
	2003	9.1	2.6	31.7	76	7
	2004	14.3	6.6	31.2	48	13
	2005	14.2	6.2	32.7	52	15
	2006	9.0	4.3	18.6	45	8
	2007	9.1	4.0	21.0	52	9
Hermit Thrush	2002	0.2	0.1	0.7	99	1
	2003	1.5	0.3	7.4	101	8
	2004	5.2	3.1	8.7	30	37
	2005	4.3	2.4	7.6	34	33
	2006	2.4	1.3	4.3	34	15
	2007	2.5	1.2	5.2	45	17
American Robin	2002	10.6	7.1	15.8	21	25
	2003	15.1	9.9	23.0	22	30
	2004	15.8	10.8	23.1	21	40
	2005	20.9	15.7	27.7	16	58
	2006	19.4	12.7	29.8	23	44
	2007	26.6	17.1	41.4	25	66
Yellow-rumped Warbler	2002	23.3	15.1	35.9	24	46
	2003	34.7	20.1	60.1	30	58
	2004	18.8	11.5	30.7	28	42
	2005	15.5	9.2	26.0	30	38
	2006	17.0	10.6	27.2	26	33
	2007	9.3	5.0	17.3	35	20
Western Tanager	2002	0.8	0.2	3.6	100	1

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Western Tanager (cont'd)	2003	5.4	2.1	14.2	55	6
	2004	10.5	5.8	19.2	36	14
	2005	3.7	1.2	11.5	71	6
	2006	13.1	7.3	23.6	34	17
	2007	9.1	5.3	15.7	33	13
Chipping Sparrow	2002	6.3	2.9	13.7	45	6
	2003	26.2	10.5	65.4	52	21
	2004	11.8	4.4	31.8	62	8
	2005	17.8	10.3	30.9	33	19
	2006	31.0	18.1	53.2	32	29
	2007	34.9	21.1	57.7	30	34
Dark-eyed Junco	2002	22.5	11.3	44.7	42	20
	2003	71.7	41.9	122.8	33	54
	2004	67.0	40.5	111.1	31	63
	2005	73.2	43.2	124.1	33	77
	2006	82.2	44.3	152.7	38	66
	2007	109.5	63.7	188.5	34	99
Pine Siskin	2002	3.9	0.8	18.7	98	4
	2003	17.5	9.7	31.7	32	15
	2004	79.4	48.6	129.7	30	37
	2005	57.2	30.1	108.8	39	33
	2006	36.1	16.8	77.6	43	32
	2007	74.5	54.0	102.6	18	71
Red Squirrel	2002	13.7	4.1	46.2	72	12
	2003	33.9	16.1	71.1	41	25
	2005	26.7	14.7	48.5	35	29
	2006	8.2	2.4	27.4	72	7
	2007	28.5	12.3	65.8	49	27

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

Montane Grassland (MG)

We conducted 111 point counts along 10 transects in Montane Grassland between 11 June and 27 June 2007. We detected 805 birds, with an average of 7.3 birds per point count (Table 10). We detected a total of 58 species with an average of 18 species per transect (Table 10).

The point-count transect data from Montane Grassland yielded robust density estimates (CV < 50%) for 11 species and moderately robust estimates (CV = 50-75%) for five additional species (Table 12). We should be able to continue to monitor these 16 species in the future.

Brewer's Sparrow, Dark-eyed Junco, Vesper Sparrow, Dusky Flycatcher, and Horned Lark had the highest estimated densities of all species detected in Montane Grassland (listed in order of highest to lowest density). Ten species – Black-billed Magpie, Common Raven, Horned Lark, Rock Wren, Mountain Bluebird, Green-tailed Towhee, Brewer's Sparrow, Vesper Sparrow, Lark

Sparrow, and Western Meadowlark – had higher estimated densities in Montane Grassland than in the other two habitats that we surveyed in Shoshone National Forest.

Table 12. Estimated densities of breeding birds in Montane Grassland habitat in the Shoshone National Forest, summer 2002-2007[1].

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Northern Flicker	2002	0.6	0.2	2.1	83	5
	2003	1.5	0.6	3.4	50	11
	2004	2.3	1.1	5.0	46	19
	2005	1.3	0.6	2.6	41	10
	2006	2.2	1.2	3.9	35	18
	2007	2.5	1.4	4.5	36	16
Dusky Flycatcher	2002	4.9	1.3	18.2	83	11
	2003	5.6	1.7	19.0	74	11
	2004	4.9	1.9	12.5	57	10
	2005	5.9	1.7	20.4	75	12
	2006	5.2	1.9	14.0	59	11
	2007	11.5	4.3	30.2	58	19
Warbling Vireo	2002	0.6	0.2	1.4	56	4
	2003	1.9	0.6	6.5	74	12
	2004	2.5	1.0	6.2	53	18
	2005	2.8	0.8	10.0	77	18
	2006	2.6	1.0	7.1	58	18
	2007	4.3	1.7	11.3	57	23
Clark's Nutcracker	2002	0.5	0.2	1.2	52	7
	2003	0.5	0.2	1.7	74	6
	2004	1.1	0.4	2.9	60	12
	2005	0.4	0.1	1.6	88	5
	2006	1.7	0.8	3.8	50	20
	2007	1.0	0.5	2.3	49	10
Black-billed Magpie	2002	0.6	0.3	1.5	51	13
	2003	0.3	0.1	1.0	65	6
	2004	0.5	0.2	1.2	46	8
	2005	0.5	0.2	1.0	42	6
	2006	0.9	0.5	1.6	35	16
	2007	0.6	0.2	1.5	53	9
Common Raven	2002	0.1	0.1	0.2	55	5
	2003	0.1	0.1	0.2	57	4
	2004	0.1	0.1	0.2	47	7
	2005	0.2	0.1	0.4	29	12
	2006	0.4	0.3	0.6	23	19
	2007	0.4	0.2	0.6	26	15
Horned Lark	2002	4.7	1.4	16.2	77	15
	2003	0.7	0.2	2.2	66	2
	2004	2.5	0.8	8.0	71	8
	2005	0.1	0.0	0.9	119	4
	2006	3.7	1.2	11.0	66	11
	2007	9.4	1.9	47.5	109	21
Rock Wren	2002	7.9	4.1	15.2	38	48

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Rock Wren (cont'd)	2003	7.0	3.5	14.2	40	37
	2004	15.4	8.2	29.2	36	91
	2005	8.3	4.5	15.4	35	45
	2006	12.6	8.5	18.7	23	70
	2007	3.8	2.3	6.3	29	17
Ruby-crowned Kinglet	2002	2.0	0.7	5.8	65	13
	2003	0.5	0.2	1.4	57	3
	2004	2.0	0.8	4.7	51	13
	2005	1.9	0.7	5.4	62	11
	2006	2.0	0.8	4.8	53	12
	2007	3.1	1.1	9.0	64	15
Mountain Bluebird	2002	2.6	1.0	6.6	56	8
	2003	2.6	0.9	7.1	59	7
	2004	6.4	3.0	13.9	45	16
	2005	20.1	11.4	35.4	33	34
	2006	5.5	2.3	13.2	51	16
	2007	9.2	5.3	16.0	32	18
American Robin	2002	3.6	1.7	7.9	45	28
	2003	2.4	1.0	5.6	49	16
	2004	2.3	1.0	5.6	51	18
	2005	4.2	2.1	8.3	38	28
	2006	4.0	1.7	9.3	49	27
	2007	8.0	4.8	13.3	29	45
Green-tailed Towhee	2002	6.6	2.8	15.6	50	22
	2003	9.4	4.2	20.8	45	27
	2004	6.6	3.4	12.8	38	22
	2005	9.1	3.1	27.0	64	27
	2006	9.3	4.8	17.8	37	29
	2007	8.6	3.8	19.4	47	21
Chipping Sparrow	2002	8.9	4.6	17.3	38	20
	2003	2.1	0.5	8.9	94	4
	2004	4.5	2.4	8.3	36	10
	2005	7.5	2.3	24.8	73	14
	2006	10.5	4.5	24.4	50	21
	2007	6.7	2.6	17.1	55	11
Brewer's Sparrow	2002	19.6	9.3	41.5	44	53
	2003	16.3	7.9	33.5	42	38
	2004	20.0	10.4	38.6	38	53
	2005	6.6	2.6	16.9	55	15
	2006	33.5	19.5	57.5	31	85
	2007	31.8	17.7	57.3	34	61
Vesper Sparrow	2002	30.6	17.6	53.4	32	82
	2003	20.0	14.0	28.6	21	89
	2004	34.3	24.8	47.4	20	119
	2005	10.8	6.6	17.6	29	56
	2006	18.2	12.4	26.8	23	69
	2007	12.8	9.1	18.0	20	78
Lark Sparrow	2002	6.7	3.3	13.6	41	24
	2003	2.9	1.0	8.1	60	9

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Lark Sparrow (cont'd)	2004	3.1	1.1	8.9	64	10
	2005	3.1	1.7	6.0	38	9
	2006	1.8	0.6	5.6	70	6
	2007	0.4	0.1	1.5	85	1
Dark-eyed Junco	2002	0.3	0.1	1.6	101	1
	2004	5.5	2.5	12.0	46	14
	2005	3.5	1.2	9.7	61	9
	2006	5.8	2.7	12.7	45	16
	2007	13.1	6.6	25.8	39	28
Western Meadowlark	2002	22.5	10.2	49.6	45	89
	2003	33.7	15.7	72.4	43	134
	2004	14.5	6.4	32.5	47	110
	2005	12.0	5.6	25.9	45	70
	2006	16.4	8.4	31.8	39	95
	2007	7.5	3.5	16.1	46	50

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

Montane Riparian (MR)

We conducted 120 point counts along eight transects in Montane Riparian between 6 June and 7 July 2007. We detected 949 birds, with an average of 7.9 birds per point count (Table 10). We detected 71 species with an average of 25 species per transect (Table 10).

The point-count transect data from Montane Riparian yielded robust density estimates (CV < 50%) for eight species and moderately robust estimates (CV = 50-75%) for seven additional species (Table 13). We should be able to continue to monitor these 15 species In the future.

Pine Siskin, Dark-eyed Junco, American Robin, Lincoln's Sparrow, and Yellow-rumped Warbler had the highest estimated densities of all species detected in Montane Riparian (listed in order of highest to lowest density). Ten species – Spotted Sandpiper, Warbling Vireo, American Robin, Yellow Warbler, Yellow-rumped Warbler, Wilson's Warbler, Song Sparrow, Lincoln's Sparrow, White-crowned Sparrow, and Pine Siskin – had higher estimated densities in Montane Riparian than in the other two habitats that we surveyed in Shoshone National Forest.

Table 13. Estimated densities of breeding birds in Montane Riparian habitat in the Shoshone National Forest, summer 2002-2007[1].

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
American Robin	2002	22.3	13.0	38.4	32	30
	2003	28.4	11.5	70.4	53	31
	2004	55.3	28.8	106.3	37	48
	2005	41.6	27.3	63.4	24	32
	2006	57.6	24.9	133.2	47	48

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
American Robin (cont'd)	2007	60.1	32.2	112.1	36	64
Chipping Sparrow	2002	5.3	2.3	12.4	49	8
	2003	13.9	5.6	34.3	52	17
	2004	26.6	10.0	71.2	55	23
	2005	21.3	10.5	43.0	37	18
	2006	23.3	13.7	39.7	29	24
	2007	9.9	5.5	17.7	33	11
Dark-eyed Junco	2002	18.6	7.4	46.5	54	14
	2003	26.2	12.7	53.8	42	16
	2004	83.1	42.1	163.8	38	40
	2005	49.4	18.8	130.1	53	22
	2006	19.4	6.5	58.0	64	8
	2007	79.1	38.7	161.9	41	47
Dusky Flycatcher	2002	0.6	0.1	2.9	100	1
	2003	18.0	8.9	36.5	40	23
	2004	26.5	12.7	55.5	41	28
	2005	28.0	13.1	59.8	40	26
	2006	24.1	9.2	63.1	54	25
	2007	6.3	2.4	16.4	55	8
Green-tailed Towhee	2002	1.7	0.4	7.7	103	5
	2003	4.5	1.7	11.6	58	11
	2004	5.5	1.6	18.8	74	11
	2005	10.1	1.9	53.0	102	18
	2006	4.9	1.3	18.3	81	10
	2007	2.1	0.6	6.7	72	5
Lincoln's Sparrow	2002	0	--	--	--	0
	2003	35.2	14.7	84.2	50	39
	2004	20.8	6.5	66.3	66	19
	2005	5.0	1.2	20.4	80	4
	2006	13.9	3.9	50.0	74	13
	2007	48.3	25.7	90.7	35	52
Mountain Chickadee	2002	12.1	6.2	23.8	39	16
	2003	9.3	3.8	23.1	52	10
	2004	27.1	16.1	45.6	29	21
	2005	9.0	3.4	23.6	52	7
	2006	12.2	6.1	24.2	37	11
	2007	26.4	12.5	55.4	42	27
Pine Siskin	2002	8.7	3.0	25.1	65	5
	2003	30.0	14.2	63.2	44	14
	2004	150.4	47.4	477.2	70	21
	2005	38.3	17.2	85.3	46	12
	2006	28.0	6.9	112.5	86	6
	2007	79.9	47.7	133.8	31	31
Ruby-crowned Kinglet	2002	20.3	10.0	41.4	41	39
	2003	8.3	4.2	16.6	39	13
	2004	25.6	10.7	61.5	48	32
	2005	14.1	8.1	24.6	30	16
	2006	11.4	3.7	35.4	64	15
	2007	9.7	3.7	25.7	56	15

Species	Year	*D*	*LCI*	*UCI*	*%CV*	*n*
Song Sparrow	2002	70.7	27.4	182.3	56	85
	2003	22.5	8.5	60.0	57	22
	2004	14.9	5.8	38.3	52	12
	2005	5.6	1.5	21.0	73	4
	2006	26.7	12.4	57.8	42	22
	2007	10.3	3.5	30.4	62	10
Spotted Sandpiper	2002	17.7	9.0	34.9	39	27
	2003	31.5	11.6	85.0	58	39
	2004	11.7	3.8	36.4	64	12
	2005	7.8	2.9	20.6	53	6
	2006	15.3	5.0	46.8	63	16
	2007	8.1	3.4	19.4	51	8
Warbling Vireo	2002	11.4	4.7	27.8	52	19
	2003	23.0	10.7	49.4	43	31
	2004	40.3	23.6	68.9	29	42
	2005	49.9	34.7	71.7	19	48
	2006	27.2	11.4	65.3	48	30
	2007	29.1	15.4	54.9	35	39
White-crowned Sparrow	2002	38.9	14.1	107.5	61	49
	2003	10.8	2.3	51.3	102	11
	2004	7.1	1.8	27.8	81	6
	2005	4.0	1.2	14.1	70	3
	2006	22.0	9.4	51.6	47	19
	2007	46.4	15.0	143.5	66	45
Wilson's Warbler	2002	49.9	15.0	165.5	75	32
	2003	1.9	0.4	8.5	97	1
	2004	2.3	0.5	11.4	100	1
	2005	2.6	0.5	15.3	110	1
	2006	15.9	3.9	65.7	87	7
	2007	32.9	8.6	126.3	84	15
Yellow-rumped Warbler	2002	33.1	19.8	55.2	29	42
	2003	46.6	29.4	73.8	26	48
	2004	42.3	25.6	69.9	28	31
	2005	36.0	14.7	88.5	48	27
	2006	23.0	11.3	47.1	39	20
	2007	47.9	26.9	85.4	32	48
Yellow Warbler	2002	7.0	3.4	14.2	41	16
	2003	16.7	3.9	70.5	91	31
	2004	7.8	2.7	22.5	59	12
	2005	12.6	3.9	41.0	66	15
	2006	16.6	6.1	45.0	56	26
	2007	23.3	8.7	62.8	57	43

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of independent detections used to estimate *D*.

DISCUSSION AND RECOMMENDATIONS

Unique Values of Each Habitat

Birds comprise a diverse group of niche specialists, occupy a broad range of habitats, are sensitive to both physical and chemical impacts on the environment, and often reflect the abundance and diversity of other organisms with which they coexist. While some bird species can inhabit many different habitat types, the number of species and densities of birds tend to vary across habitats. Each habitat supports unique assemblages of birds and other attributes that contribute to the overall biological diversity in Wyoming. Highlights pertaining to each habitat surveyed in 2007 follow.

Wyoming Statewide Transects

Aspen

In 2007, American Three-toed Woodpecker, Bald Eagle, Purple Martin, and Sharp-tailed Grouse were observed exclusively in Aspen. Pine Siskin, Dark-eyed Junco, Warbling Vireo, Broad-tailed Hummingbird, and House Wren had the highest estimated densities of all species detected in Aspen (listed in order of highest to lowest density). Twenty species – Dusky Grouse, Downy Woodpecker, Northern Flicker, Western Wood-Pewee, Dusky Flycatcher, Warbling Vireo, Common Raven, Tree Swallow, Black-capped Chickadee, Red-breasted Nuthatch, House Wren, Hermit Thrush, American Robin, Orange-crowned Warbler, Yellow-rumped Warbler, Green-tailed Towhee, Lincoln's Sparrow, Dark-eyed Junco, Black-headed Grosbeak, and Pine Siskin – had higher estimated densities in Aspen than in the other five statewide habitats surveyed. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed Aspen provides optimal habitat for these species in Wyoming.

Grassland

In 2007, American Avocet, Chestnut-collared Longspur, Common Loon, Eastern Kingbird, Ferruginous Hawk, Gadwall, Great Egret, Mountain Plover, Rock Pigeon, Western Kingbird, and Wild Turkey were observed exclusively in Grassland. Western Meadowlark, Horned Lark, Lark Bunting, Brewer's Sparrow, and McCown's Longspur had the highest estimated densities of all species detected in Grassland (listed in order of highest to lowest density). Seven species – Killdeer, Lark Bunting, Grasshopper Sparrow, McCown's Longspur, Chestnut-collared Longspur, Red-winged Blackbird, and Western Meadowlark – had higher estimated densities in Grassland than in the other five statewide habitats surveyed. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed, Grassland provides optimal habitat for these species in Wyoming.

Juniper Woodland

In 2007, Blue-gray Gnatcatcher, Northern Shoveler, and Pinyon Jay were observed exclusively in Juniper Woodland. Blue-gray Gnatcatcher, Chipping Sparrow, Horned Lark, Mountain Bluebird, and Green-tailed Towhee had the highest estimated densities of all species detected in Juniper Woodland (listed in order of highest to lowest density). Six species – Pinyon Jay, Black-billed Magpie, Blue-gray Gnatcatcher, Mountain Bluebird, Chipping Sparrow, and Vesper Sparrow – had higher estimated densities in Juniper Woodland than in the other five statewide habitats surveyed. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed, Juniper Woodland provides optimal habitat for these species in Wyoming. Ten species that are commonly detected each year in Juniper Woodland habitat were removed from analyses this year due to observer identification error.

Mid-elevation Conifer

In 2007, Black-backed Woodpecker, Blue Grosbeak, Great Gray Owl, Sharp-shinned Hawk, and White-winged Crossbill were observed exclusively in Mid-elevation Conifer. Dark-eyed Junco, Pine Siskin, Mountain Chickadee, American Robin, and Cassin's Finch had the highest estimated densities of all species detected in Mid-elevation Conifer (listed in order of highest to lowest density). Twelve species – Hairy Woodpecker, Hammond's Flycatcher, Gray Jay, Steller's Jay, Clark's Nutcracker, Mountain Chickadee, Golden-crowned Kinglet, Ruby-crowned Kinglet, Townsend's Solitaire, Western Tanager, Cassin's Finch, and Red Crossbill – had higher estimated densities in Mid-elevation Conifer than in the other statewide habitats surveyed. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed, Mid-elevation Conifer provides optimal habitat for these species in Wyoming.

Montane Riparian

In 2007, American Redstart, Barrow's Goldeneye, Black-chinned Hummingbird, Bufflehead, Lesser Goldfinch, Lesser, Scaup, Northern Waterthrush, Ovenbird, Peregrine Falcon, Pine Grosbeak, Sora, Trumpeter Swan, and Yellow-breasted Chat were observed exclusively in Montane Riparian. Broad-tailed Hummingbird, Pine Siskin, Yellow warbler, White-crowned Sparrow, and MacGillivray's Warbler had the highest estimated densities of all species detected in Montane Riparian (listed in order of highest to lowest density). Twenty-one species – Common Merganser, Sandhill Crane, Spotted Sandpiper, Wilson's Snipe, Broad-tailed hummingbird, Red-naped Sapsucker, Olive-sided Flycatcher, Willow Flycatcher, Cordilleran Flycatcher, Gray Catbird, Cedar Waxwing, Yellow Warbler, MacGillivray's Warbler, Wilson's Warbler, Savannah Sparrow, Fox Sparrow, Song Sparrow, White-crowned Sparrow, Lazuli Bunting, Brewer's Blackbird, and American Goldfinch – had higher estimated densities in Montane Riparian than in the other statewide habitats surveyed. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed, Montane Riparian provides optimal habitat for these species in Wyoming.

Shrubsteppe

In 2007, Chukar and Say's Phoebe were observed exclusively in Shrubsteppe. Brewer's Sparrow, Horned Lark, Cliff Swallow, Western Meadowlark, and Sage Sparrow had the highest estimated densities of all species detected in Shrubsteppe (listed in order of highest to lowest density). Four species – Cliff Swallow, Sage Thrasher, Brewer's Sparrow, and Sage Sparrow – had higher estimated densities in Shrubsteppe than in the other statewide habitats surveyed. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed, Shrubsteppe provides optimal habitat for these species in Wyoming.

Shoshone NF Transects

Mid-elevation Conifer

In 2007, Black-backed Woodpecker, Blue Grosbeak, Cliff Swallow, Dusky Grouse, Northern Goshawk, Sharp-shinned Hawk, Spotted Towhee, Steller's Jay, Turkey Vulture, and Williamson's Sapsucker were observed exclusively in Mid-elevation Conifer in Shoshone NF. Dark-eyed Junco, Pine Siskin, Mountain Chickadee, Chipping Sparrow, and American Robin had the highest estimated densities of all species detected in Mid-elevation Conifer (listed in order of highest to lowest density). Eleven species – Northern Flicker, Hammond's Flycatcher, Dusky Flycatcher, Clark's Nutcracker, Mountain Chickadee, Red-breasted Nuthatch, Ruby-crowned Kinglet, Hermit Thrush, Western Tanager, Chipping Sparrow, and Dark-eyed Junco – had higher estimated densities in Mid-elevation Conifer than in the other two habitats that we surveyed in Shoshone National Forest. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed, Mid-elevation Conifer provides optimal habitat for these species in Shoshone National Forest.

Montane Grassland

In 2007, Barn Swallow, Chukar, Ferruginous Hawk, Horned Lark, Osprey, Sage Thrasher, Savannah Sparrow, and Vesper Sparrow were observed exclusively in Montane Grassland in Shoshone NF. Brewer's Sparrow, Dark-eyed Junco, Vesper Sparrow, Dusky Flycatcher, and Horned Lark had the highest estimated densities of all species detected in Montane Grassland (listed in order of highest to lowest density). Ten species – Black-billed Magpie, Common Raven, Horned Lark, Rock Wren, Mountain Bluebird, Green-tailed Towhee, Brewer's Sparrow, Vesper Sparrow, Lark Sparrow, and Western Meadowlark – had higher estimated densities in Montane Grassland than in the other two habitats that we surveyed in Shoshone National Forest. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed, Montane Grassland provides optimal habitat for these species in Shoshone National Forest.

Montane Riparian

In 2007, American Green-winged Teal, Black-headed Grosbeak, Broad-tailed Hummingbird, Bullock's Oriole, Common Grackle, Common Yellowthroat, Eastern Kingbird, Golden-crowned Kinglet, Great Blue Heron, Least Flycatcher, Mallard, Northern Harrier, Orange-crowned Warbler, Sage Sparrow, Sora, Tree Swallow, Veery, Wilson's Snipe, and Wilson's Warbler were observed exclusively in Montane Riparian in Shoshone NF. Pine Siskin, Dark-eyed Junco, American Robin, Lincoln's Sparrow, and Yellow-rumped Warbler had the highest estimated densities of all species detected in Montane Riparian (listed in order of highest to lowest density). Ten species – Spotted Sandpiper, Warbling Vireo, American Robin, Yellow Warbler, Yellow-rumped Warbler, Wilson's Warbler, Song Sparrow, Lincoln's Sparrow, White-crowned Sparrow, and Pine Siskin – had higher estimated densities in Montane Riparian than in the other two habitats that we surveyed in Shoshone National Forest. If density is assumed to be positively correlated with habitat quality, then of the habitats we surveyed, Montane Riparian provides optimal habitat for these species in Shoshone National Forest.

Prospects for Population Monitoring

This year we combined point-count transect data from 2002 through 2007 in order to more accurately determine density estimates for each year. This allowed us to calculate density estimates for some species that would not have had large enough sample sizes if we had used only the 2007 data. As a result, we were able to calculate density estimates for 77 species in 2007. Had we only used the data collected during the 2007 field season, we would have only been able to calculate density estimates for 39 species. Continuing to use this method, we anticipate that within one or two years we should be able to calculate density estimates for at least 12 more species.

The statewide, habitat-stratified point transects produced excellent results with low coefficients of variation (≤ 50%) for 61 bird species, and moderate results (CV = 50-75%) for another 16 species in at least one habitat surveyed statewide in 2007. Thus, we should be able to detect habitat-specific population trends for these 77 species within our maximum target of at least 30 years.

This year on our statewide transects we detected 67 bird species that are of management interest, as designated by either U.S. Forest Service, U.S. Fish and Wildlife Service, Wyoming Game and Fish Department, or Wyoming Partners In Flight (Appendix 1). We recorded 24 of these species in sufficient numbers to calculate a density estimate in at least one habitat this year. The combined 2002-2007 data yielded excellent results with low coefficients of variation (≤ 50%) for 16 of these species, and moderate results (CV = 50-75%) for another 8 species in at least one habitat surveyed statewide. Continuing to use this method, we anticipate that within one or two years we should be able to calculate density estimates for three more species of management interest.

Using the combined 2002-2007 data, we were able to calculate density estimates for 77 species, representing 47 percent of *all species* observed statewide on transects surveyed in 2007. This represents about 92% of all *individual birds* observed. The other 53% of species (about 8% of individual birds observed) which were detected too infrequently to monitor their populations fall into one of the following categories:

1) Low-density, highly localized species (e.g., Lewis's Woodpecker);
2) Low-density, widespread species (e.g., Northern Goshawk);
3) Species whose breeding ranges in Wyoming are peripheral to their continental distribution (e.g., Black-chinned Hummingbird);
4) Nocturnal species (e.g., Northern Saw-whet Owl);
5) Wetland-obligate species (e.g., Sora); and
6) Species that are most readily detectable prior to late May (e.g., Ruffed Grouse).

Species in the aforementioned groups could be monitored through additional effort using one or more of the following survey techniques:

1) Additional point transects in existing habitats;
2) Census of small, localized populations;
3) Census of birds at nesting sites (e.g., colonies, eyries, etc);
4) Species-specific call-response surveys;
5) Nocturnal surveys;
6) Wetland surveys; and
7) Early-season (i.e., winter/spring) surveys.

For species with large home ranges and high nest-site fidelity, such as Golden Eagle and Prairie Falcon, monitoring could be achieved by locating active nests and visiting a subset during the spring and summer as necessary to evaluate the outcome of each. Nests would first be located by consulting with local biologists, birders, and other experts, and then as part of the field effort, additional suitable habitat could be searched to locate previously unrecorded nests. Ultimately, the majority of active nests would be included in the monitoring scheme and a random subset would be visited each year to check for occupancy and outcome.

For some low-density but widespread species, such as Northern Goshawk, a brief call-response survey could be used to detect the presence of this or other similar species across the areas already covered by the habitat-stratified point transects. A high-powered, yet easily portable playback system would be required for each observer, but otherwise, relatively few additional expenses would be incurred. RMBO successfully implemented such a study in 2006 for the USFS in several National Forests throughout Colorado, Wyoming, and the Black Hills.

Rocky Mountain Bird Observatory is open to discussing these options with our Wyoming partners.

Accomplishments

Wyoming Statewide Transects

During the 2007 field season, RMBO was scheduled to complete at least 30 MWB point transect in five habitat types, for a total of 150 transects and 2,250 individual point counts. Field staff completed 1,704 point counts along 120 point transects among the five habitat types. Altogether, there were 15,984 individual birds detected from 158 species. A description of our accomplishments in each habitat is as follows:

Aspen

In 2007, RMBO staff conducted 354 point counts along 25 transects in Aspen between 4 June and 08 July 2007. We detected a total of 3,752 individual birds from 98 different species. Five transects were not completed this year: AS06, AS18, AS20, AS24, and AS25. AS06, AS18, and AS24 were not completed, because the transects are located in marginal aspen habitat and need to be reestablished in the future. Another transect, AS20, was not completed, because by the time the technician went to complete it, he realized it was at too low an elevation to be conducted so late in the season. It is unknown why the last transects, AS25, was not completed this year. RMBO is currently making inquiries with the field technician responsible for this transect to better understand what happened. Overall, RMBO has 27 established, active Aspen transects in Wyoming. Three more current transects will need to be reestablished in 2008 so that we have the required 30 transects for this habitat type.

Grassland

In 2007, RMBO staff conducted 356 point counts along 24 transects in Grassland between 25 May and 12 June 2007 (Table 1). We detected a total of 2,940 birds from 59 different species. Six transects were not completed this year: GR16, GR22, GR28, GR35, GR39, and GR50. Prior to the 2007 field season, all 150 Wyoming statewide transects were divided up amongst the field staff, so that each person was responsible for completing their list of transects. Unfortunately, one of our crew members started the field season later than we had expected. As a result, he was unable to complete his assigned transects in Grassland, because the optimal survey dates had already passed. This was an oversight in planning and will be considered when planning next year's field season. Overall, RMBO has 29 established, active Grassland transects in Wyoming. One more transect will need to be reestablished in 2008 so that we have the required 30 transects for this habitat type.

Juniper Woodland

In addition to the transects conducted by RMBO, WGFD was assigned to complete 30 Juniper Woodland transects in 2007. WGFD staff conducted 218 point counts along 15 transects in Juniper Woodland between 23 May and 29 June 2007. They detected a total of 1,397 individual birds from 48 different species. The remaining 15 transects were not completed due to the short time frame for conducting transects and minimal assistance. Unfortunately, we were unable to use much of the data collected due to observer identification error. Overall, RMBO has 30 established, active Mid-elevation Conifer transects in Wyoming. No new transects will need to be reestablished in 2008 because we already have the required 30 transects for this habitat type.

Mid-elevation Conifer

In 2007, RMBO staff conducted 366 point counts along 27 transects in Mid-elevation Conifer between 19 May and 8 July 2007. We detected a total of 3,366 individual birds from 86 species. Three transects were not completed this year: MC22-05, MC28, and MC33. MC28 was not completed, because the field technician responsible for this transect was injured near the end of the season and was unable to conduct it. No one else was available to complete this transect, as everyone else was trying to get their assigned transects done within the required timeframe. It is unknown why MC33 was not completed this year. RMBO is currently making inquiries with the field technician responsible for this transect to better understand what happened. MC22-05 was conducted, but unfortunately the technician lost the data sheets for this transect before turning them in to RMBO. Overall, RMBO has 28 established, active Mid-elevation Conifer transects in Wyoming. Two more current transects will need to be reestablished in 2008 so that we have the required 30 transects for this habitat type.

Montane Riparian

In 2007, RMBO staff conducted 354 point counts along 25 transects in Montane Riparian between 3 June and 12 July, 2007. We detected a total of 3,741 birds from 115 species. Five transects were not completed this year: MR09, MR39, MR42, MR90, and MR98. Two transects, MR09 and MR42, were never scheduled to be done in 2007, because they needed to be reestablished and new random sites were not chosen prior to the field season. MR39 was not conducted this year, because a large fire was burning at the site during the field season. It is unknown why the remaining two transects, MR90 and MR98, were not completed this year. RMBO is currently making inquiries with the field technicians responsible for these transects to better understand what happened. Overall, RMBO has 23 established, active Montane Riparian transects in Wyoming. Seven more current transects will need to be reestablished in 2008 so that we have the required 30 transects for this habitat type.

Shrubsteppe

In 2007, RMBO staff conducted 274 point counts along 19 transects in Shrubsteppe between 12 May and 13 June, 2007. We detected a total of 2,380 individual birds from 66 different species. Eleven transects were not completed this year: SS06, SS18, SS19, SS21, SS24, SS27, SS34, SS41, SS49, SS50, and SS56. SS19 was not conducted this year because the access road was undrivable for several days and the field technician had to move on in order to complete the rest of his transects within the survey window. SS21 was also not completed due to poor weather conditions and inaccessible roads. One crew member started the field season later than expected and as a result, was unable to complete his ten assigned transects in Shrubsteppe because the optimal survey dates had already passed. This was an oversight in planning and will be remedied when planning next year's field season. Overall, RMBO has 29 established, active Shrubsteppe transects in Wyoming. One more transect will need to be reestablished in 2008 so that we have the required 30 transects for this habitat type.

Shoshone NF Transects

In 2007, RMBO staff were assigned 41 point transects in the Shoshone National Forest. Due to our method of naming point transects, ten of these are duplicates of other transects on the list. For example, SH-MG10 and SH-MG10-03 are the same transect. As a result, there were only 31 active transects assigned, for a total of 465 individual point counts. Of these 31, RMBO staff conducted a total of 28 point-count transects and 370 point counts in 3 different habitat types. We conducted all transects between 6 June and 7 July. We detected a total of 2,810 individual birds of 94 species on Shoshone National Forest point-count transects. Descriptions of our accomplishments in each habitat are as follows:

Mid-elevation Conifer

In 2007, RMBO staff conducted 139 point counts along ten transects in Mid-elevation Conifer between 18 June and 6 July 2007. We detected 1,056 individual birds from 61 species. One transect was not completed this year: WY-MC22-05. This transect was conducted, but unfortunately the technician lost the data sheets for this transect before turning them in to RMBO. Overall, RMBO has ten established, active Mid-elevation Conifer transects in Shoshone NF. One additional transect will need to be reestablished in 2008.

Montane Grassland

In 2007, RMBO staff conducted 111 point counts along 10 transects in Montane Grassland between 11 June and 27 June 2007. We detected 805 individual birds from 58 species. We were able to conduct all Montane Grassland transects this year. Overall, RMBO has nine established, active Montane Grassland transects in Shoshone NF. One transect will need to be reestablished in 2008.

Montane Riparian

In 2007, RMBO staff conducted 120 point counts along eight transects in Montane Riparian between 6 June and 7 July 2007. We detected 949 individual birds from 71 species. We did not complete two transects this year: SH-MR05 and SH-MR92. The access road to SH-MR05 was closed and probably will be closed again next year. RMBO staff will review this transect for next field season and relocate it. SH-MR92 was conducted, but unfortunately the technician lost the data sheets for this transect before turning them in to RMBO. Overall, RMBO has nine established, active Montane Riparian transects in Shoshone NF. One transect, previously mentioned, will need to be reestablished.

Meeting Our Goals in the Future

RMBO staff were not able to complete all scheduled point count transects for one of the following reasons:

1) Fire
2) Poor weather conditions
3) Injury
4) Transect needs to be reestablished
5) Unknown reasons due to a lack of communication
6) Optimal dates for survey missed

While there will always be unforeseeable events such as bad weather or wildfires, RMBO staff will work towards eliminating other problems that are avoidable.

One issue is that several transects, both statewide and in Shoshone NF, need to be reestablished so they can be conducted properly. This can be time-consuming during an already busy field season and some transects need to be reestablished several times before they are finally placed in an appropriate location. In order to avoid these issues, RMBO staff can set up transects prior to the field season. This will be done by experienced, non-seasonal staff who know how to set up a point count transect that will be sustainable.

Another issue was a lack of communication between field staff and full-time staff. It is unknown why some transects were not conducted this year, and attempts to obtain this information from field technicians have proven to be difficult. One solution is to require field technicians to submit their field data prior to receiving their paychecks, a policy that RMBO will establish for 2008.

Most transects that were not completed in 2007 were the result of missing optimal survey dates for their respective habitat types. In 2007, we had a shortage of qualified applicants and thus were understaffed. In order to increase the number of seasonal staff for 2008, we plan to increase the pay received by field technicians.

The last issue concerned ensuring that field data were entered into the database. Data are recorded in the field by hand-writing information onto datasheets, which are then entered into the database over the internet by the field technician. Unfortunately, this year some data sheets were lost between data collection and data entry, so information was lost. One solution is to give field technicians hand-held PDAs (Personal Digital Assistant). Data can be directly entered into the PDA in the field, and then directly uploaded from there onto the internet, thus eliminating both the need for data sheets and the time spent entering data into the database. Most PDAs come equipped with wireless internet, so data can be frequently saved in the database by field technicians during the field season. While initially expensive, investment in PDAs would reduce paper and printing supplies, as well as money spent paying field technicians for hours of data entry. PDAs can also come equipped with GPS, eliminating the need to buy and replace GPS units. This would be a very cost effective and time-saving solution.

RMBO staff will take these issues into consideration when planning for the 2008 field season.

Data Dissemination Website

We are currently in the process of redesigning our web site so that data can be queried and results can be displayed on a variety of scales (i.e. management unit, county, state). Access to the raw data and habitat relationships will allow managers to apply the data to local management issues. In addition, we are working with the Cornell Lab of Ornithology's Avian Knowledge Network and the U.S. Geological Survey to compile and merge results from a variety of sources. This effort will identify monitoring programs, integrate information, and conduct analyses on regional datasets that can help inform management decisions.

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APPENDIX A. SPECIES ACCOUNTS

This section presents one-page accounts for each bird species detected in 2007 that is of management interest, as designated by the U.S. Forest Service, U.S. Fish and Wildlife Service, Wyoming Game and Fish Department, or Wyoming Partners In Flight. For U.S. Forest Service, we include accounts for Region 2 Sensitive Species (R2SS). For U.S. Fish and Wildlife Service, we include accounts for Birds of Conservation Concern for Region 6 (Mountain-Prairie Region; USDI 2003). For Wyoming Game and Fish Department, we include accounts for Threatened or Endangered Species and Species of Greatest Conservation Need (Wyoming Comprehensive Wildlife Conservation Strategy, 2005). For Wyoming Partners In Flight we include accounts from Wyoming Partners in Flight Bird Conservation Plan (Nicholoff 2003; including Levels I, II, and III priority species). For each species' summary, we include a brief description of breeding habitat, other pertinent information, and an evaluation of our ability to monitor the species under MWB. Unless otherwise noted, breeding information for each species is from the WY-PIF Wyoming Bird Conservation Plan (Nicholoff 2003).

Geographic distribution maps depict locations and relative abundance of each species of management interest that were detected on point transects in 2007. The relative abundance scale used in the maps is based on the number of points along each transect where the species was detected. The location of dots do not indicate the precise location at which the species was observed, but rather the access point of the transect on which the species was observed. In addition, these maps only reflect species abundance and distribution across sites we surveyed and should not be construed to suggest anything about abundance and distribution between survey sites.

Every species account includes a table that lists all habitats and projects (Shoshone NF and/or statewide) in which that species was detected, as well as its estimated density, where applicable. This year we pooled point-count transect data from 2002 through 2007 in order to more accurately determine density estimates for each year. This allowed us to calculate density estimates for some species that would not have had large enough sample sizes if we had used only the 2007 data. This information still is unavailable for many species with insufficient sample sizes. When we were able to calculate a density estimate in at least one habitat, a graph shows species density over time for each habitat.

In each table, two numbers pertain to number of observations for that species: *N, number of individuals observed,* and *n, number of independent observations used to estimate density for that species*. These two numbers may be different because often several individuals are detected in a single observation, such as when birds are in a flock. In addition, a small percentage of long-range observations are truncated from the data in order to calculate density. Also, number of individuals observed (N) includes flyovers and between point

detections. While number of individuals observed is often of interest, especially for rare species, density estimates are derived using only independent observations. If we lacked sufficient data to calculate density, *n* is not included in the table.

In the tables, Shoshone NF habitats are prefixed with SH, while Wyoming statewide transects are prefixed with WY. Many Shoshone National Forest transects are also MWB statewide transects. When a species was detected on one of these transects, it may be listed in the table twice, once as a Wyoming transect and once as a Shoshone transect, depending on habitat type. Therefore, adding up N for a given species that occurred on both Shoshone and Wyoming transects may not total the actual number of individuals observed. In the case of Montane Grassland habitat, there is no overlap, because there were no statewide transects in this habitat type. For Mid-elevation Conifer habitat, all Shoshone transects are also statewide transects, so there is complete overlap. In Montane Riparian habitat, there is some overlap, because some Shoshone transects are also part of the statewide project. A footnote under each table describes where the data of these Montane Riparian transects come from.

Trumpeter Swan
(Cygnus buccinator)

USFS Region 2 Sensitive Species
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

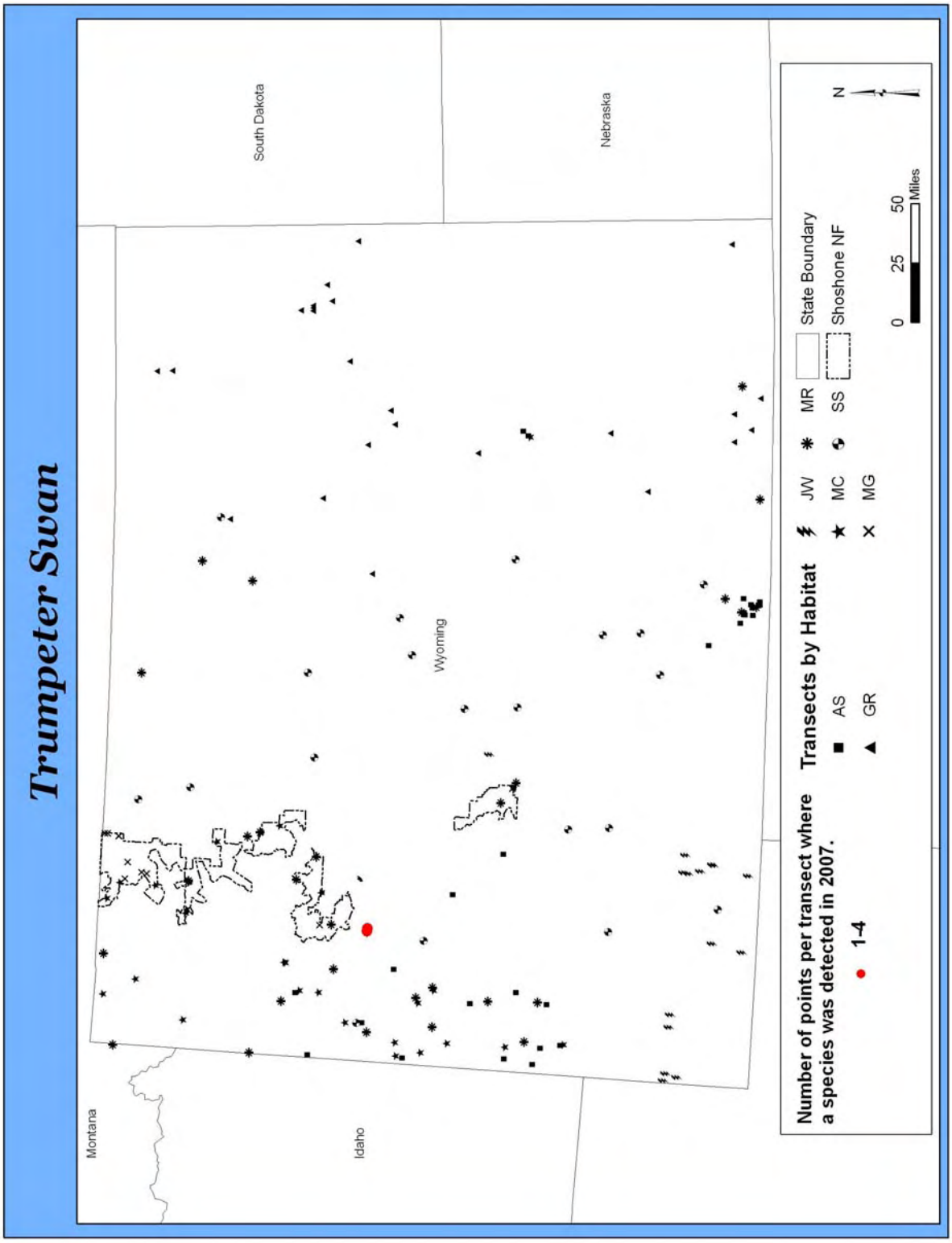
Trumpeter Swan uses a variety of shallow marshes, ponds, lakes, and rivers in western Wyoming. In 2007, we recorded six Trumpeter Swans on two montane riparian transects, MR16 and MR94. This is the first year the species has been recorded on an MWB transect.

Trumpeter Swan is uncommon in Wyoming, so we will most likely not be able to monitor this species. Also, we do not currently survey its preferred habitat type, which is wetland habitat. As a result, the following distribution map will not accurately reflect the species actual distribution. Adding wetland habitat transects in the northwestern portion of the state may increase our chances of detecting the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Trumpeter Swan on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-MR	ID	--	--	--	--	6

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Trumpeter Swan on transects in Wyoming, 2007.

Lesser Scaup
(Aythya affinis)

WGFD Species of Greatest Conservation Need

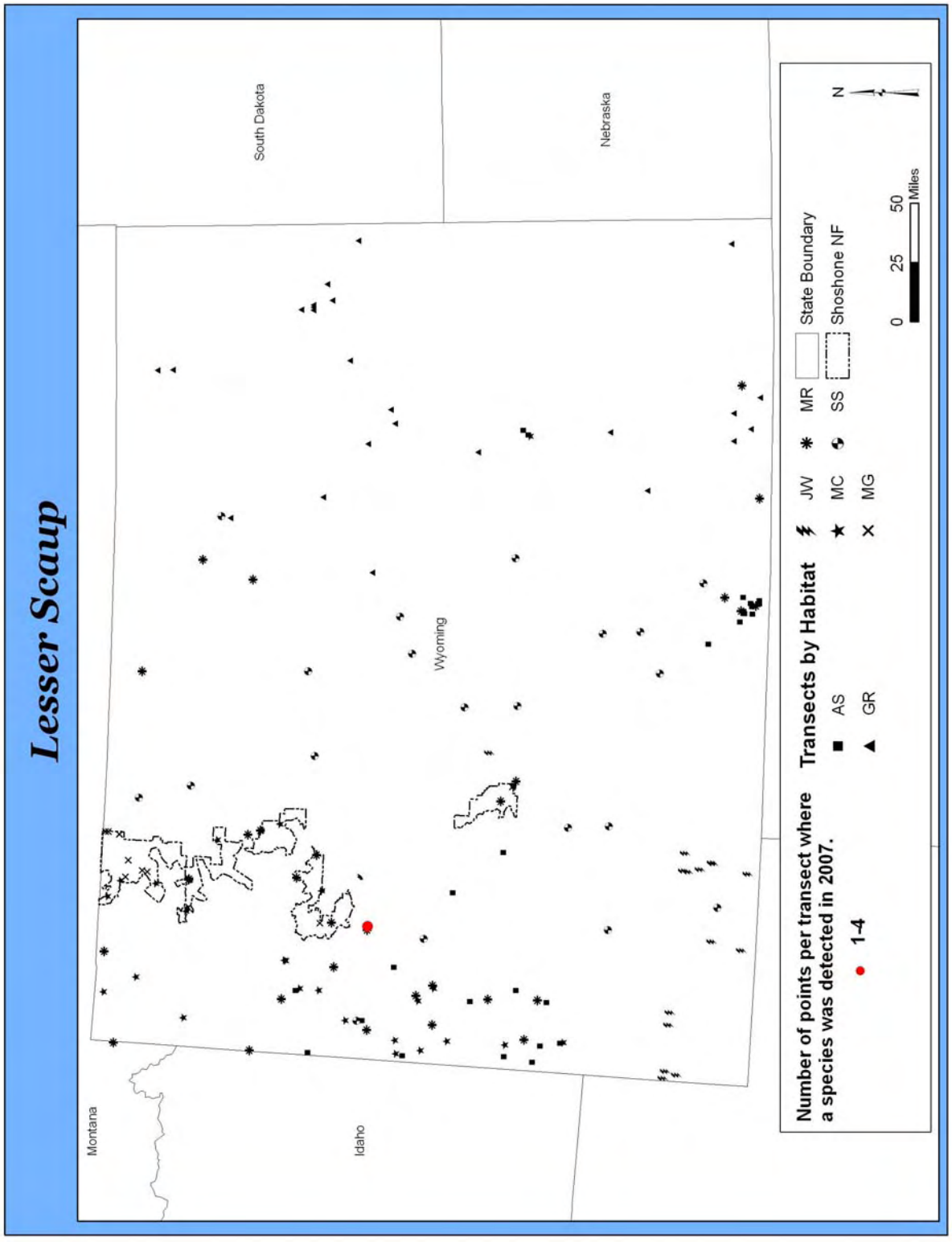
Lesser Scaup is a widespread duck that can be found in small wetlands and lakes with emergent vegetation (Poole and Gill 2005). In 2007, we detected one individual on a montane riparian transect, MR94. We have consistently detected Lesser Scaup on this transect for the last four years.

Even though the species is fairly abundant, it is not likely that it will be recorded in sufficient numbers to estimate density under the current sampling design. We do not currently survey its preferred habitat type, which is wetland habitat. As a result, the following distribution map will not accurately reflect the species actual distribution. Adding transects near wetlands or open water would most likely improve our ability to detect Lesser Scaup.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Lesser Scaup on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-MR	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Lesser Scaup on transects in Wyoming, 2007.

Barrow's Goldeneye
(Bucephala islandica)

WGFD Species of Greatest Conservation Need

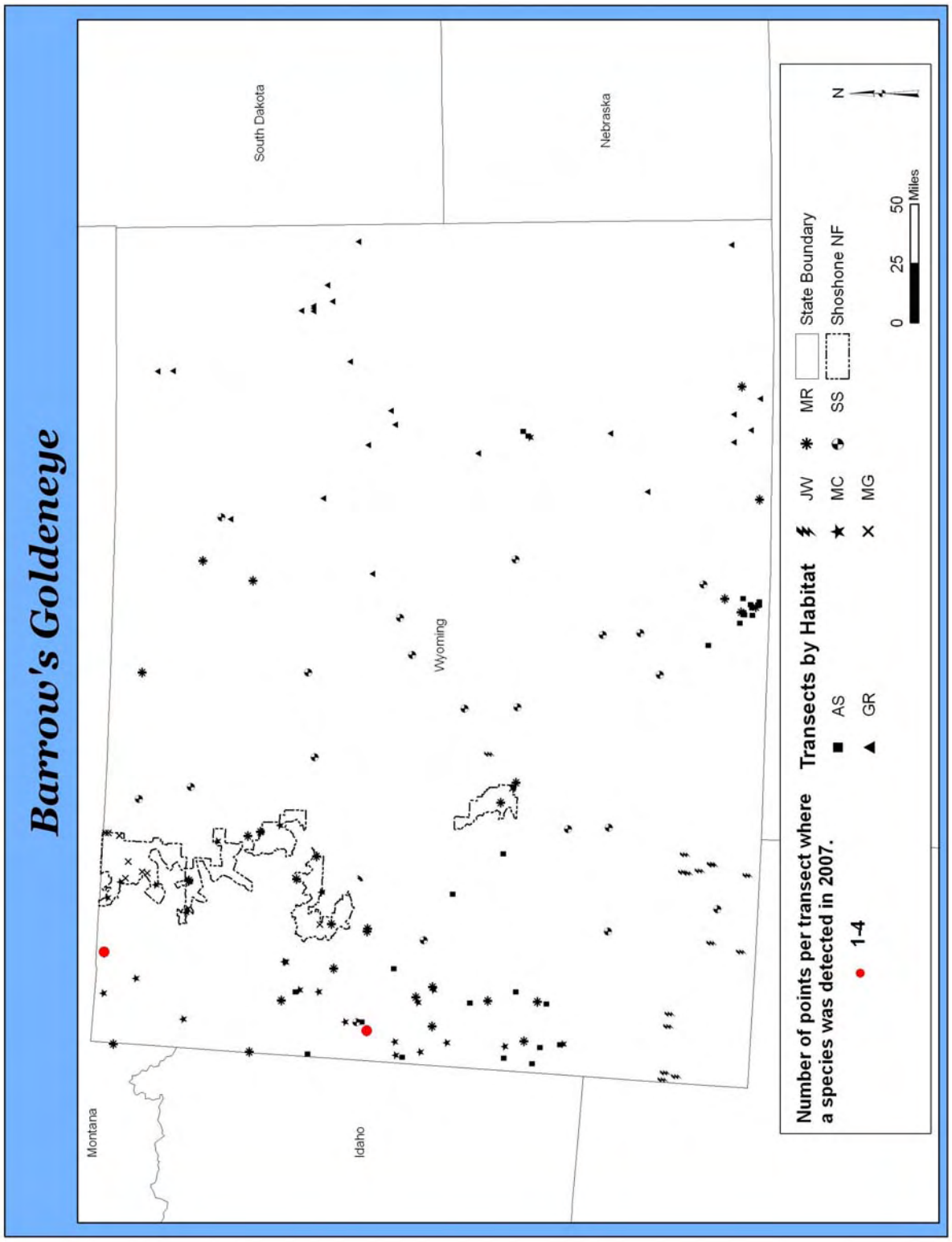
Barrow's Goldeneye frequently breeds in Yellowstone National Park and in the northwestern portion of the state (Poole and Gill 2005). It inhabits open freshwater lakes, ponds, and rivers (Poole and Gill 2005). In 2007, we detected four individuals on two montane riparian transects. On one transect, MR22, we have observed the species for five consecutive years. This transect is located in Yellowstone NP.

It is not likely that Barrow's Goldeneye will be recorded in sufficient numbers to estimate a density on this project. We do not currently survey its preferred habitat type, which is wetland habitat. As a result, the following distribution map will not accurately reflect the species actual distribution. Adding transects in and around Yellowstone National Park near wetlands or open water would most likely improve our ability to detect the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Barrow's Goldeneye on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-MR	ID	--	--	--	--	4

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Barrow's Goldeneye on transects in Wyoming, 2007.

Greater Sage-Grouse (*Centrocercus urophasianus*)

USFS Region 2 Sensitive Species
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

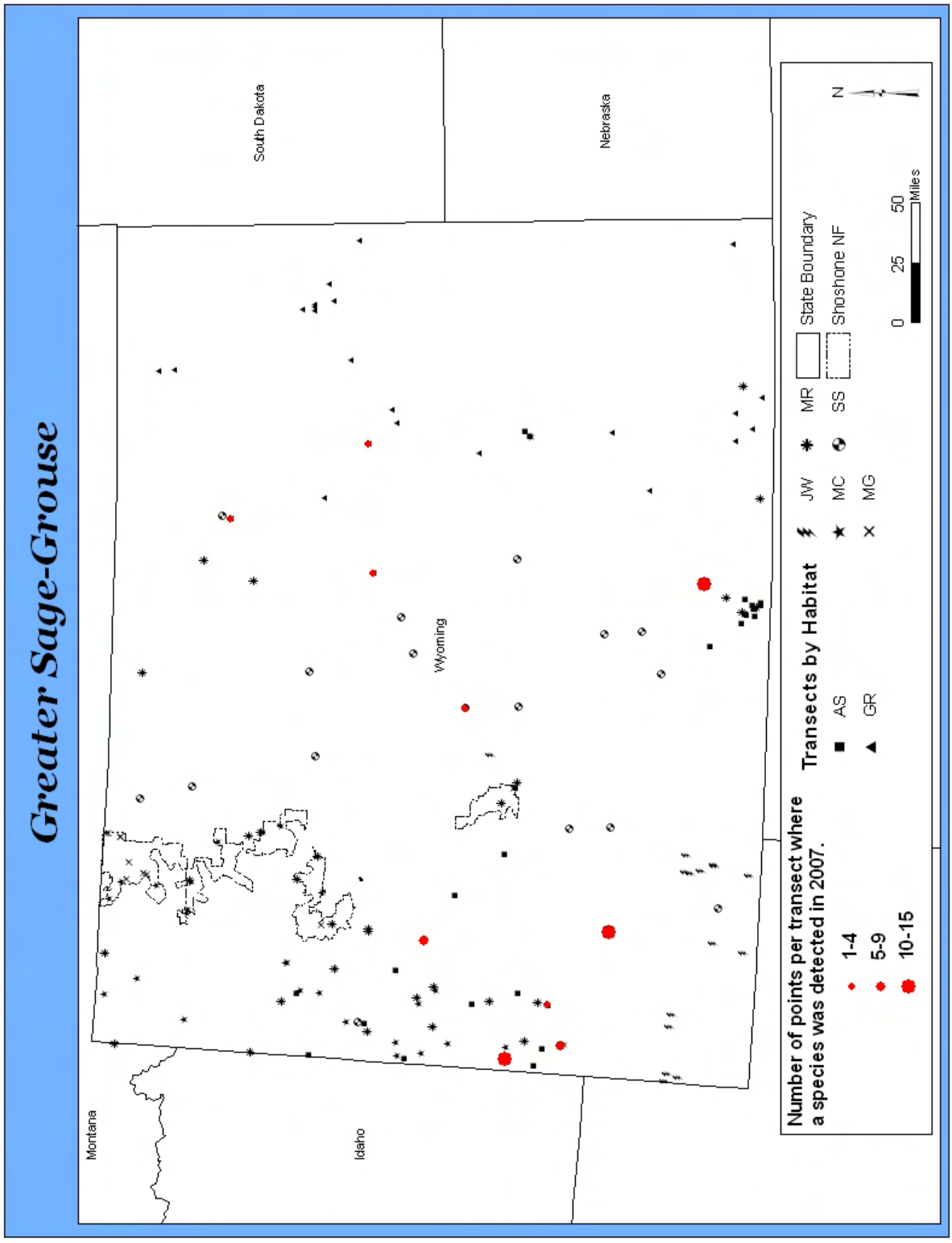
Greater Sage-Grouse inhabits large contiguous areas of sagebrush, often where tall grass is present within the sagebrush matrix. In 2007, we detected 53 Greater Sage-Grouse in three habitats on MWB. Twenty-eight detections were from shrubsteppe transects: SS12, SS42, SS51, and SS60. Seven of these detections were on SS12, the same transect where we detected 32 individuals in 2006. Twelve Greater Sage-Grouse were detected on GR25, where we observed twelve individuals in 2005.

This monitoring project does not target Greater Sage-Grouse or any gallinaceous birds, all of which are game species in Wyoming and whose populations are monitored by the WGFD. Although we do regularly detect the species on point transects, it is usually between point counts during the line transect portion of the survey. By using the line transect data or conducting separate surveys earlier in the spring, we may be able to improve our power to detect a trend for the species in at least shrubsteppe and grassland habitats.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Greater Sage-Grouse on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	10
WY-GR	ID	--	--	--	--	15
WY-SS	ID	--	--	--	--	28

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

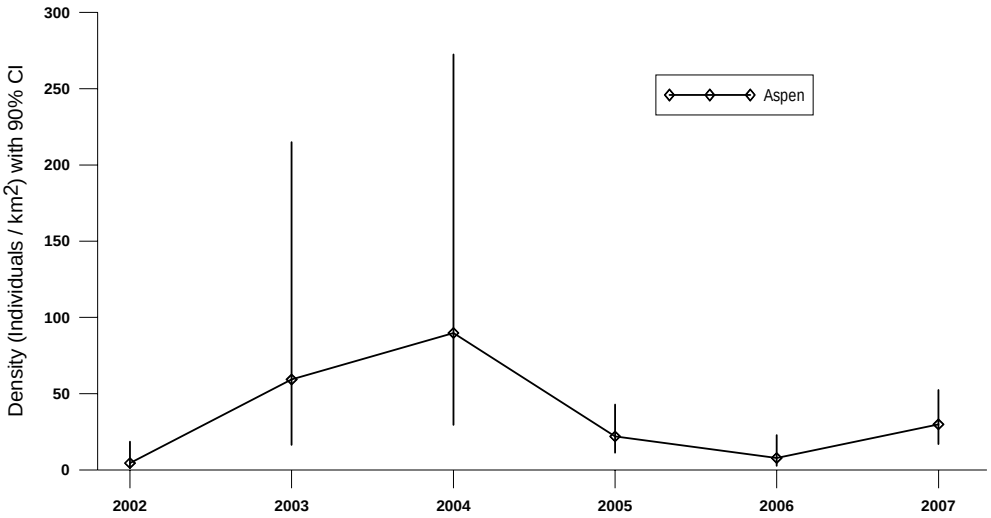


RMBO point-transect locations and detections of Greater Sage-Grouse on transects in Wyoming, 2007.

Dusky Grouse
(Dendragapus obscurus)

WY-PIF Level III Priority Species

Dusky Grouse can be found in coniferous forests and shrublands at middle elevations in summer. In 2007, we detected 34 Dusky Grouse in three habitats, aspen and mid-elevation conifer, and shrubsteppe. We detect the species in low numbers every year, especially in aspen and mid-elevation conifer habitats. The species is often detected along transects and less frequently at point-count stations. The number of detections of Dusky Grouse is too few to effectively monitor the species under the current sampling design. This year, using all detections across all years, we were able to calculate a density estimate for the species in aspen habitat in 2007.

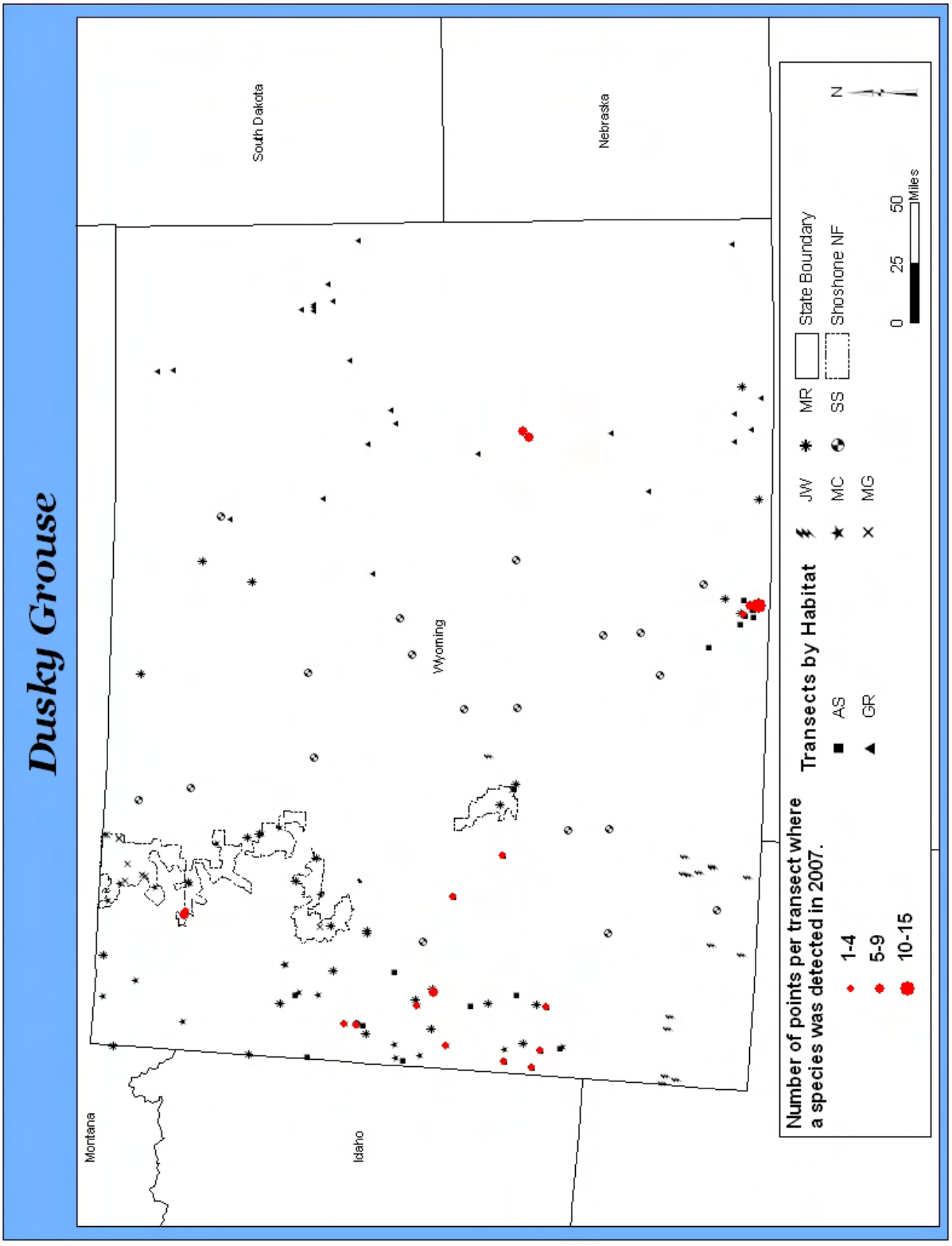


Estimated density (birds/km2) of Dusky Grouse, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Dusky Grouse on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	3
WY-AS	29.8	17.0	52.3	34	7	21
WY-MC	ID	--	--	--	--	11
WY-SS	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Dusky Grouse on transects in Wyoming, 2007.

Sharp-tailed Grouse
(*Tympanuchus phasianellus*)

USFS Region 2 Sensitive Species
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

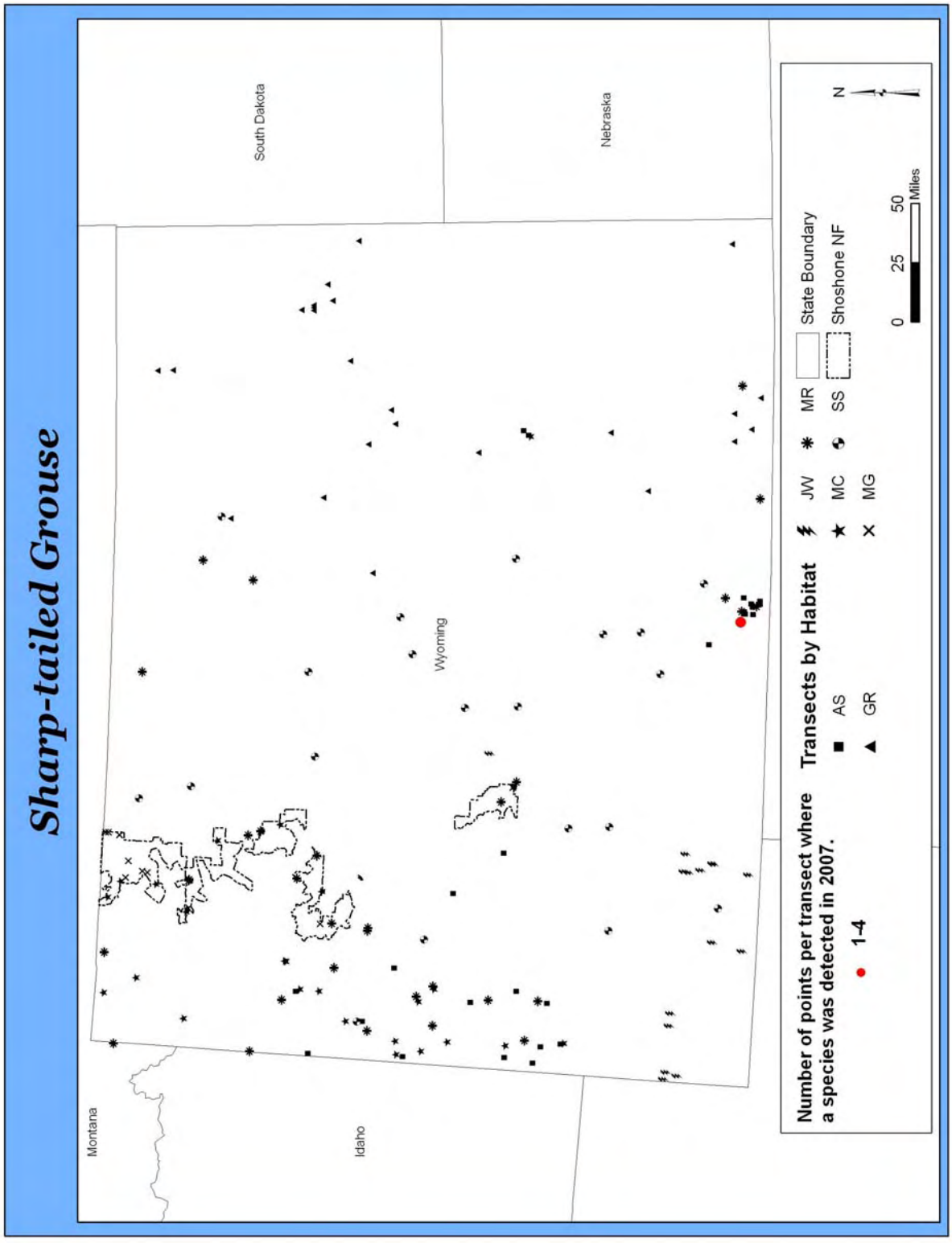
Sharp-tailed Grouse uses a wide range of open country from native prairie to aspen parkland. Habitat conversion and degradation, especially from agriculture, have caused this species to occur largely in scattered vestigial populations. In 2007, we detected only three individuals. All three were detected on one aspen transect, AS47. We did not detect Sharp-tailed Grouse in sufficient numbers to calculate a density estimate.

The timing of our surveys does not correspond well to the peak period of detectability of the species, which occurs earlier in spring. Thus the species probably goes undetected on many of our late-spring/early summer surveys. Since we detect Sharp-tailed Grouse so infrequently on transects, it is unlikely we will be able to effectively monitor it in any individual habitat or across habitats under the current sampling design. Effective monitoring would require a more intensive and focused effort. Additional surveys in aspen and grassland earlier in the spring would likely yield better information on Sharp-tailed Grouse.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Sharp-tailed Grouse on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	3

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Sharp-tailed Grouse on transects in Wyoming, 2007.

Common Loon
(Gavia immer)

WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

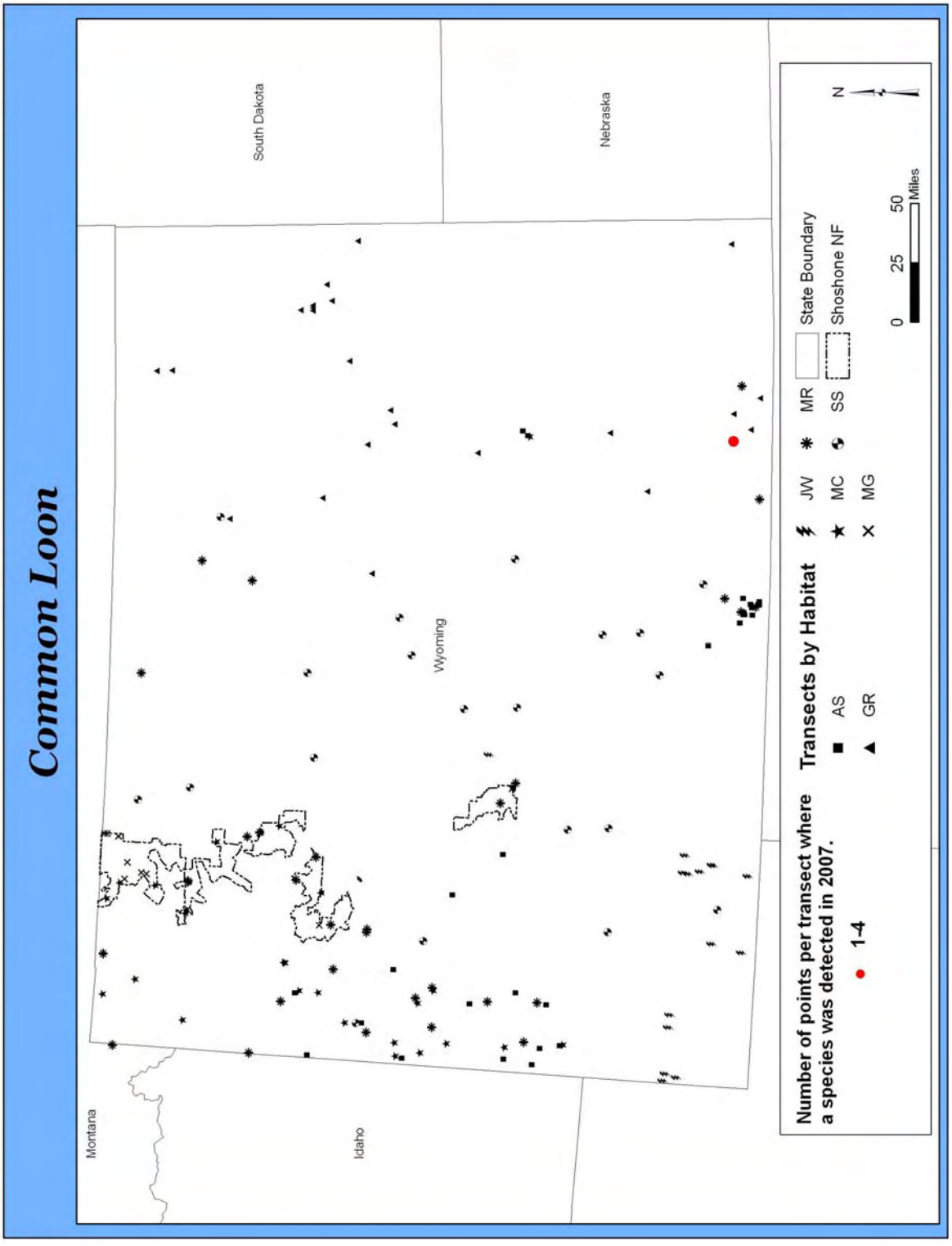
Common Loon can be found on lakes across Wyoming during migration, but during the summer it nests in the northwestern portion of the state. In 2007, we observed one Common Loon on a grassland transect, GR63. This bird was detected in the southeastern portion of the state, so most likely it was a late migrant and not breeding in this location. This is only the second year we have detected Common Loon on MWB transects.

Even though the species breeds in Wyoming, it is not likely that it will be recorded in sufficient numbers to estimate a density under the current sampling design. We do not currently survey its preferred habitat type, which is wetland habitat. As a result, the following distribution map will not accurately reflect the species actual distribution. Adding transects near wetlands or open water in the northwest portion of the state would most likely improve our ability to detect Common Loon.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Common Loon on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Common Loon on transects in Wyoming, 2007.

American White Pelican
(Pelicanus erythrorhynchos)

WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

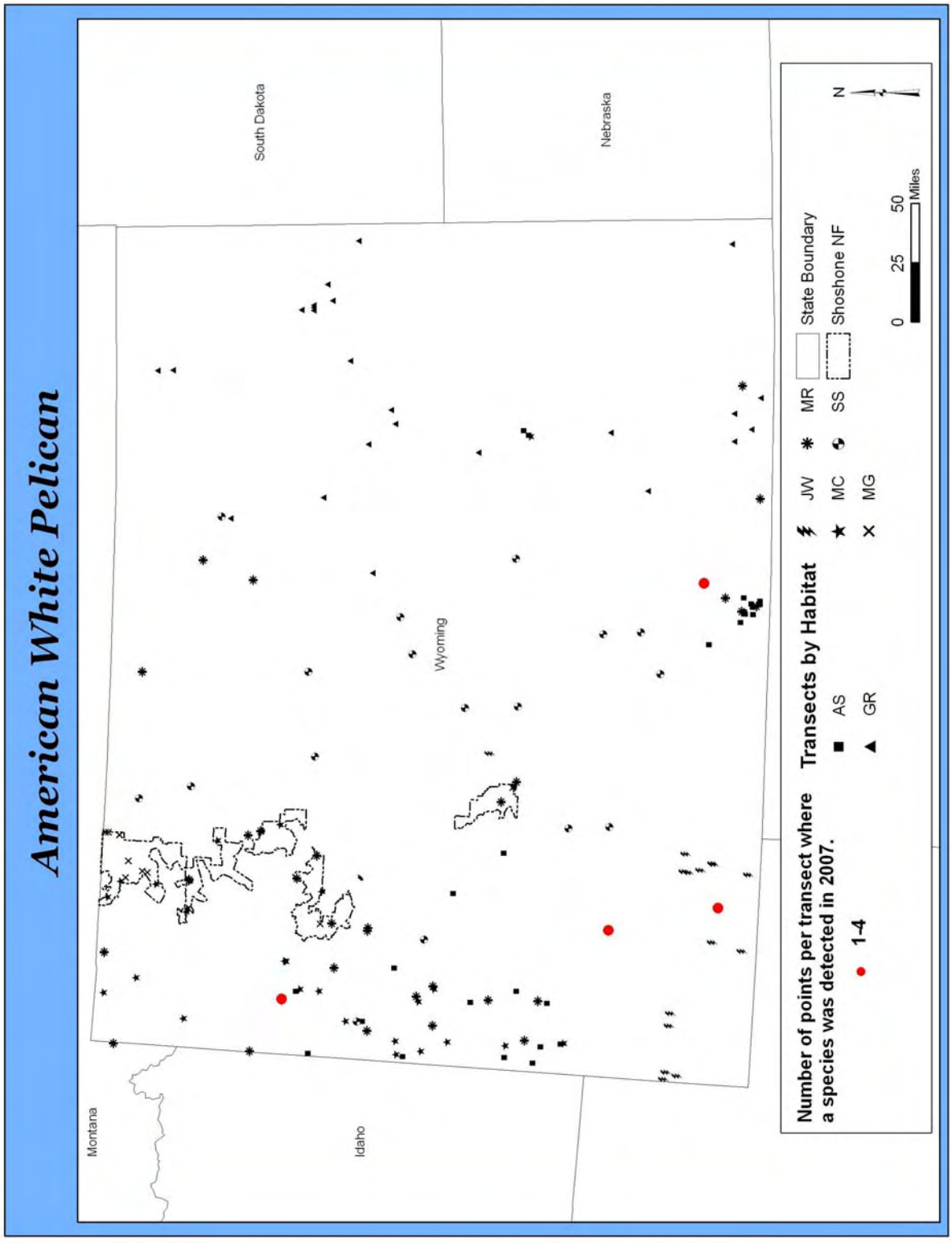
American White Pelican can be found on rivers, streams, lakes, ponds, and marshes, but it nests at only a few specific locations in the state. It requires islands with low vegetation and isolated from mammalian predators for breeding. In 2007, we detected eight individuals in two habitats, montane riparian and shrubsteppe. We detected three American White Pelicans on one transect, MR59, where we detected eight in 2006.

It is not likely that we will be able to record the species in sufficient numbers to estimate a density under the current sampling design. We do not currently survey its preferred habitat type, which is wetland habitat. As a result, the following distribution map will not accurately reflect the species actual distribution. Adding wetland transects may improve our ability to monitor it. However, due to the very specific breeding requirements of American White Pelican, effective monitoring would likely entail a more intensive and focused effort, involving cataloguing colonies and checking nest occupancy each year. This effort is already underway in Colorado through Project ColonyWatch. A similar project could be implemented in Wyoming given interest.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for American White Pelican on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-MR	ID	--	--	--	--	3
WY-SS	ID	--	--	--	--	5

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of American White Pelican on transects in Wyoming, 2007.

Great Blue Heron
(Ardea herodias)

WGFD Species of Greatest Conservation Need

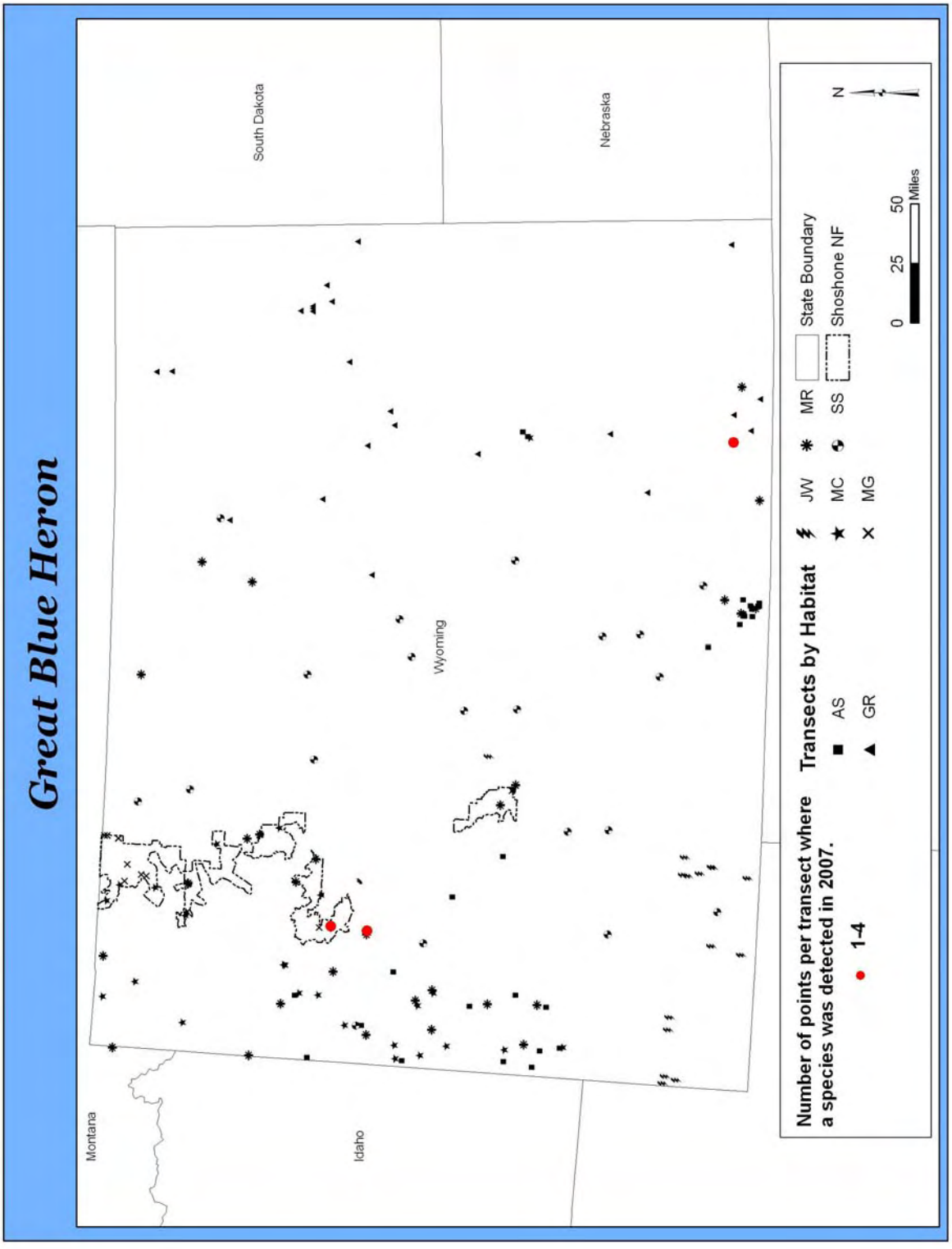
Great Blue Heron inhabits shorelines of marshes, lakes, and rivers, as well as upland fields, and they nest primarily on islands or in wooded swamps in northeastern Wyoming (Poole and Gill 2005). In 2007, we detected three individuals in two habitats, grassland and montane riparian. We detected one Great Blue Heron on one transect, MR21, where we detected the species in 2006.

It is not likely that we will be able to record the species in sufficient numbers to estimate a density under the current sampling design. We do not currently survey its preferred habitat type, which is wetland habitat. As a result, the following distribution map will not accurately reflect the species actual distribution. Adding wetland transects in the northeastern portion of the state may improve our ability to monitor Great Blue Heron. However, effective monitoring would likely entail a more intensive and focused effort, involving cataloguing colonies and checking nest occupancy each year. This effort is already underway in Colorado through Project ColonyWatch. A similar project could be implemented in Wyoming given interest.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Great Blue Heron on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MR*	ID	--	--	--	--	1
WY-GR	ID	--	--	--	--	1
WY-MR	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*This transect is part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Great Blue Heron on transects in Wyoming, 2007.

Black-crowned Night-Heron
(Nycticorax nycticorax)

WGFD Species of Greatest Conservation Need

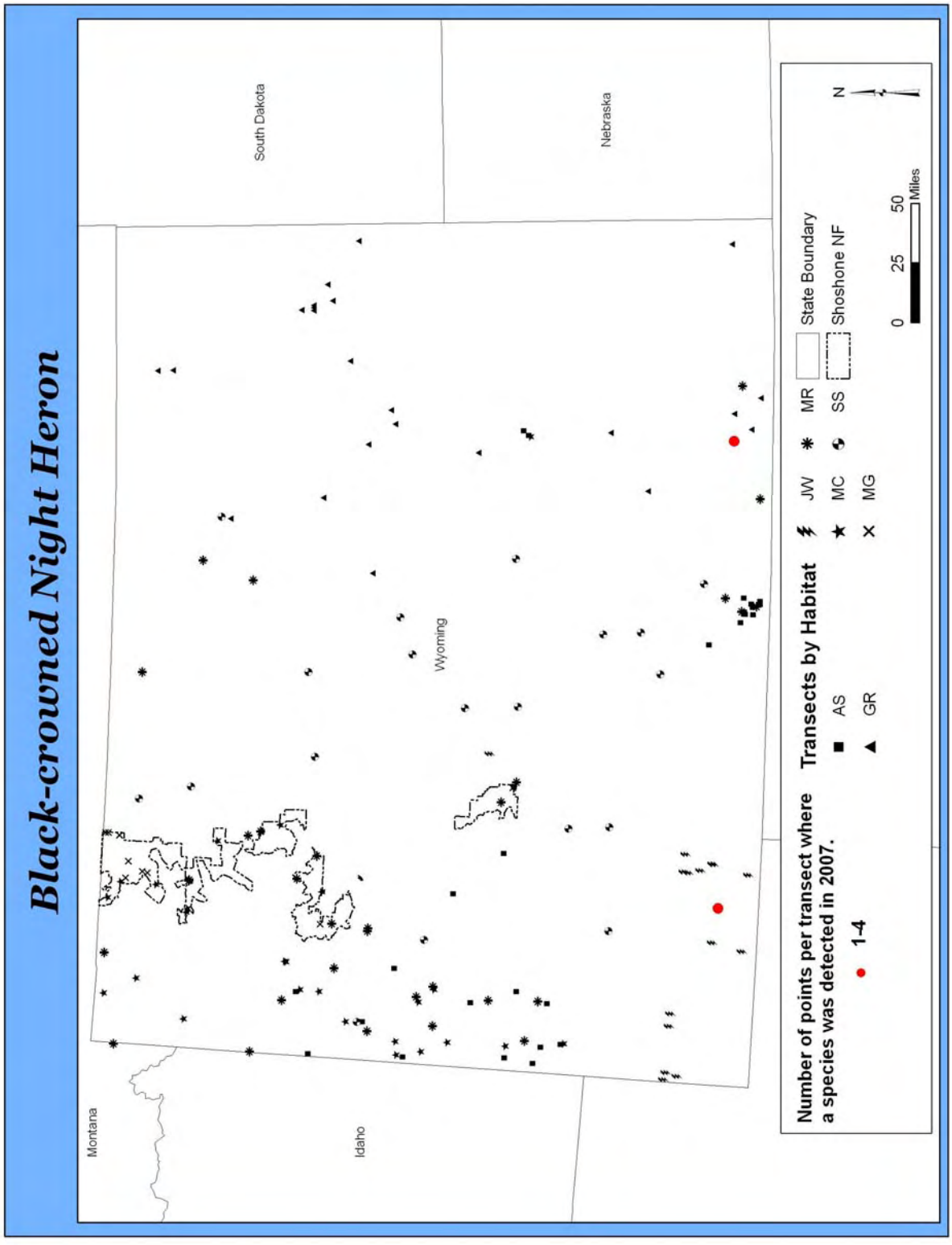
Black-crowned Night-Heron can be found in a wide variety of wetland habitats in southern Wyoming (Poole and Gill 2005). This species tends to be nocturnal, doing most of its hunting at night. In 2007, we observed three individuals in two habitats, grassland and shrubsteppe. This is the first year we have detected the species.

It is not likely that we will be able to record Black-crowned Night-Heron in sufficient numbers to estimate a density under the current sampling design. We do not currently survey its preferred habitat type, which is wetland habitat. As a result, the following distribution map will not accurately reflect the species actual distribution. Adding wetland transects in the southern portion of the state may improve our ability to monitor the species. However, effective monitoring would likely require a more intensive and focused effort, involving cataloguing colonies and checking nest occupancy each year. This effort is already underway in Colorado through Project ColonyWatch. A similar project could be implemented in Wyoming given interest.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Black-crowned Night-Heron on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	2
WY-SS	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Black-crowned Night Heron on transects in Wyoming, 2007.

Bald Eagle
(*Haliaeetus leucocephalus*)

WGFD Species of Greatest Conservation Need
WGFD Threatened Species
WY-PIF Level I Priority Species

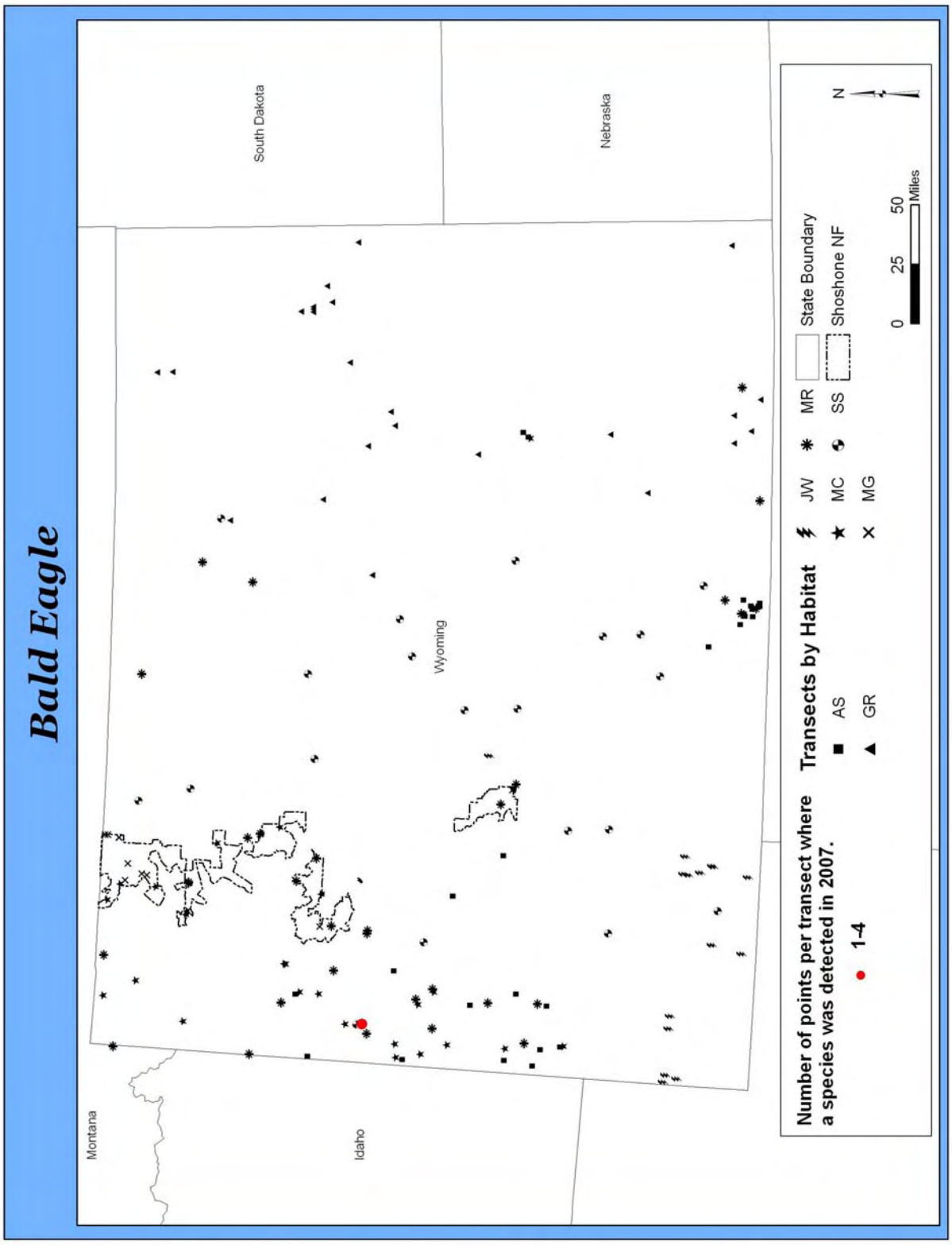
Bald Eagle requires large bodies of open water with plentiful fish and tall trees for nesting and roosting. Although the species was once threatened with extinction in the lower 48 states, under the protection of the Endangered Species Act (ESA), it has made a remarkable recovery. In Wyoming, the species has been monitored by many organizations over the last 10 years, including the BLM and the WGFD. In 2007, we detected one Bald Eagle on an aspen transect, AS90. One Bald Eagle has been observed on this transect in 2003 and 2004, and all three observations were at either point one or point two of the transect.

Bald Eagle, like other raptors, is difficult to monitor using a point-transect protocol because of its low density and large territory size. Therefore, it is unlikely we will be able to monitor Bald Eagle in any habitat or across habitats. Adding wetland transects may improve our ability to monitor the species; however, effective monitoring would likely require a more intensive and focused effort, possibly involving cataloguing nests and checking nest occupancy each year.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Bald Eagle on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Bald Eagle on transects in Wyoming, 2007.

Northern Harrier
(Circus cyaneus)

USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WY-PIF Level III Priority Species

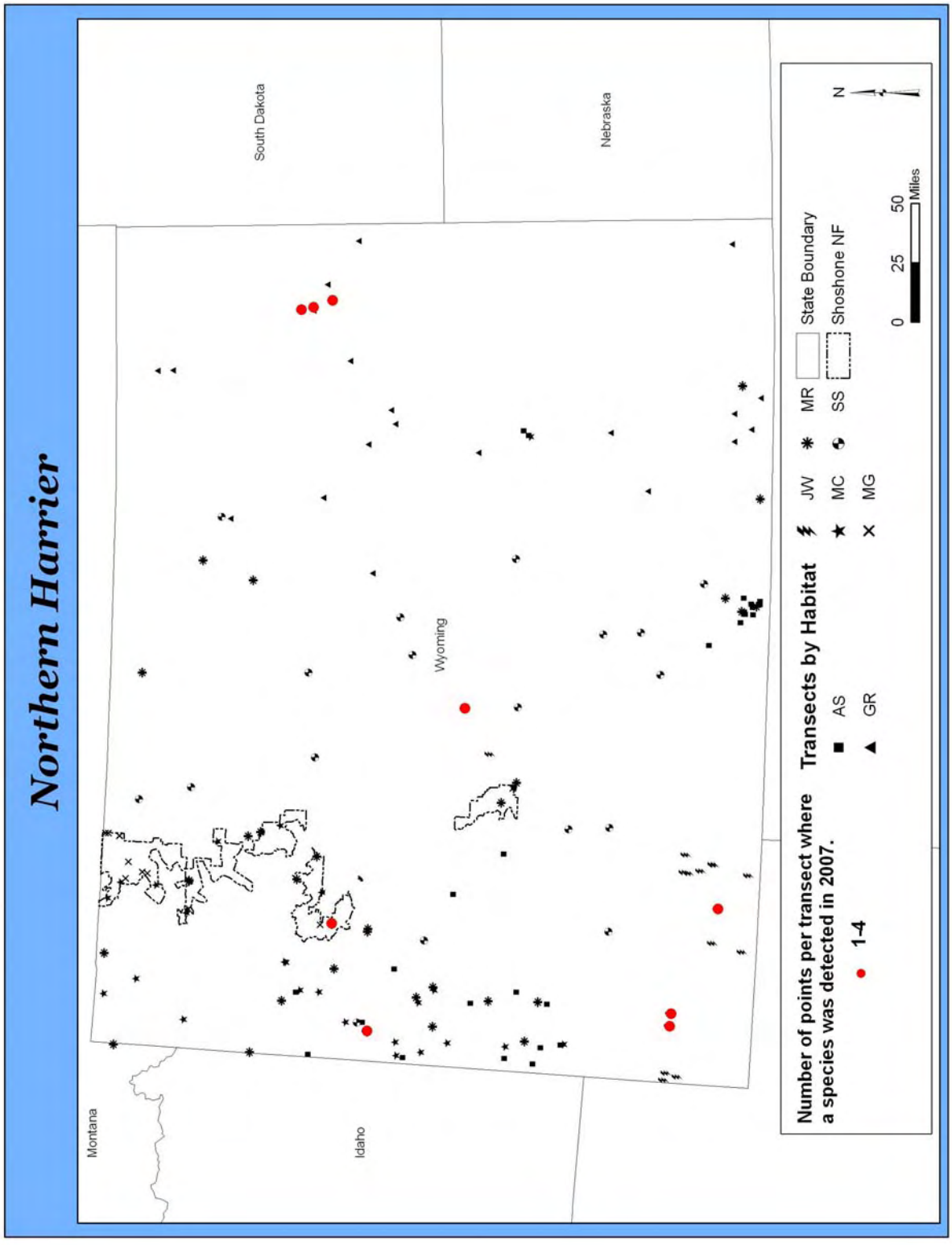
Historically, Northern Harrier was thought to be one of the most common raptors on the plains. Like many raptor species, Northern Harrier declined in the 1970s due to DDT poisoning. It appears that Northern Harrier continues to decline due to habitat loss, particularly of wetlands (Poole and Gill, 2005). In 2007, we detected 11 Northern Harrier in four different habitats.

Like other raptor species, the Northern Harrier is difficult to monitor using a point-transect protocol, because of its low density and large territory size. Therefore, it is unlikely we will be able to monitor Northern Harrier in any habitat or across habitats. Effective monitoring would likely require a more intensive and focused effort, possibly involving cataloguing nests and checking nest occupancy each year.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Northern Harrier on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MR*	ID	--	--	--	--	2
WY-GR	ID	--	--	--	--	4
WY-JW	ID	--	--	--	--	2
WY-MR	ID	--	--	--	--	3
WY-SS	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data;
*These transects are all part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Northern Harrier on transects in Wyoming, 2007.

Northern Goshawk
(*Accipiter gentilis*)

USFS Region 2 Sensitive Species
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

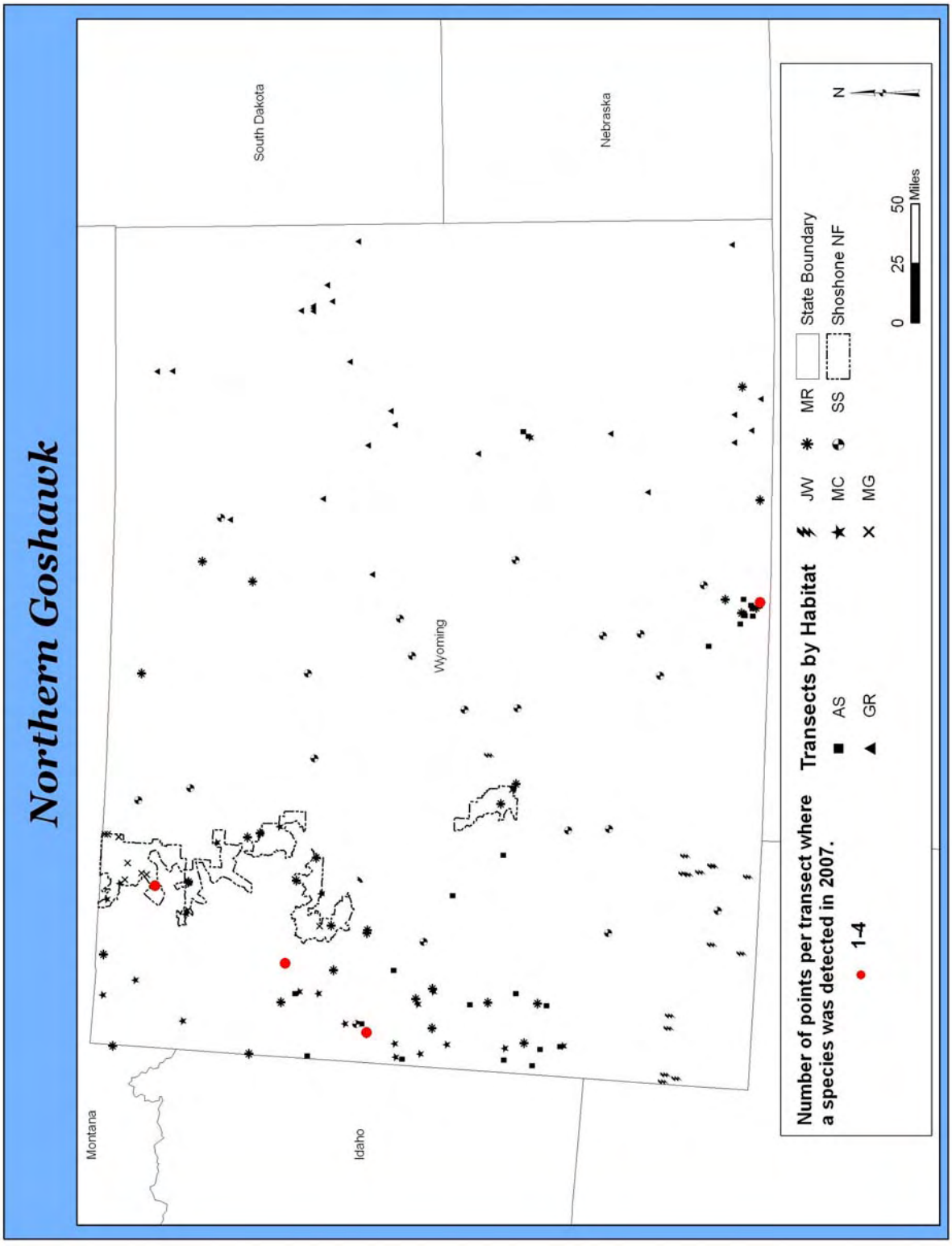
Northern Goshawk inhabits mature forests and requires large tracts of undisturbed habitat for nesting and foraging. In 2007, we detected four Northern Goshawk in three habitats, aspen, mid-elevation conifer, and montane riparian.

Data from all the habitat-based point transects will likely not be sufficient to track population trends of Northern Goshawk over time. However, RMBO implemented a pilot study in 2006 that used a call-playback technique developed by the USFS to monitor Northern Goshawk. This study was conducted in several National Forests throughout Colorado, Wyoming, and the Black Hills. Effective monitoring will likely require such intensive and focused efforts, implemented region-wide.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Northern Goshawk on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	1
WY-AS	ID	--	--	--	--	1
WY-MC	ID	--	--	--	--	2
WY-MR	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data;



RMBO point-transect locations and detections of Northern Goshawk on transects in Wyoming, 2007.

Swainson's Hawk
(*Buteo swainsoni*)

USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

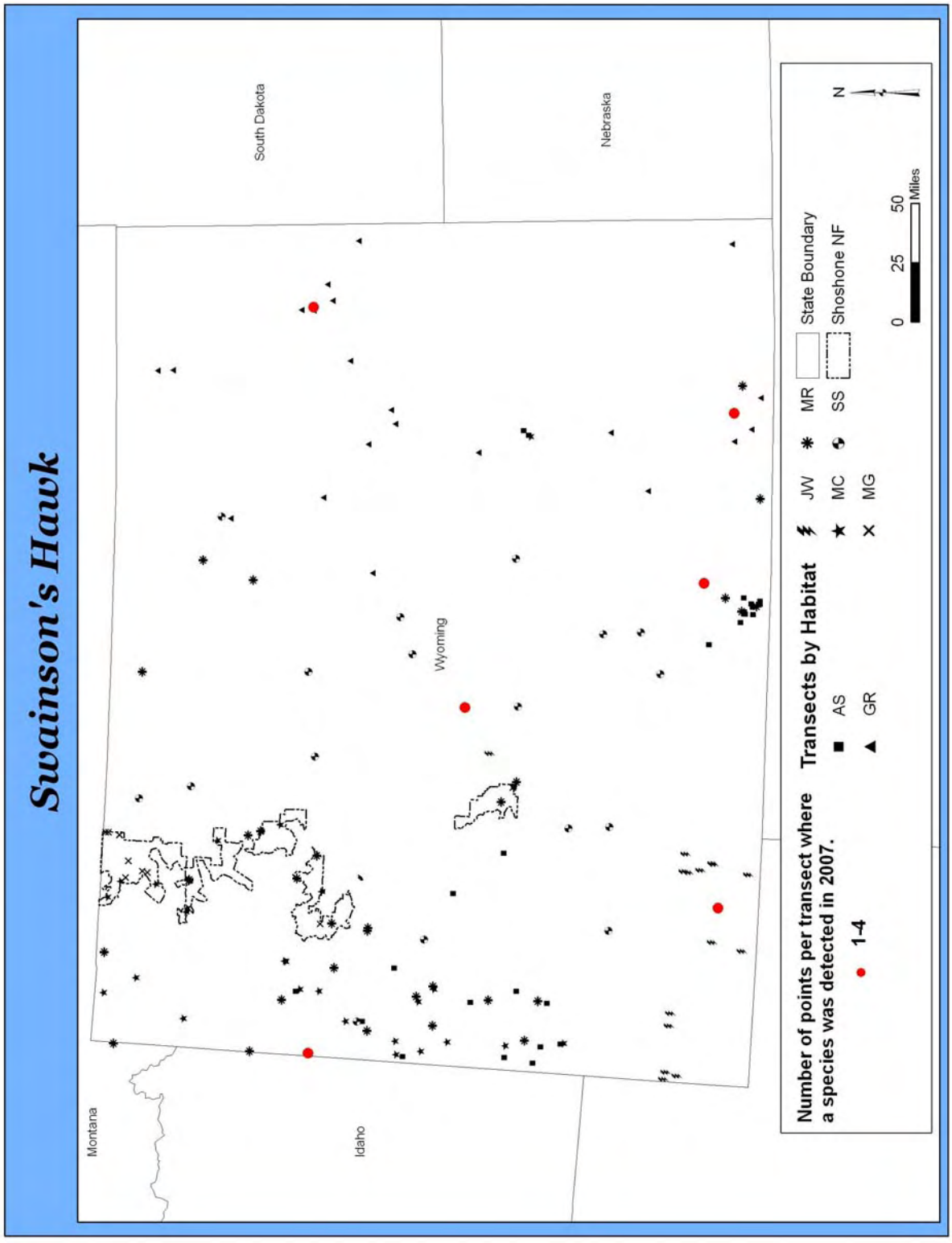
Swainson's Hawk typically inhabits sites in grassland, desert, and agricultural areas with scattered trees and shrubs. In 2007, we detected eight Swainson's Hawks in three habitats, aspen, grassland, and shrubsteppe.

Swainson's Hawk, like other raptor species, is difficult to monitor using the point-transect protocol, because of its low density and large territory size. Therefore, it is unlikely we will be able to monitor the species in any habitat or across habitats. Effective monitoring would likely require a more intensive and focused effort, possibly involving cataloguing nests and checking nest occupancy each year.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Swainson's Hawk on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	2
WY-GR	ID	--	--	--	--	2
WY-SS	ID	--	--	--	--	4

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data;



RMBO point-transect locations and detections of Swainson's Hawk on transects in Wyoming, 2007.

Ferruginous Hawk
(*Buteo regalis*)

USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

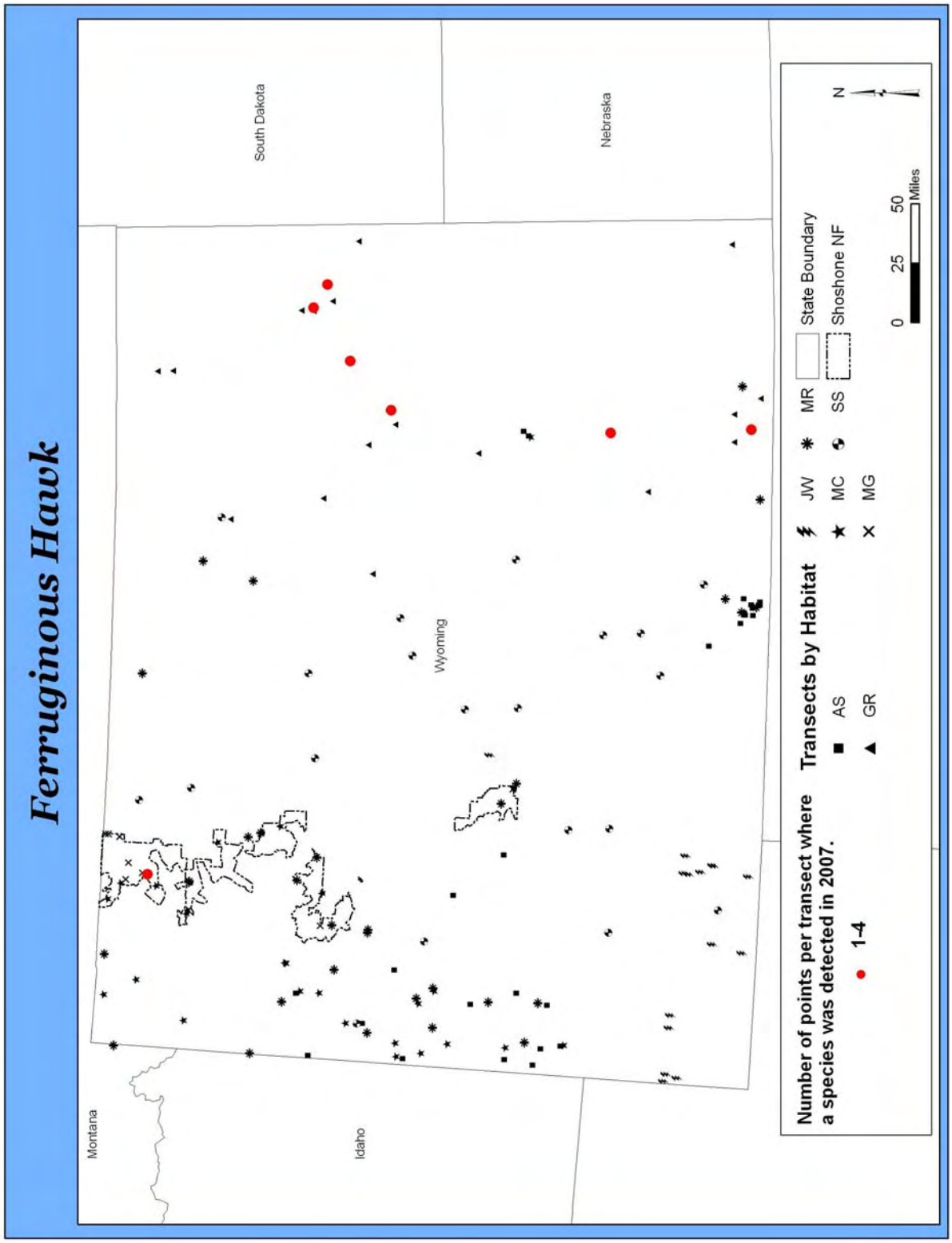
Ferruginous Hawk typically inhabits expansive ungrazed or lightly grazed grassland or shrubland with varied topography, including hills, ridges, and valleys. In 2007, we detected seven Ferruginous Hawks in two habitats, grassland and montane grassland. We detected two Ferruginous Hawks on a grassland transect, GR08, where we also detected the species in 2005 and 2006. For the first time in 2007, we detected a Ferruginous Hawk on a Shoshone transect, SH-MG01

Ferruginous Hawk, like other raptor species, is difficult to monitor using the point-transect protocol, because of its low density and large territory size. Therefore, it is unlikely we will be able to monitor the species in any habitat or across habitats. Effective monitoring would likely require a more intensive and focused effort, possibly involving cataloguing nests and checking nest occupancy each year.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Ferruginous Hawk on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MG	ID	--	--	--	--	1
WY-GR	ID	--	--	--	--	6

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data;



RMBO point-transect locations and detections of Ferruginous Hawk on transects in Wyoming, 2007.

Golden Eagle
(*Aquila chrysaetos*)

USFWS Bird of Conservation Concern
WY-PIF Level III Priority Species

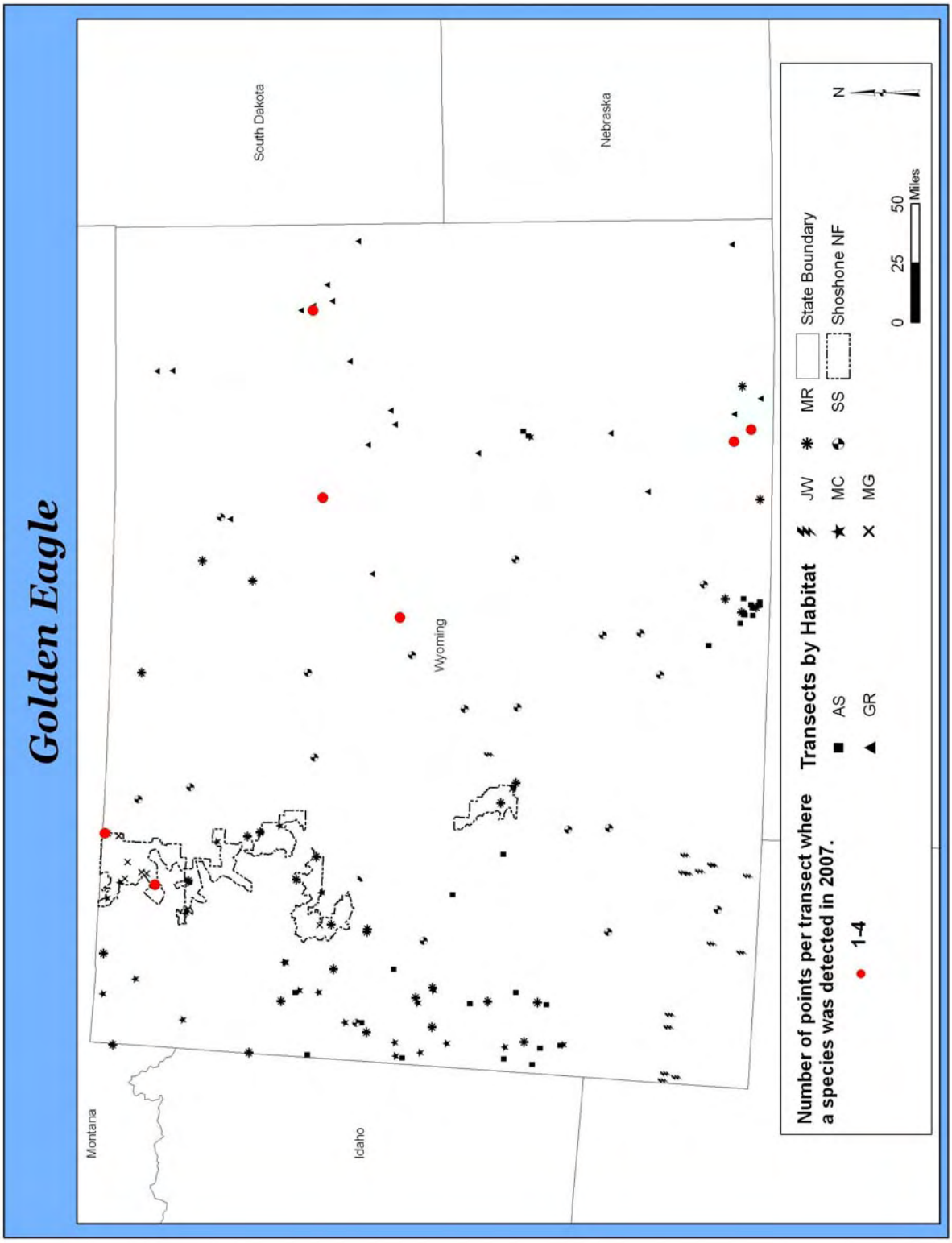
Golden Eagle occupies a wide variety of habitats, but because of its size, the species requires vast open habitats for hunting, including grassland, sagesteppe, farmlands, and even tundra. In 2007, we detected seven Golden Eagles in four habitats. For four of the transects on which we detected Golden Eagles in 2007 – GR04, GR19, GR63, and GR74 - also had the species in previous years. Two Golden Eagles were detected on Shoshone transects SH-MG07 and WY-MC61.

Golden Eagle, like other raptor species, is difficult to monitor using the point-transect protocol, because of its low density and large territory size. Therefore, it is unlikely we will be able to monitor the species in any habitat or across habitats. Effective monitoring would likely require a more intensive and focused effort, possibly involving cataloguing nests and checking nest occupancy each year.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Golden Eagle on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	1
SH-MG	ID	--	--	--	--	1
WY-GR	ID	--	--	--	--	4
WY-MC	ID	--	--	--	--	1
WY-SS	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Golden Eagle on transects in Wyoming, 2007.

Peregrine Falcon
(Falco peregrinus)

USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

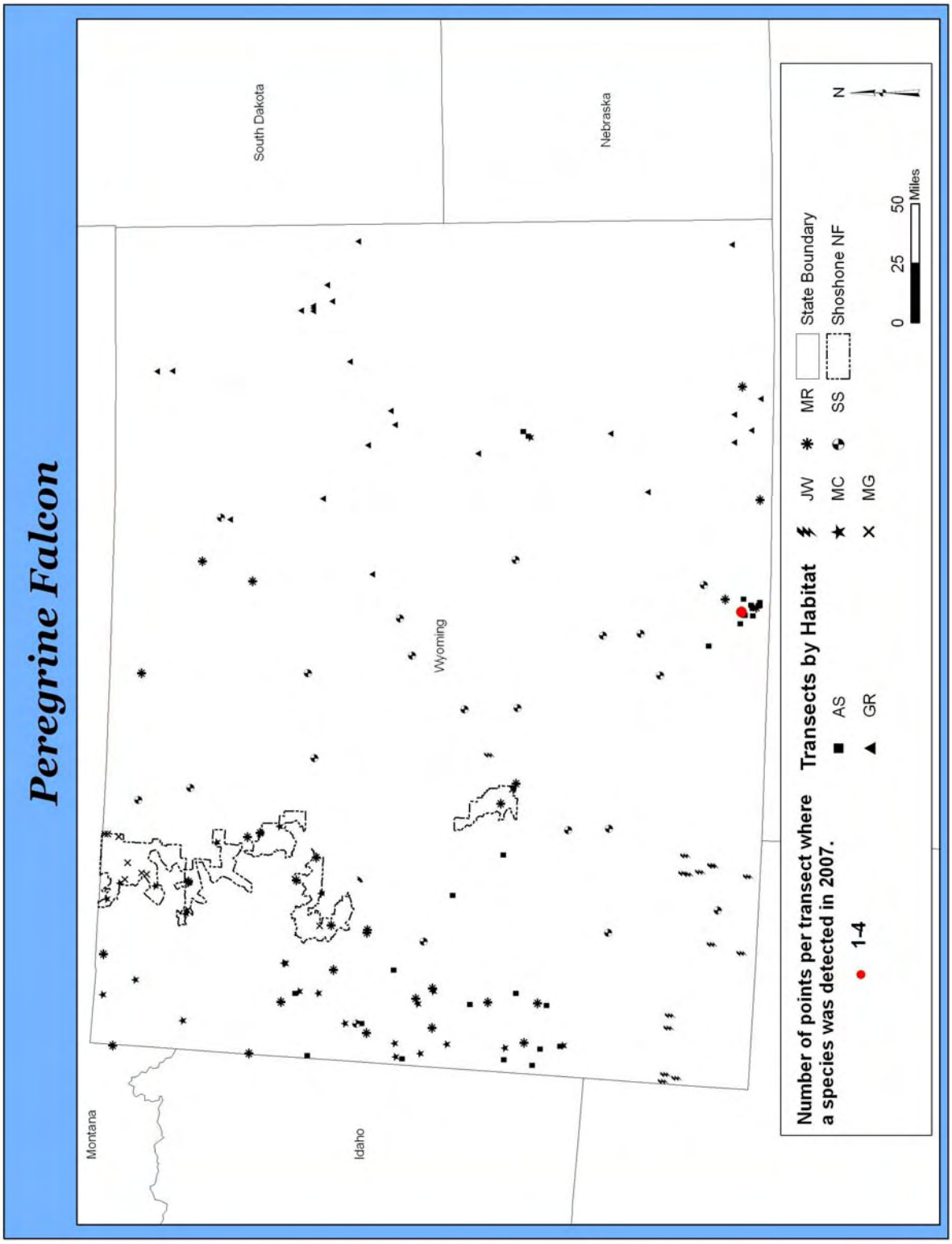
Peregrine Falcon can be found in a variety of open habitats, such as open woodlands and forests, shrubsteppe, grasslands, marshes, and riparian habitats, but it requires cliffs near water for nesting. It breeds mostly in northwestern and northeastern Wyoming. In 2007, we detected only one individual, in montane riparian habitat. This is only the second Peregrine Falcon detection in the history of MWB.

Peregrine Falcon, like other raptor species, is difficult to monitor using the point-transect protocol, because of its low density and large territory size. Locating and monitoring Peregrine Falcon nests could be incorporated into a special species program combined with similar efforts for other cliff-nesting species (e.g., Prairie Falcon).

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Peregrine Falcon on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-MR	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data;



RMBO point-transect locations and detections of Peregrine Falcon on transects in Wyoming, 2007.

Prairie Falcon
(*Falco mexicanus*)

USFWS Bird of Conservation Concern
WY-PIF Level III Priority Species

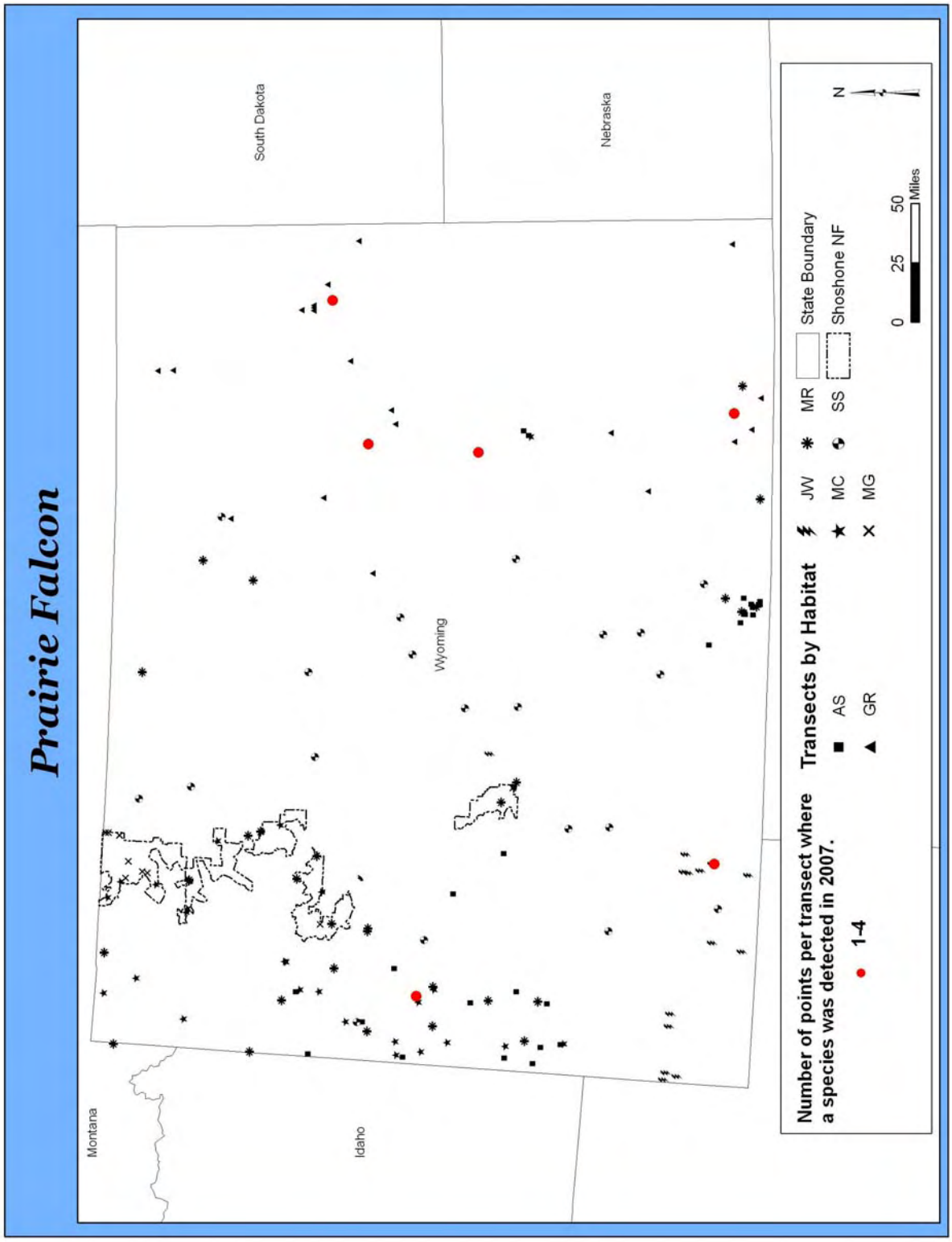
Prairie Falcon inhabits open habitat throughout Wyoming, including grassland, shrubsteppe and alpine tundra. In 2007, we detected six Prairie Falcons in three habitats. The six were independently detected on six different transects where we have never recorded the species in the past.

Prairie Falcon, like other raptor species, is difficult to monitor using the point-transect protocol, because of its low density and large territory size. Locating and monitoring Prairie Falcon nests could be incorporated into a special species program combined with similar efforts for other cliff-nesting species (e.g., Peregrine Falcon).

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Prairie Falcon on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	4
WY-JW	ID	--	--	--	--	1
WY-MR	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



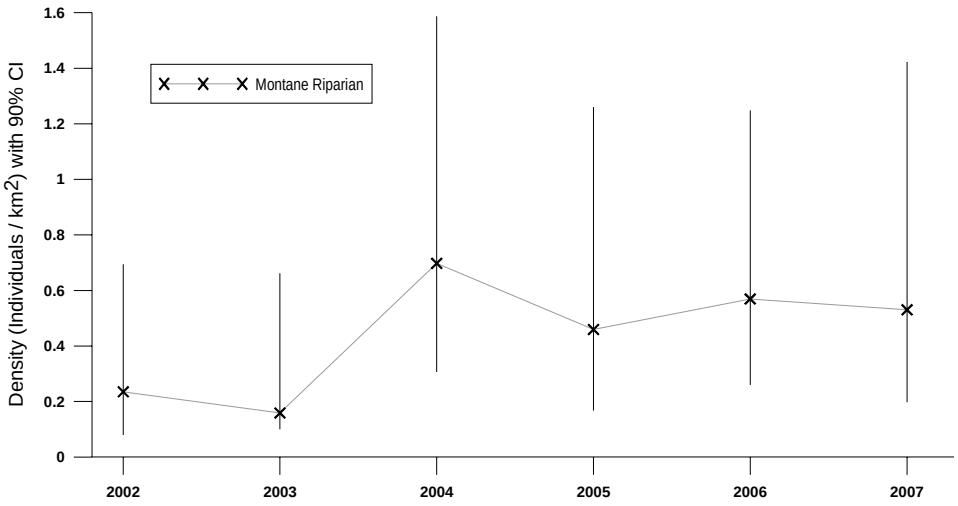
RMBO point-transect locations and detections of Prairie Falcon on transects in Wyoming, 2007.

Sandhill Crane
(*Grus canadensis*)

WGFD Species of Greatest Conservation Need

Sandhill Crane inhabits a variety of open habitats, including wetlands and uplands, particularly in agricultural areas. The species breeds throughout Wyoming, with the exception of the northeast corner of the state. In 2007, we detected 46 Sandhill Cranes in six habitats. Four of the Sandhill Crane detections in montane riparian habitat were from transect MR22. We have detected Sandhill Cranes on this transect for five consecutive years. Eight detections in sagesteppe habitat came from SS12, where we have recorded this species for four consecutive years.

In 2007, using data from all years, we were able to calculate a density estimate for Sandhill Crane in montane riparian habitat. Adding transects near wetlands or open water would most likely improve our ability to monitor the species.

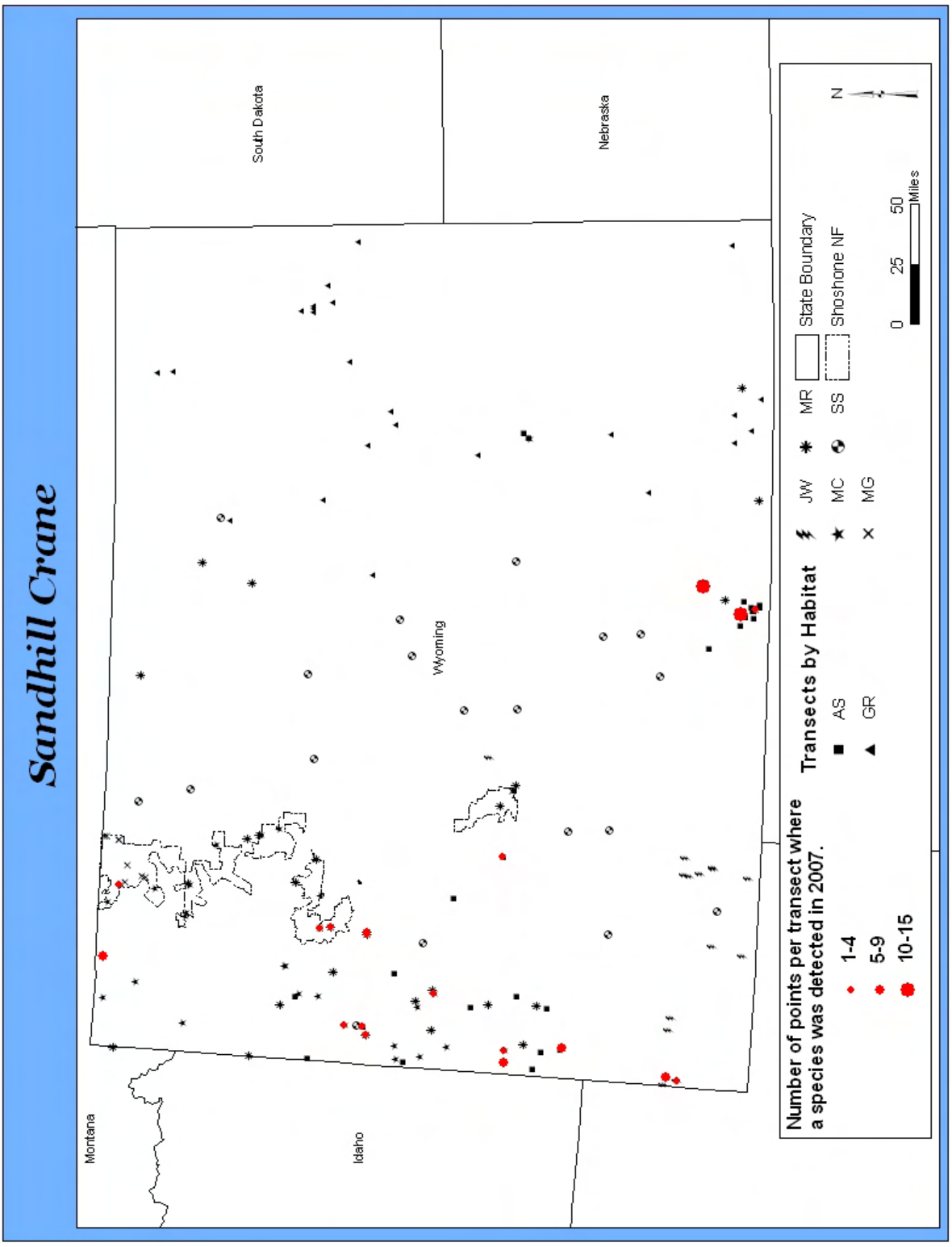


Estimated density (birds/km2) of Sandhill Crane, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Sandhill Crane on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	2
SH-MG	ID	--	--	--	--	1
SH-MR*	ID	--	--	--	--	1
WY-AS	ID	--	--	--	--	6
WY-JW	ID	--	--	--	--	3
WY-MC	ID	--	--	--	--	10
WY-MR	0.5	0.2	1.4	63	12	18
WY-SS	ID	--	--	--	--	8

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*This transect is part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Sandhill Crane on transects in Wyoming, 2007.

Mountain Plover
(*Charadrius montanus*)

USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

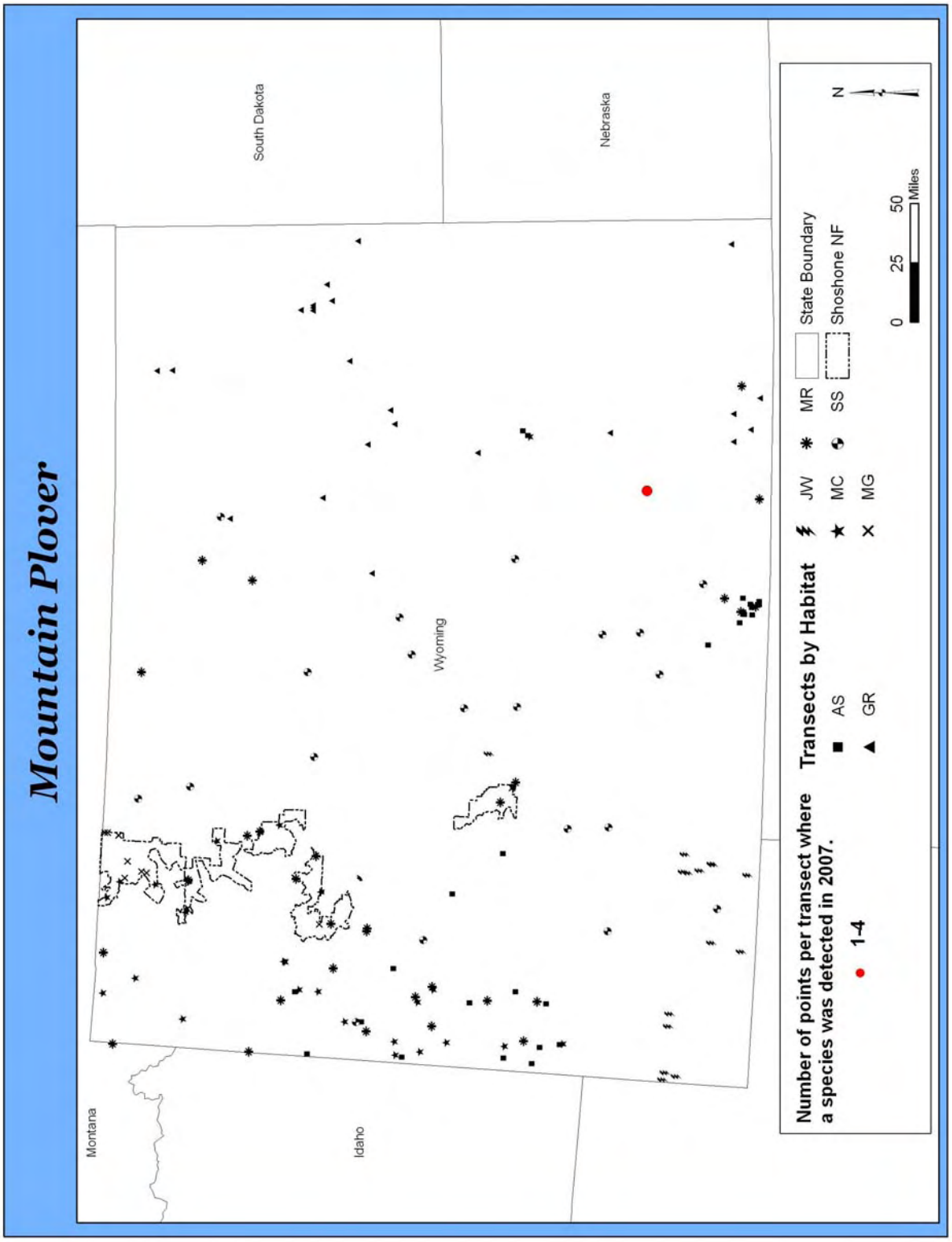
Mountain Plover primarily breeds in arid prairie, agricultural fields, and grazed rangelands. In 2007, we detected two Mountain Plovers in grassland habitat. Both were detected on one transect, GR44. We have recorded Mountain Plovers on this transect for five consecutive years.

In Colorado and Nebraska, through RMBO's Prairie Partners program, we track and monitor nests on agricultural fields through partnerships with private landowners. Nests are flagged and avoided during harvest. Given interest, such a program could be implemented in Wyoming, along with more targeted Mountain Plover surveys.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Mountain Plover on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Mountain Plover on transects in Wyoming, 2007.

American Avocet
(Recurvirostra americana)

WY-PIF Level III Priority Species

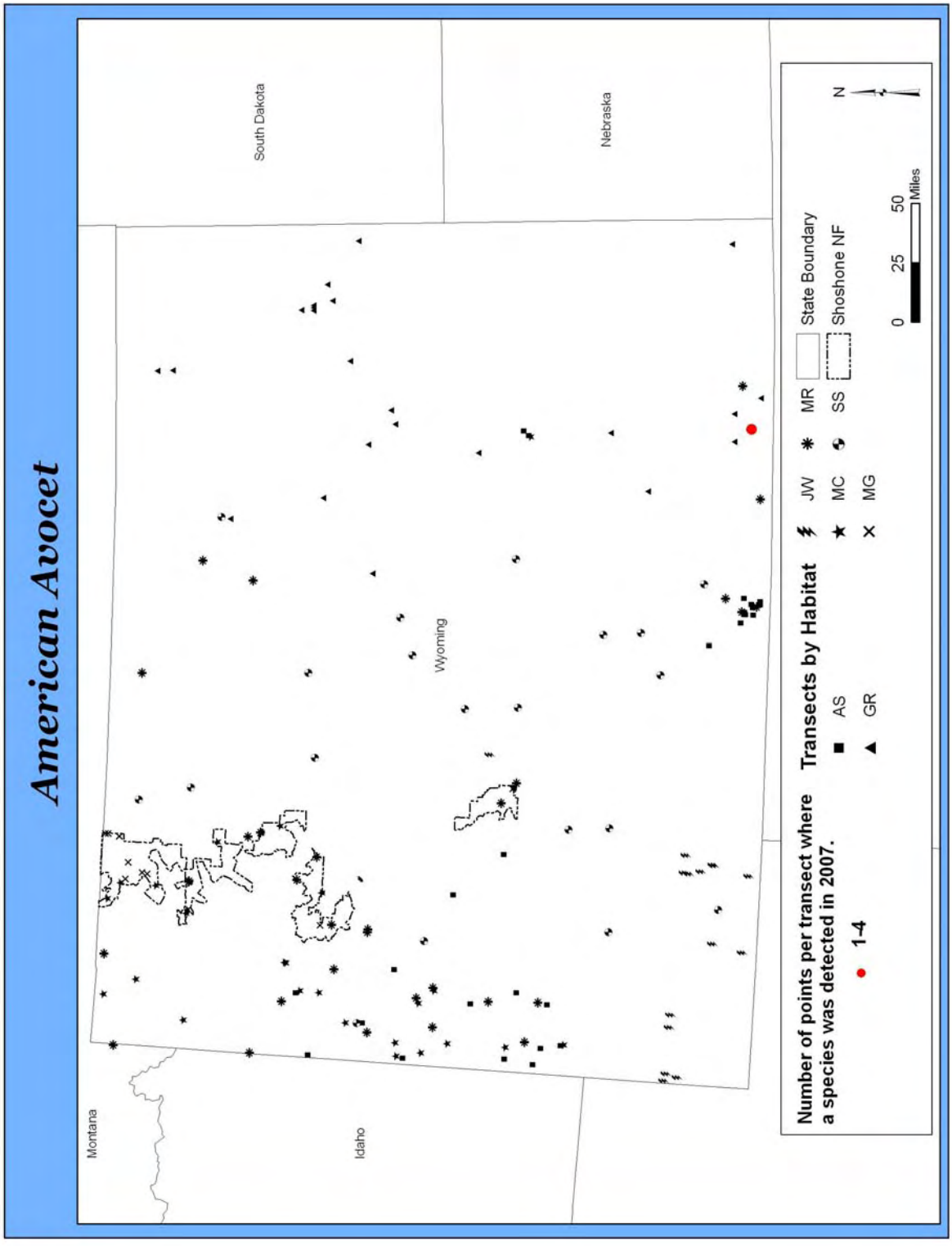
American Avocet inhabits marshes, ponds, and shorelines of open country throughout most of Wyoming. It nests in colonies on mudflats and sandy islands or sandbars. In 2007, we observed two individuals on one grassland transect, GR19. We detected three American Avocets on this same transect in 2005.

We detect American Avocet too infrequently on point transects to effectively monitor the species under the current sampling design. We do not currently survey its preferred habitat type, which is wetland habitat. As a result, the following distribution map will not accurately reflect the species actual distribution. Adding transects near wetlands would likely increase our ability to detect the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for American Avocet on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of American Avocet on transects in Wyoming, 2007.

Willet
(Catoptrophorus semipalmatus)

WY-PIF Level III Priority Species

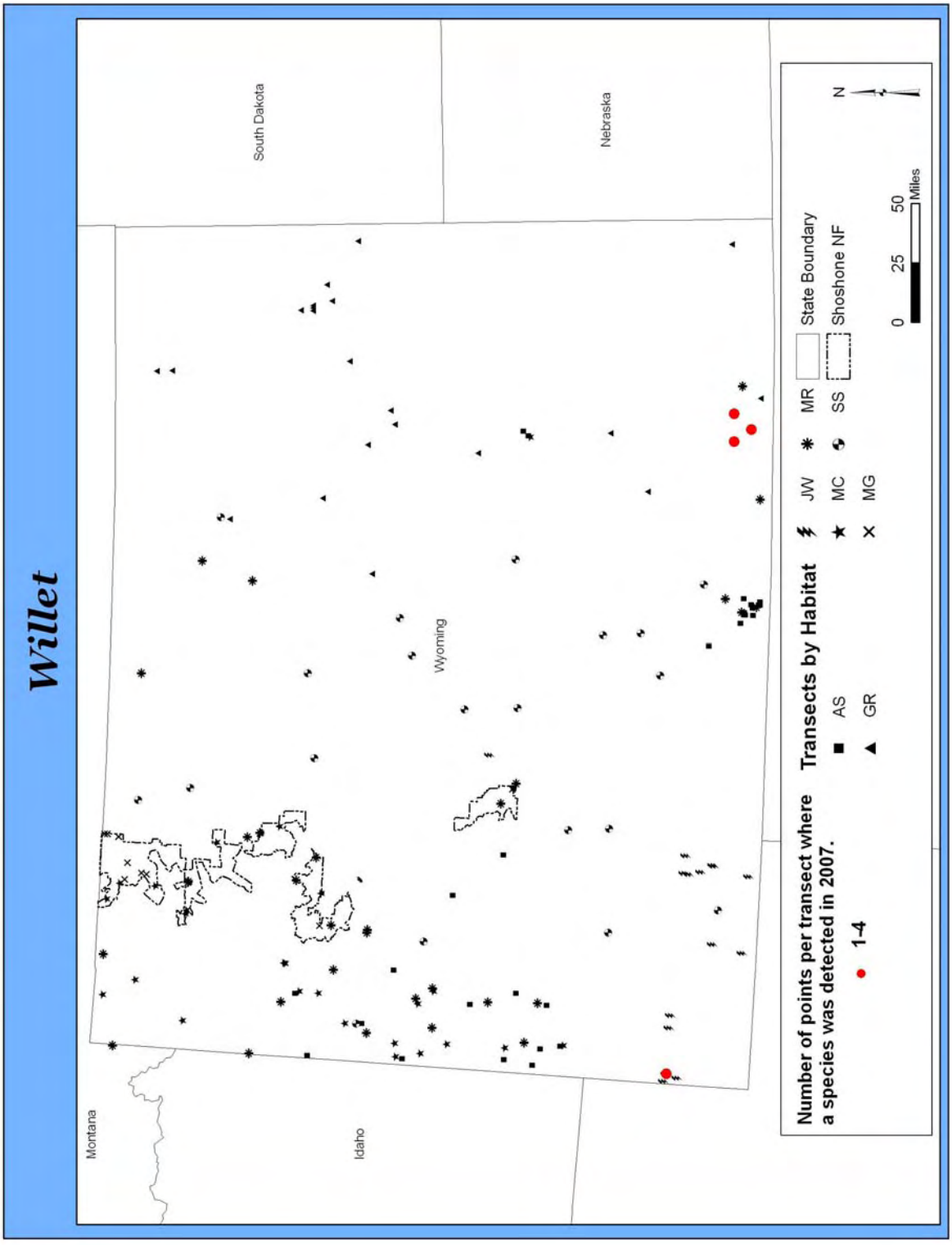
Willet can be found across most of Wyoming in wet meadow grasslands, marshes, irrigated native meadows, and shorelines. In 2007, we detected seven individuals in two habitats, grassland and juniper woodland. On one transect, GR19, we have detected the species for the last four years, and on GR62, we have detected it for the last three years.

This species has had a small number of detections on MWB transects, but using data from all years, we may eventually be able to calculate an annual density estimate for Willet, at least in grassland habitat, that can be used for population-trend monitoring. Adding additional grassland transects may improve our ability to detect Willet.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Willet on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	6
WY-JW	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Willet on transects in Wyoming, 2007.

Long-billed Curlew
(*Numenius americanus*)

USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

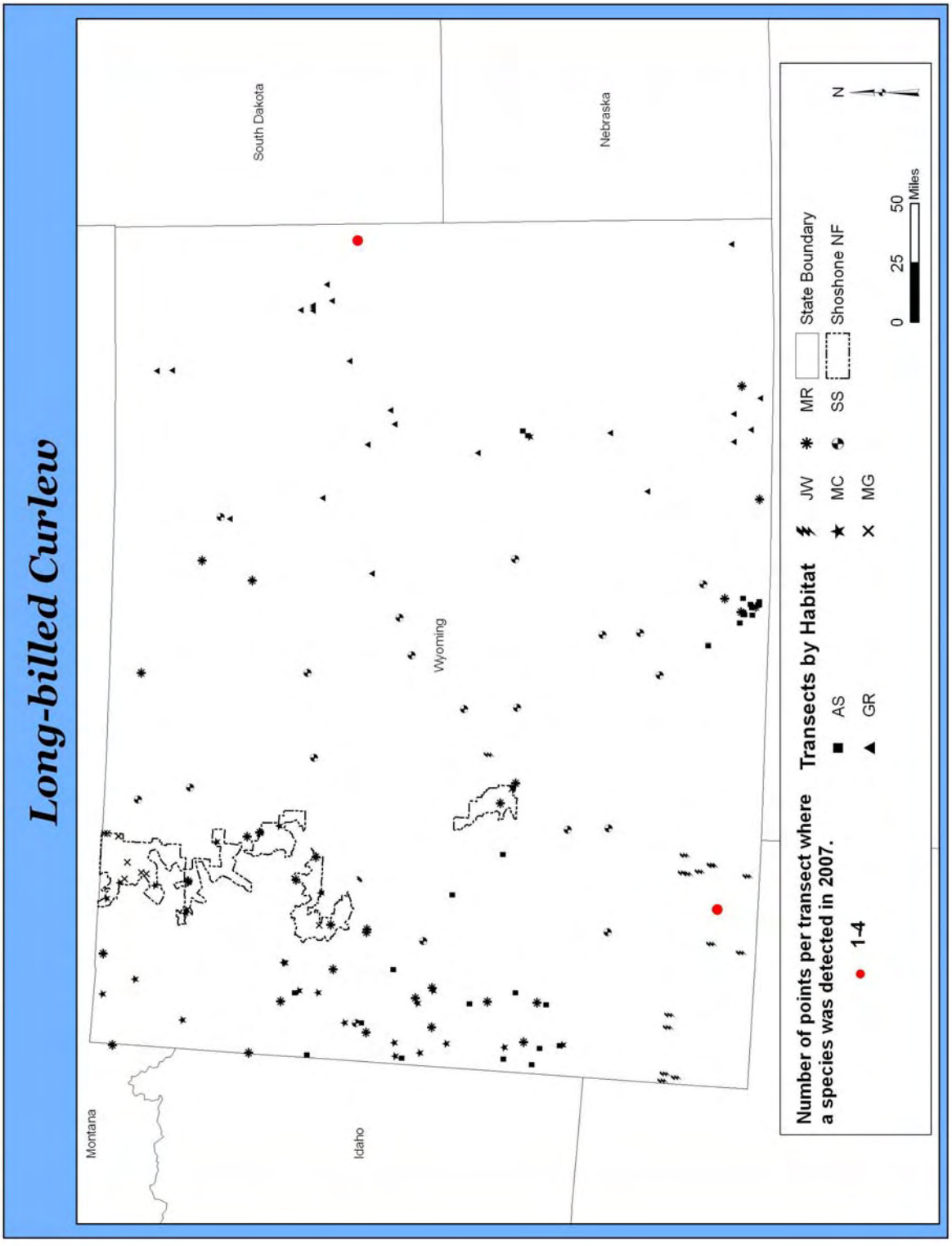
Long-billed Curlew, the largest shorebird in North America, is found in fields and dry prairie as well as mudflats, and prefers short vegetation near water (Poole and Gill, 2005). In 2007, we detected four Long-billed Curlews in two habitats, grassland and shrubsteppe. Two of the detections were on one transect, GR03, where we detected the species in 2006.

We detect Long-billed Curlew too infrequently on point transects to effectively monitor the species. Additional grassland and shrubsteppe transects would likely yield better information for Long-billed Curlew; however, given the species low population density, effective monitoring will likely require a more intensive and focused effort.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Long-billed Curlew on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	2
WY-SS	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Long-billed Curlew on transects in Wyoming, 2007.

Great Gray Owl
(*Strix nebulosa*)

WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

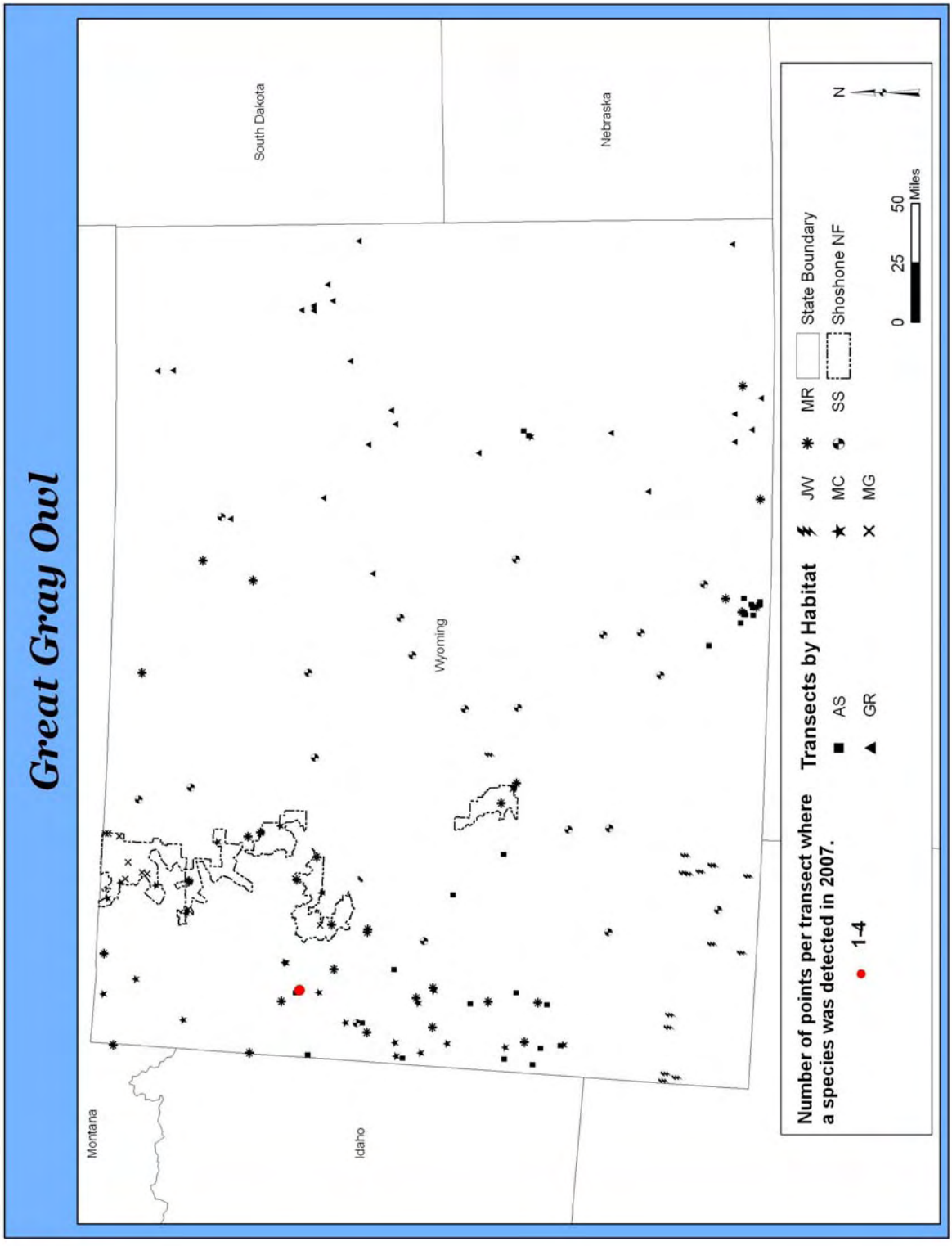
Great Gray Owl inhabits a variety of forest types but prefers dense coniferous forests near meadows and open fields. In 2007, we detected one Great Gray Owl on a mid-elevation conifer transect, MC11. This was our second detection of a Great Gray Owl in this habitat in Wyoming, and only our third detection of the species throughout the history of the MWB project.

MWB was not designed to monitor nocturnal species. Nocturnal monitoring programs have been implemented in Canada and the northeastern United States primarily using volunteers in a fashion similar to the Breeding Bird Surveys. In Wyoming, an effective monitoring program for owls and goatsuckers (nighthawks and nightjars) would likely involve nocturnal playback surveys for a group of targeted species with similar timing of breeding and habitat requirements. Such a program would be best implemented through volunteer efforts similar to the special species program that is part of the MCB project.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Great Gray Owl on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-MC	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Great Gray Owl on transects in Wyoming, 2007.

Common Poorwill
(Phalaenoptilus nuttallii)

WY-PIF Level III Priority Species

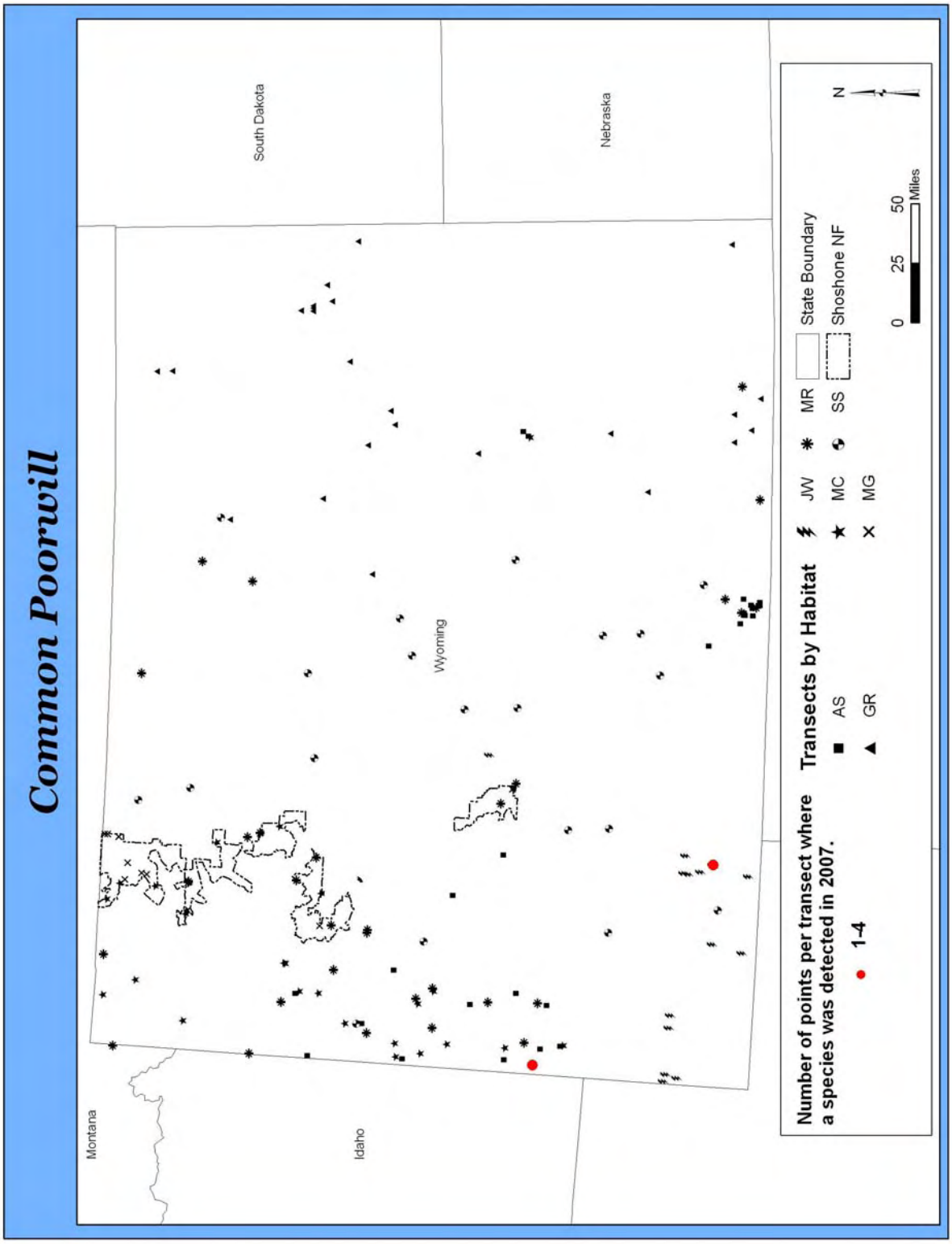
Common Poorwill can be found across most of Wyoming in sagebrush, open prairies, mountain-foothills shrublands, juniper woodlands; rocky canyons, and ponderosa pine woodlands. In 2007, we detected two individuals in aspen and juniper woodland habitats. One Common Poorwill was detected on AS10, where the species was detected in 2006.

MWB was not designed to monitor nocturnal species. Nocturnal monitoring programs have been implemented in Canada and the northeastern United States primarily using volunteers in a fashion similar to the Breeding Bird Surveys. In Wyoming, an effective monitoring program for owls and goatsuckers would likely involve nocturnal playback surveys for a group of targeted species with similar timing of breeding and habitat requirements. Such a program would be best implemented through volunteer efforts similar to the special species program that is part of the MCB project.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Common Poorwill on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	1
WY-JW	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Common Poorwill on transects in Wyoming, 2007.

Black-chinned Hummingbird (*Archilochus alexandri*)

WY-PIF Level II Priority Species

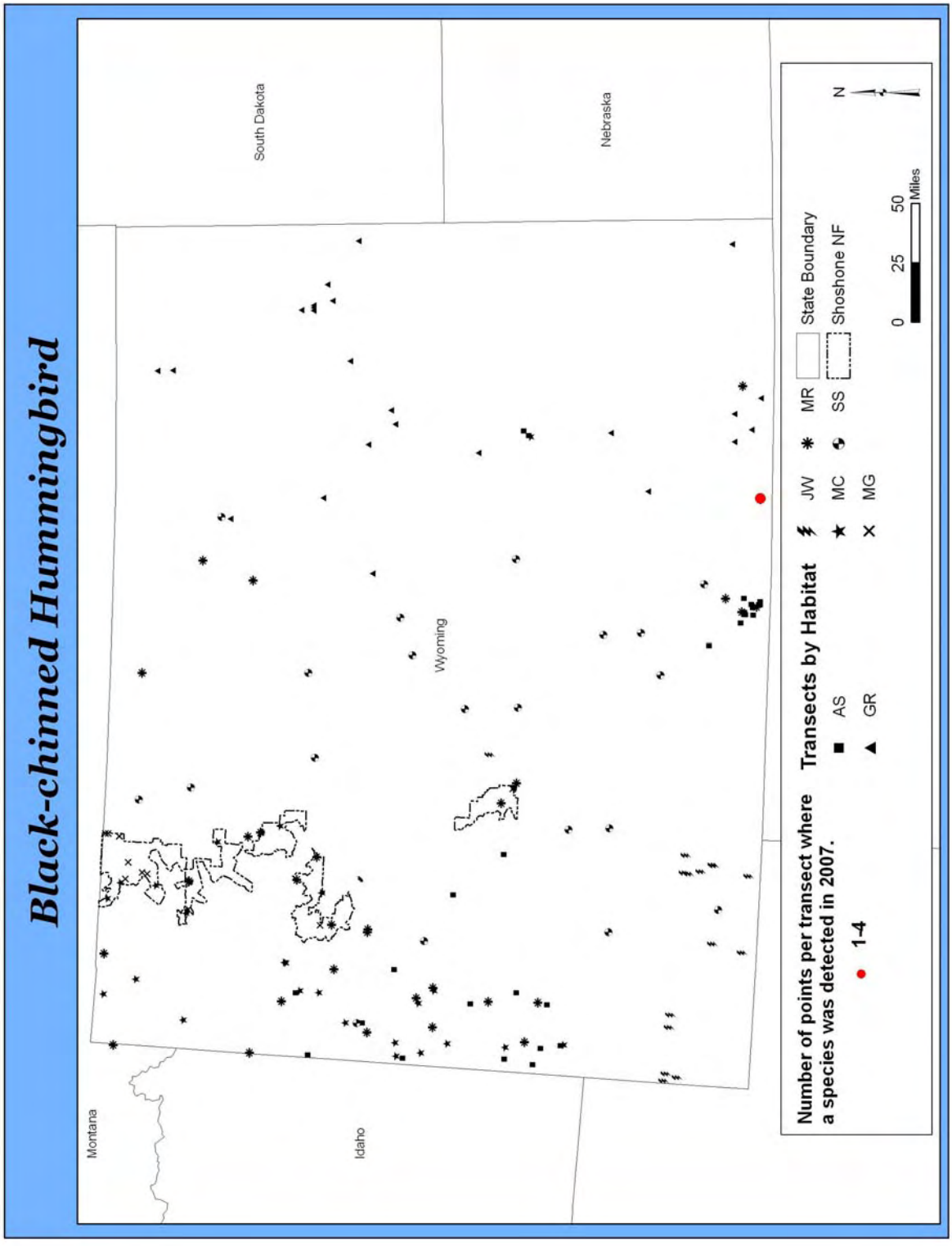
Black-chinned Hummingbird breeds most frequently in pinyon-juniper habitat, but is also found in low- and mid-elevation riparian, Gambel oak shrubland, and urban areas. The species has been recorded breeding in the southwestern corner of Wyoming, at the periphery of its range. In 2007, we detected two Black-chinned Hummingbirds on a montane riparian transect, MR79. There have only been five detections of Black-chinned Hummingbird in the history of the MWB program.

Given the limited breeding range of Black-chinned Hummingbird in Wyoming, it's unlikely we will be able to effectively monitor the species. Additional transects in juniper woodland habitat in the southwest portion of the state may yield better information for the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Black-chinned Hummingbird on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-MR	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Black-chinned Hummingbird on transects in Wyoming, 2007.

Calliope Hummingbird
(*Stellula calliope*)
WY-PIF Level II Priority Species

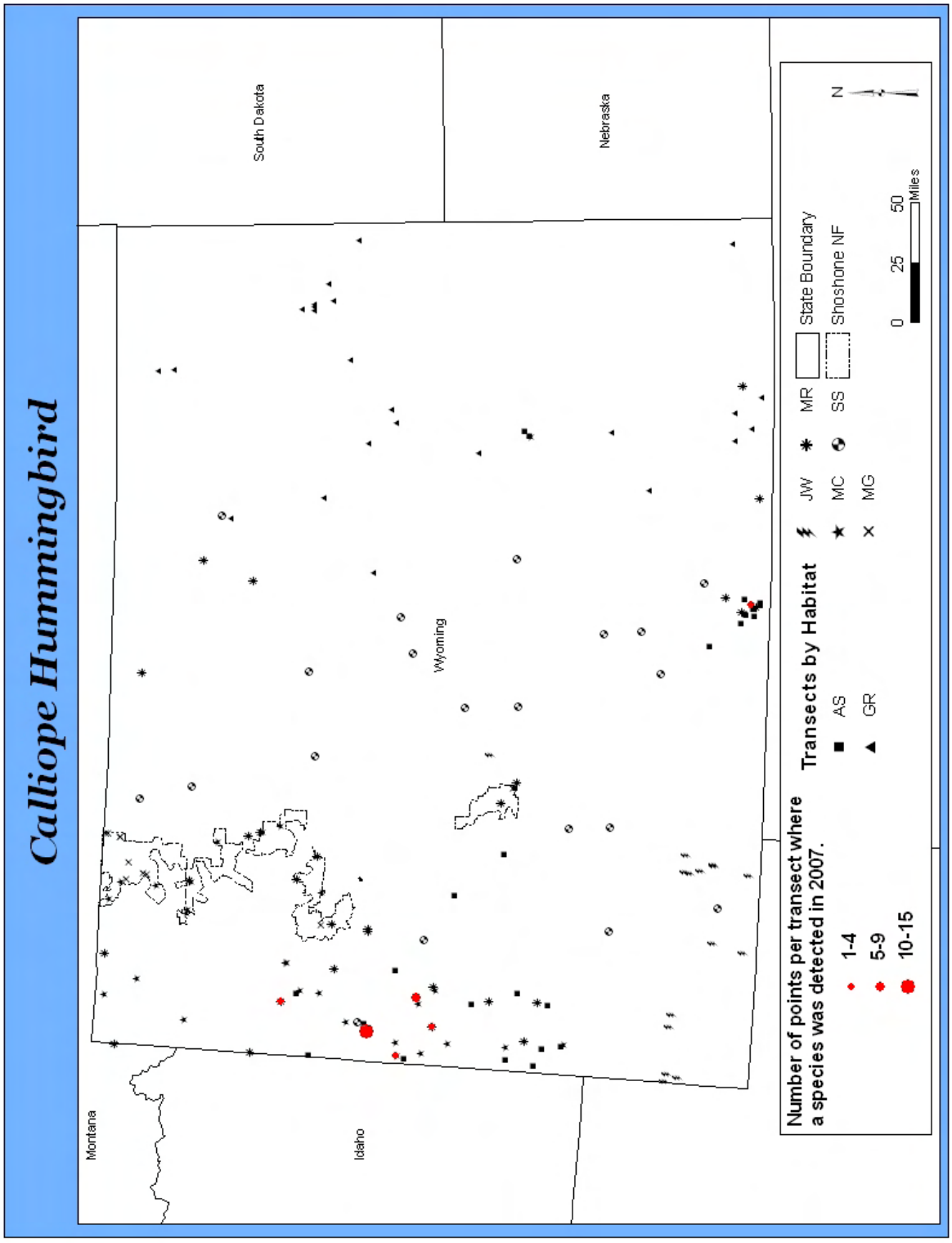
Calliope Hummingbird is found in mid-elevation areas of northern and western Wyoming. The species uses meadows, canyons, riparian areas, aspen stands, and willow thickets, but prefers coniferous forests near water with a low to intermediate canopy cover. In 2007, we detected 13 Calliope Hummingbirds in three habitats. Calliope Hummingbird was recorded on three transects where we have recorded the species in past. On one transect, MR33, where we recorded seven individuals, we have detected the species for three consecutive years.

Using data from all years, we may be able to calculate a detection function and thereby generate an annual density estimate for Calliope Hummingbird, at least in montane riparian habitat, that can be used for population-trend monitoring. At our current rate of detections, this may be possible within the next two to three years.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Calliope Hummingbird on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	1
WY-MC	ID	--	--	--	--	1
WY-MR	ID	--	--	--	--	11

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

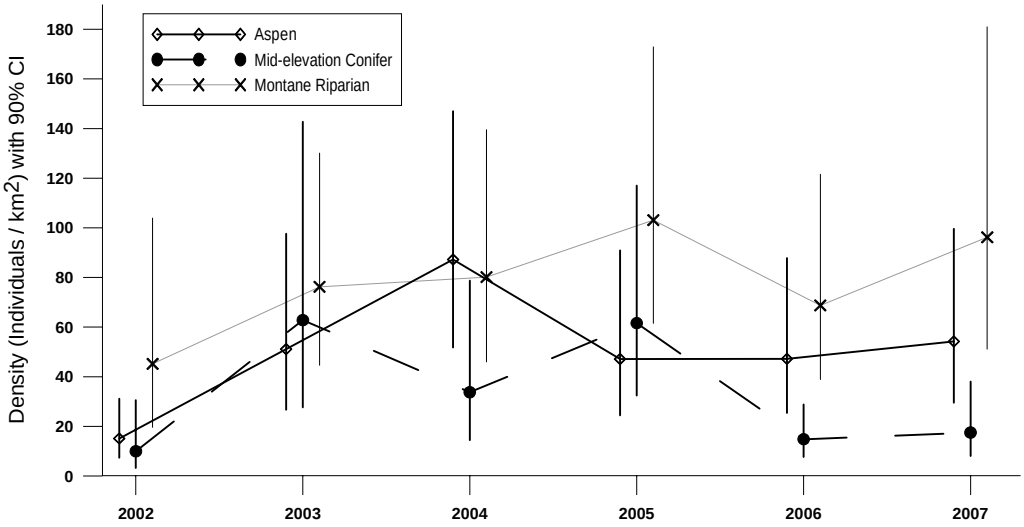


RMBO point-transect locations and detections of Calliope Hummingbird on transects in Wyoming, 2007.

Broad-tailed Hummingbird (*Selasphorus platycercus*)

WY-PIF Level II Priority Species

Broad-tailed Hummingbird inhabits a variety of forest types near wet meadows and riparian features, although Wyoming is at the eastern limit of the species' breeding range. In 2007, we detected 100 Broad-tailed Hummingbirds in five habitats in Wyoming. Sixty-six of these detections came from montane riparian habitat. We were able to calculate a density estimate in aspen, mid-elevation conifer, and montane riparian habitats. We should be able to effectively monitor the species in at least these three habitats.

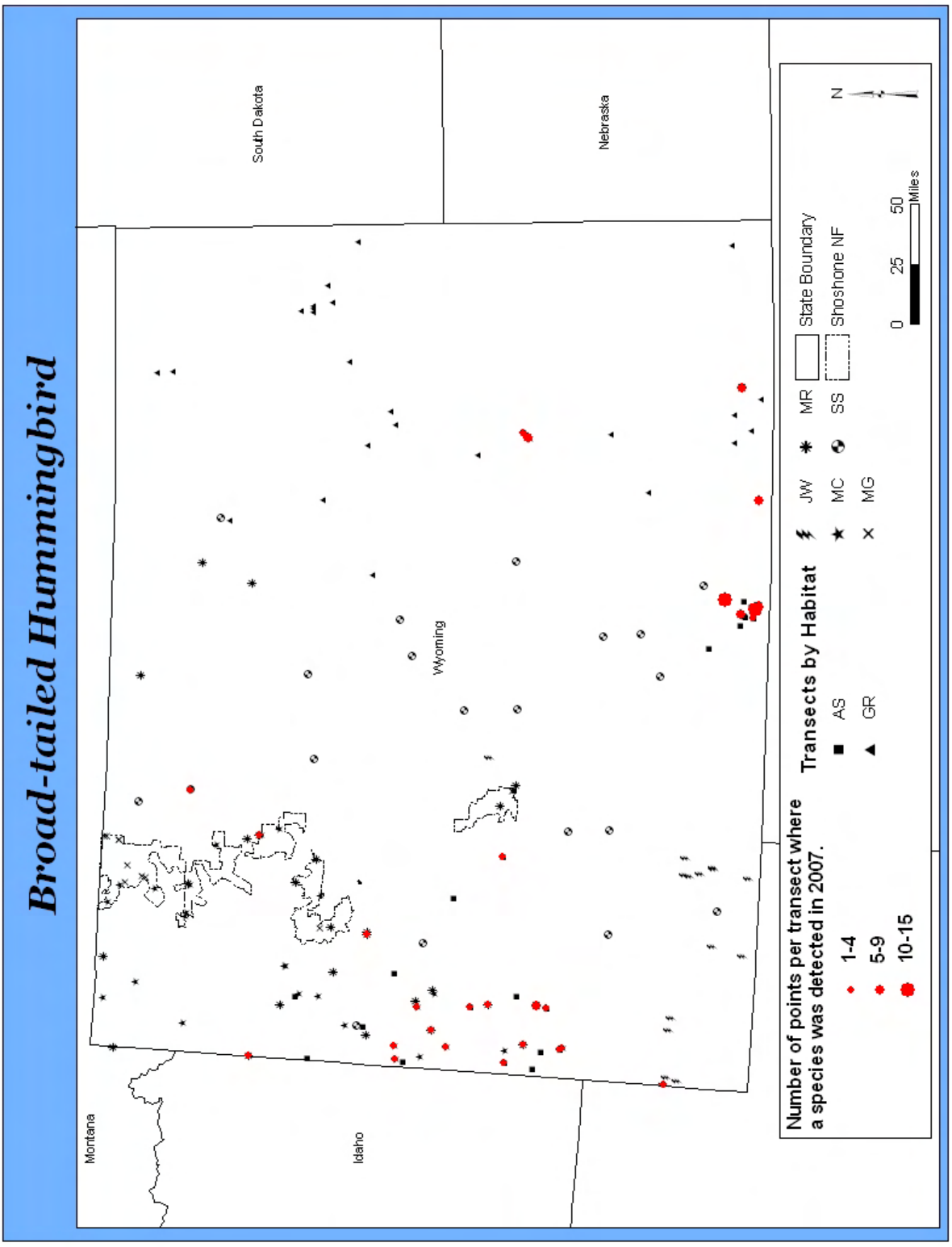


Estimated density (birds/km2) of Broad-tailed Hummingbird, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Broad-tailed Hummingbird on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MR*	ID	--	--	--	--	1
WY-AS	54.2	29.5	99.6	38	19	23
WY-JW	ID	--	--	--	--	1
WY-MC	17.5	8.1	38.1	48	6	9
WY-MR	96.2	51.1	181.0	39	63	65
WY-SS	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*This transect is not part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Broad-tailed Hummingbird on transects in Wyoming, 2007.

Williamson's Sapsucker (Sphyrapicus thyroideus)

USFWS Bird of Conservation Concern
WY-PIF Level II Priority Species

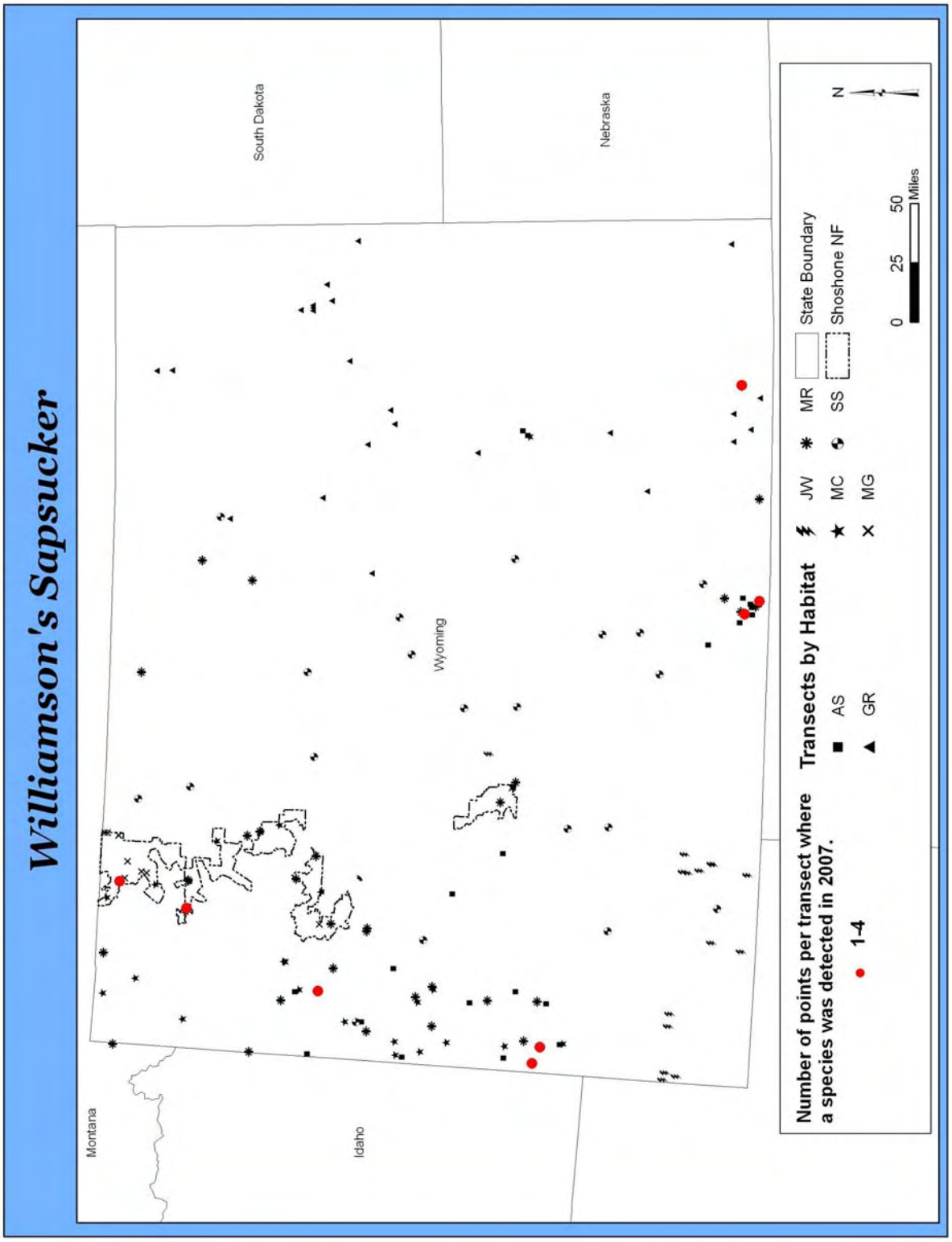
Williamson's Sapsucker prefers mixed coniferous forests and aspen stands, especially if they have burned recently. In 2007, we detected ten Williamson's Sapsuckers in three habitats, aspen, mid-elevation conifer, and montane riparian.

We do not currently conduct transects specifically in burned areas in Wyoming, which may help explain why the species is detected so infrequently. Adding transects in recently burned areas around the state may increase our ability to detect Williamson's Sapsucker.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Williamson's Sapsucker on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	2
WY-AS	ID	--	--	--	--	4
WY-MC	ID	--	--	--	--	4
WY-MR	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

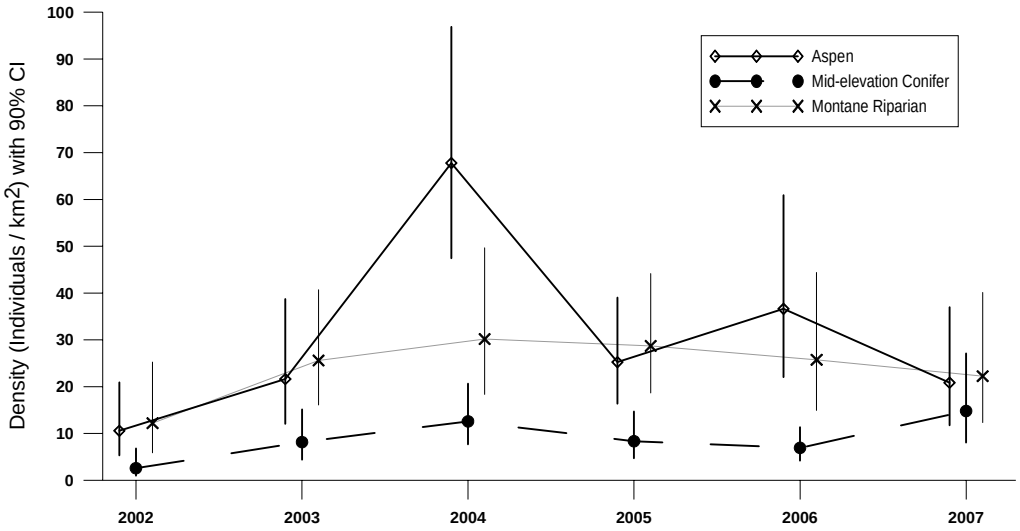


RMBO point-transect locations and detections of Williamson's Sapsucker on transects in Wyoming, 2007.

Red-naped Sapsucker (*Sphyrapicus nuchalis*)

USFWS Bird of Conservation Concern
WY-PIF Level II Priority Species

Red-naped Sapsucker inhabits open woodlands, especially along major rivers. In 2007, we detected 118 Red-naped Sapsuckers in four habitats. We were able to calculate a density estimate for the species in aspen, mid-elevation conifer, and montane riparian habitats. The species should be effectively monitored in these three habitats.

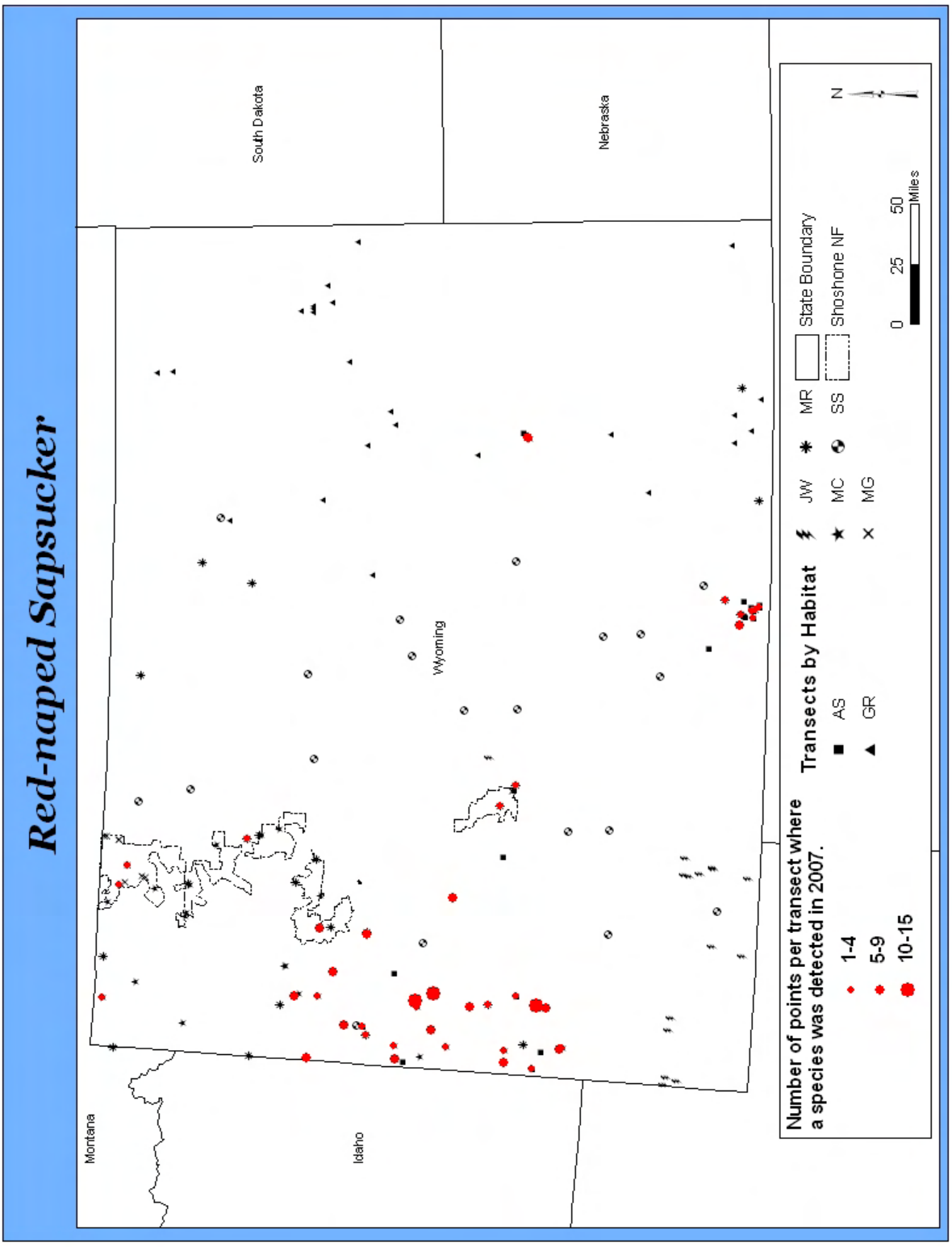


Estimated density (birds/km2) of Red-naped Sapsucker, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Red-naped Sapsucker on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	1
SH-MG	ID	--	--	--	--	7
SH-MR*	ID	--	--	--	--	2
WY-AS	20.8	11.7	37.0	35	23	44
WY-MC	14.8	8.1	27.1	37	25	29
WY-MR	22.2	12.3	40.1	36	26	36

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*These transects are not part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Red-naped Sapsucker on transects in Wyoming, 2007.

American Three-toed Woodpecker
(Picoides tridactylus)

USFS Region 2 Sensitive Species
WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

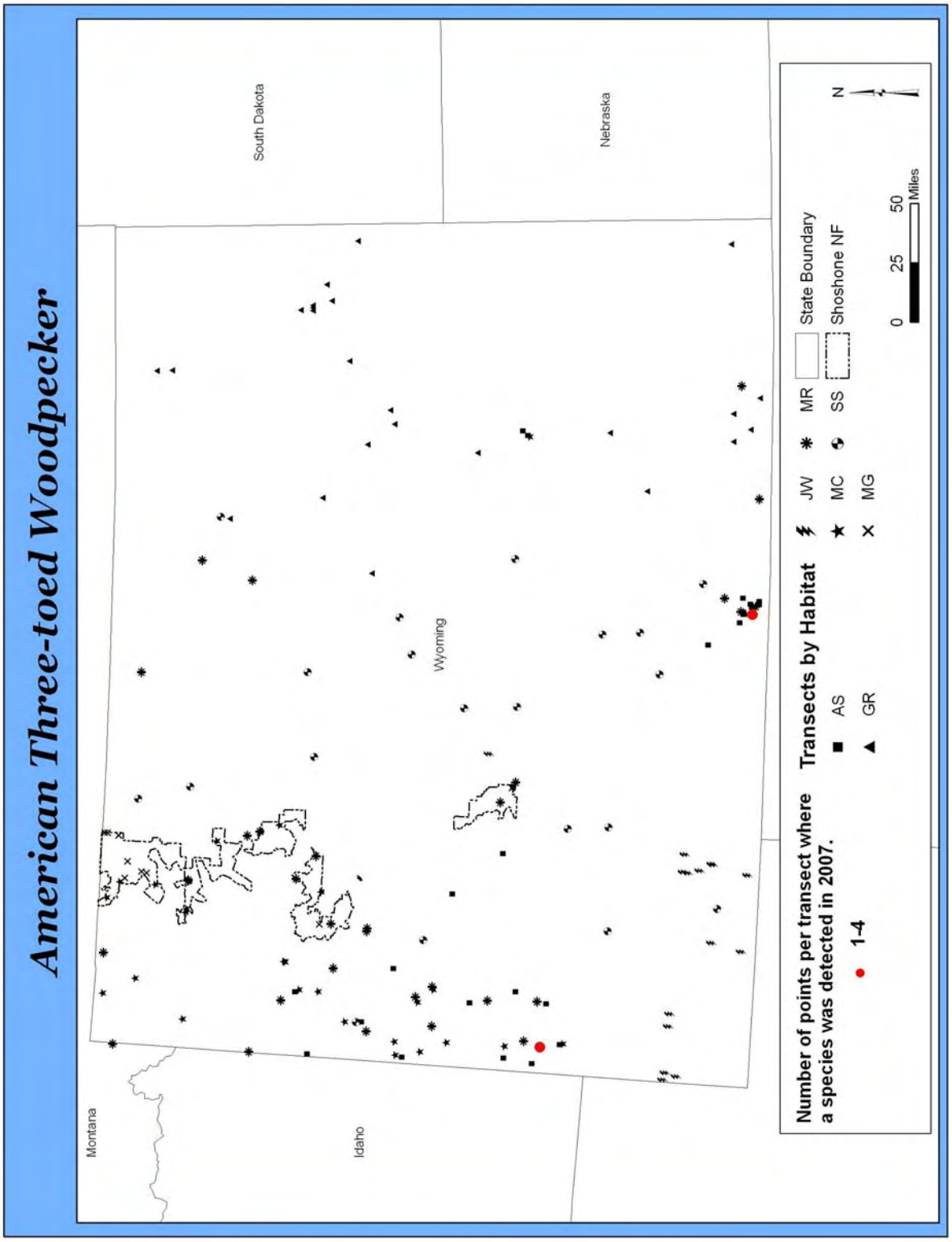
American Three-toed Woodpecker prefers conifer forests of lodgepole pine, Douglas-fir, blue spruce, Engelmann spruce, and subalpine fir. The species is also frequently present in recently burned forest. In 2007, we detected three American Three-toed Woodpeckers on two aspen transects.

In the past, we have consistently detected more American Three-toed Woodpeckers each year on Bighorn National Forest transects than on statewide transects, especially high-elevation conifer transects. This year, however, we did not survey Bighorn National Forest. If we resume surveys in the Bighorn NF, in the near future, using data from all years, we should be able to calculate a detection function and thereby generate an annual density estimate for American Three-toed Woodpecker, at least in high-elevation conifer habitat, that can be used for population-trend monitoring.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for American Three-toed Woodpecker on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	3

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of American Three-toed Woodpecker on transects in Wyoming, 2007.

Black-backed Woodpecker
(Picoides arcticus)

USFS Region 2 Sensitive Species
WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

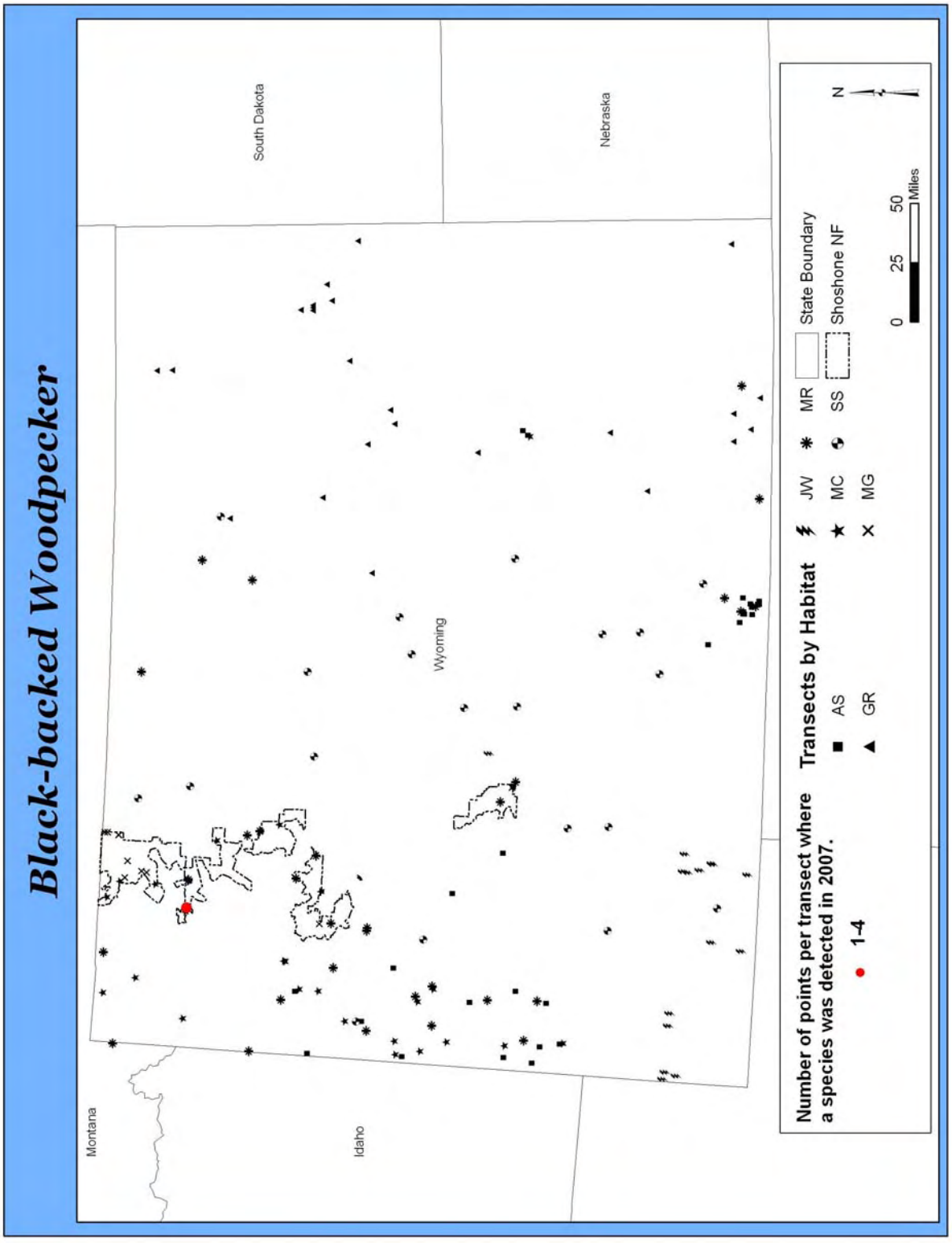
Black-backed Woodpecker inhabits mixed conifer forests of lodgepole pine, Douglas-fir, blue spruce, and Engelmann spruce-subalpine fir, especially in forests that have recently burned. In Wyoming, it can only be found in the northwest and northeast corners of the state. In 2007, we only detected one individual on a mid-elevation conifer transect, MC49. This is only the second detection of Black-backed Woodpecker in the history of MWB.

We do not currently conduct transects specifically in burned areas in Wyoming, which may help explain why the species is detected so infrequently. Adding transects in recently burned areas in the northwest and northeast corners of the state may increase our ability to detect Black-backed Woodpecker.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Black-backed Woodpecker on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	1
WY-MC	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



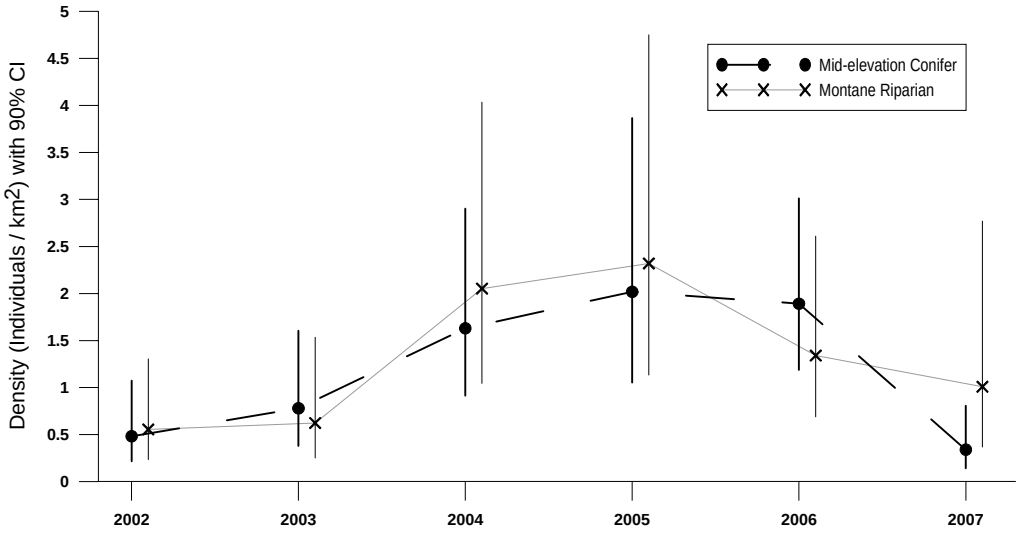
RMBO point-transect locations and detections of Black-backed Woodpecker on transects in Wyoming, 2007.

Olive-sided Flycatcher (*Contopus cooperi*)

USFS Region 2 Sensitive Species
WY-PIF Level II Priority Species

Olive-sided Flycatcher is found in mature coniferous and aspen forests throughout central and western Wyoming. It is dependent on burned areas and is often found near forest openings and edges near water. In 2007, we detected 25 Olive-sided Flycatchers in four habitats.

This year, as a result of pooling our data across all years, we were able to calculate density estimates for Olive-sided Flycatcher in mid-elevation conifer and montane riparian habitats. Olive-sided Flycatcher should be effectively monitored in mid-elevation conifer and montane riparian habitats.

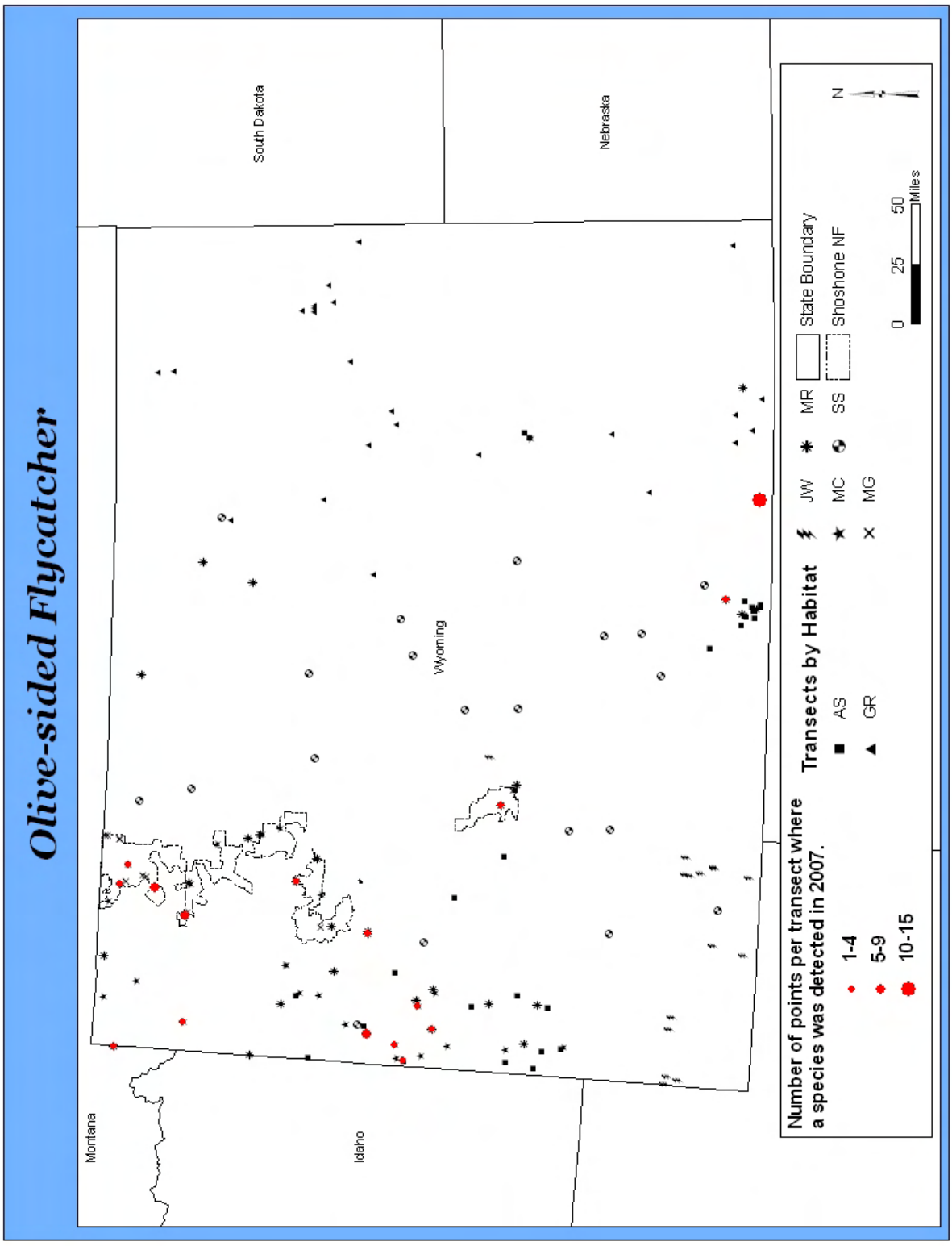


Estimated density (birds/km2) of Olive-sided Flycatcher, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Olive-sided Flycatcher on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	
SH-MG	ID	--	--	--	--	1
SH-MR*	ID	--	--	--	--	2
WY-AS	ID	--	--	--	--	1
WY-MC	0.3	0.1	0.8	54	4	9
WY-MR	1.0	0.4	2.8	66	9	12

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*These transects are not part of the 25 WY-MR transects.



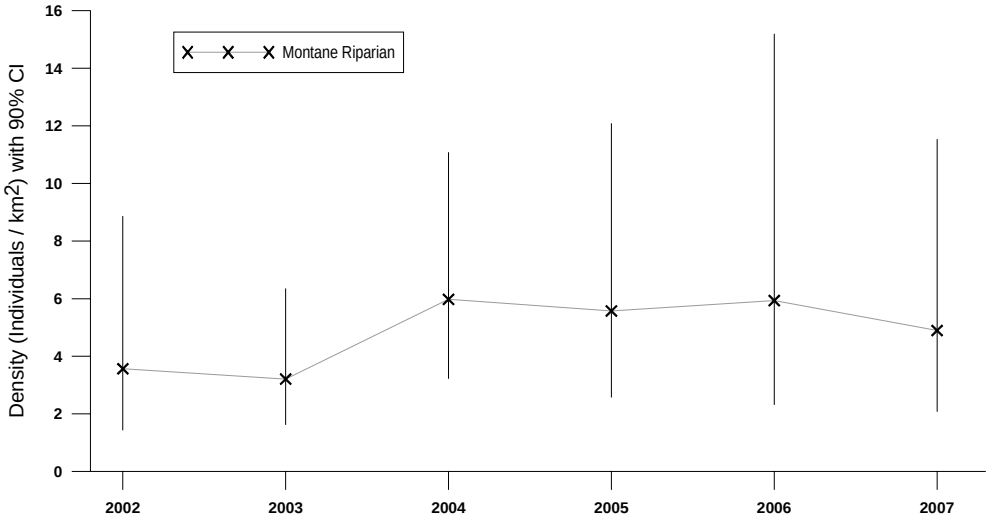
RMBO point-transect locations and detections of Olive-sided Flycatcher on transects in Wyoming, 2007.

Willow Flycatcher
(*Empidonax traillii*)

WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

Willow Flycatcher is a riparian obligate that uses willow or alder thickets along river bottoms, especially those bordered by open stands of cottonwood. In 2007, we detected 31 Willow Flycatchers in two habitats. Twenty-eight of these detections occurred in montane riparian habitat.

The number of detections of Willow Flycatcher has steadily increased each year since the inception of MWB as we have continued to establish and survey more transects in montane riparian habitat. This year we pooled our data across all years of MWB, and we were able to calculate a density estimate for the species in montane riparian habitat. Willow Flycatcher should be effectively monitored in this habitat.

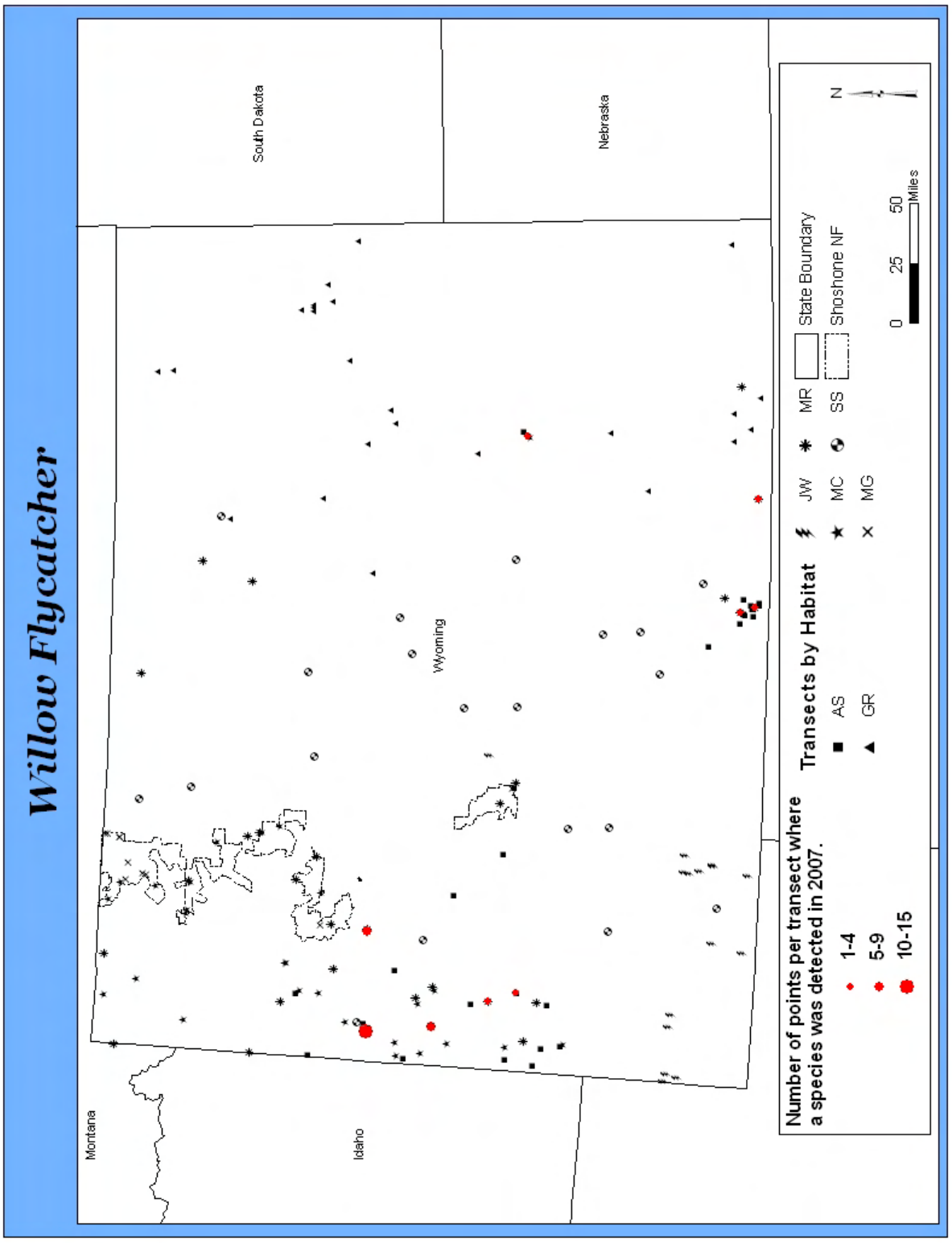


Estimated density (birds/km2) of Willow Flycatcher, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Willow Flycatcher on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	3
WY-MR	4.9	2.1	11.5	54	20	28

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



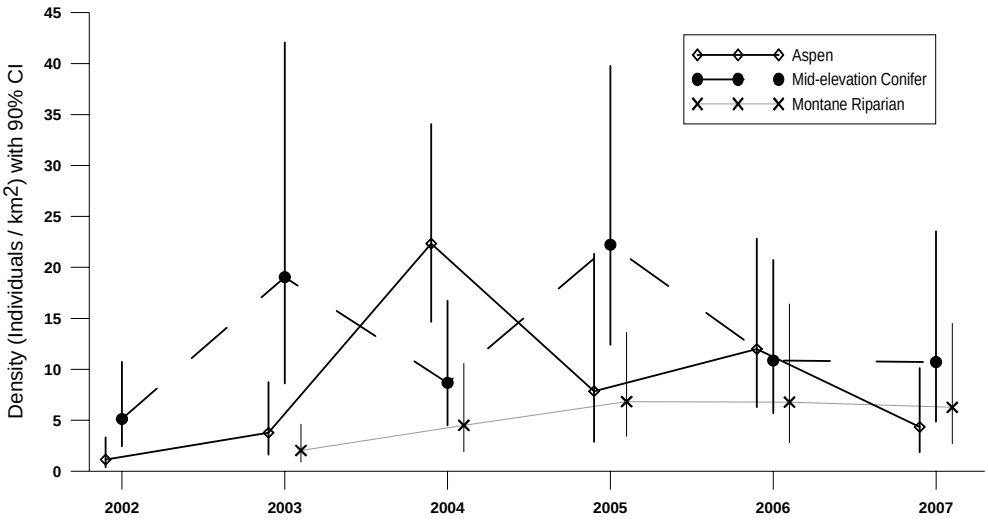
RMBO point-transect locations and detections of Willow Flycatcher on transects in Wyoming, 2007.

Hammond's Flycatcher
(*Empidonax hammondii*)

WY-PIF Level II Priority Species

Hammond's Flycatcher typically nests in moist, closed-canopy coniferous forests. In 2007, we detected 57 Hammond's Flycatchers in four habitats.

This year we pooled our data across all years of MWB, and as a result we were able to calculate density estimates for Hammond's Flycatcher in aspen, mid-elevation conifer, and montane riparian habitat. In addition, we were able to calculate a density estimate for mid-elevation conifer in Shoshone National Forest. Hammond's Flycatcher should be effectively monitored through point-transects in all three habitats.

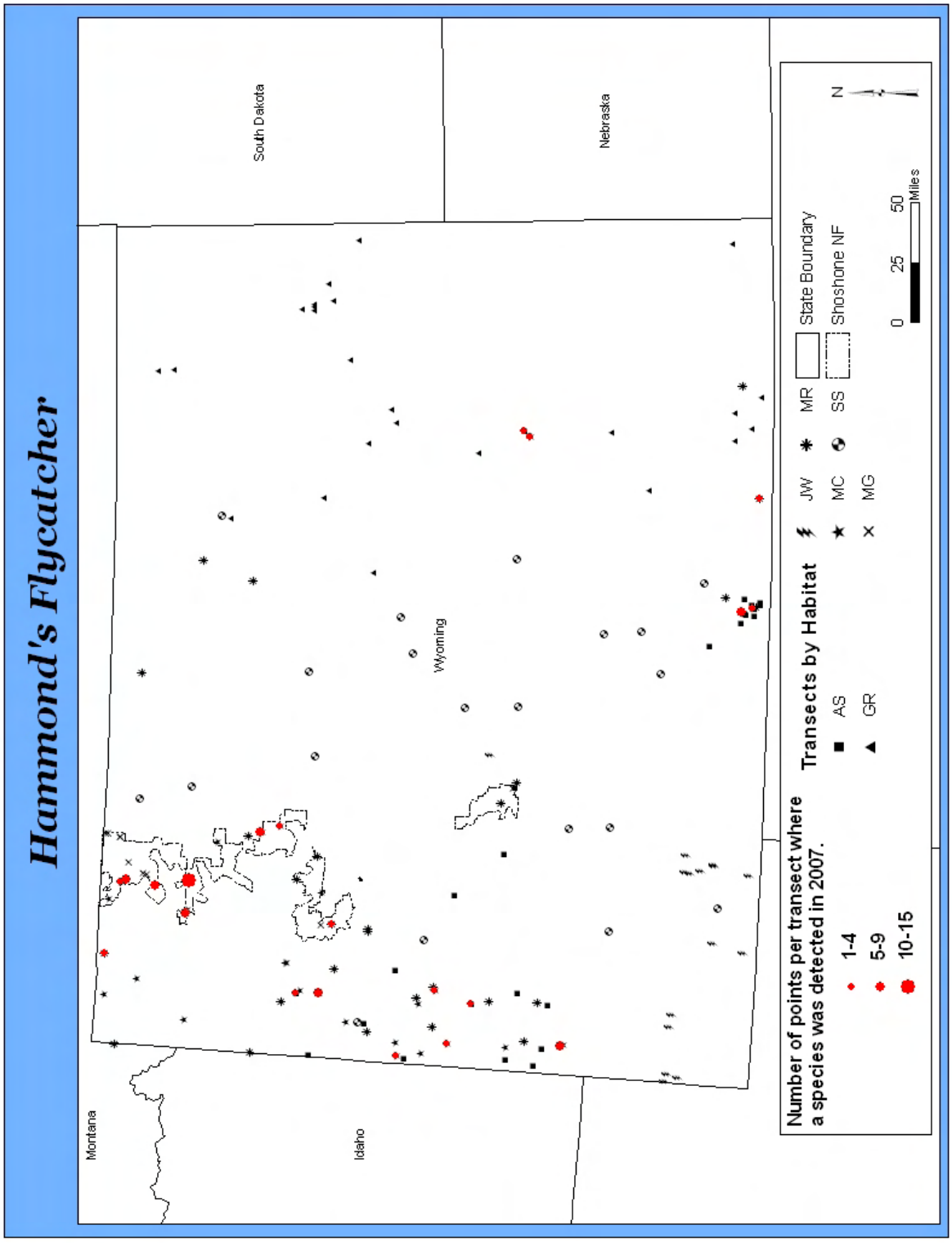


Estimated density (birds/km2) of Hammond's Flycatcher, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Hammond's Flycatcher on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	6.4	1.6	25.6	89	8	13
SH-MG	ID	--	--	--	--	3
SH-MR*	ID	--	--	--	--	13
WY-AS	4.3	1.9	10.1	53	8	10
WY-MC	10.7	4.9	23.6	49	17	23
WY-MR	6.3	2.7	14.5	52	17	17

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*Two of the three transects are part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Hammond's Flycatcher on transects in Wyoming, 2007.

Gray Flycatcher
(Empidonax wrightii)

WY-PIF Level II Priority Species

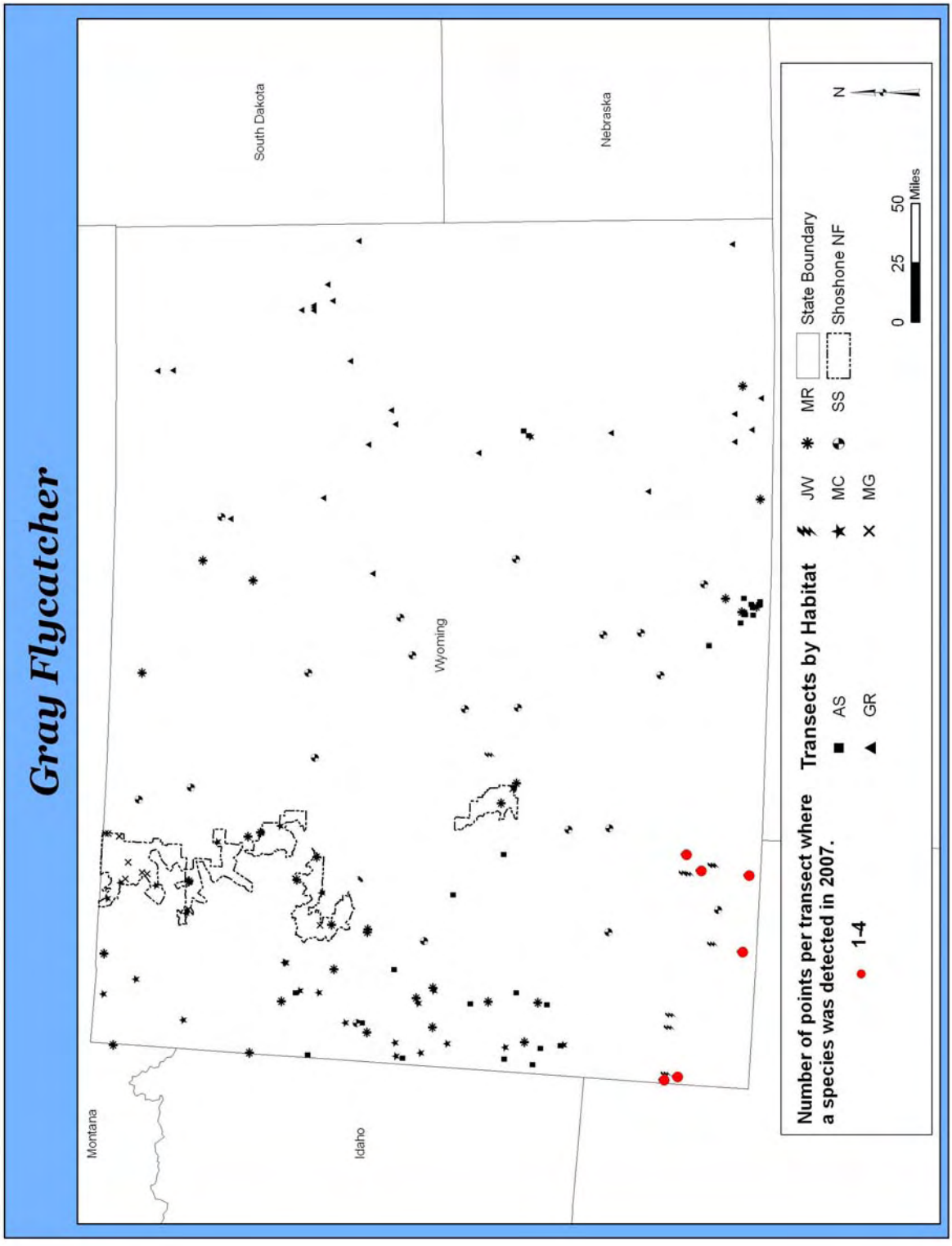
Gray Flycatcher is found in juniper woodland across central and southwestern Wyoming. In 2007, we detected seven Gray Flycatchers in juniper woodland habitat. This is far fewer than we normally detect in this habitat. Density was not calculated this year for the species due to the abnormally low number of detections. This year, juniper woodland transects were not conducted by RMBO field technicians. In the future, Gray Flycatcher should be effectively monitored in juniper woodland habitat.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Gray Flycatcher on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	CV	n	N
WY-JW*	ID	--	--	--	--	7

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*This data was not used in analysis due to observer error.

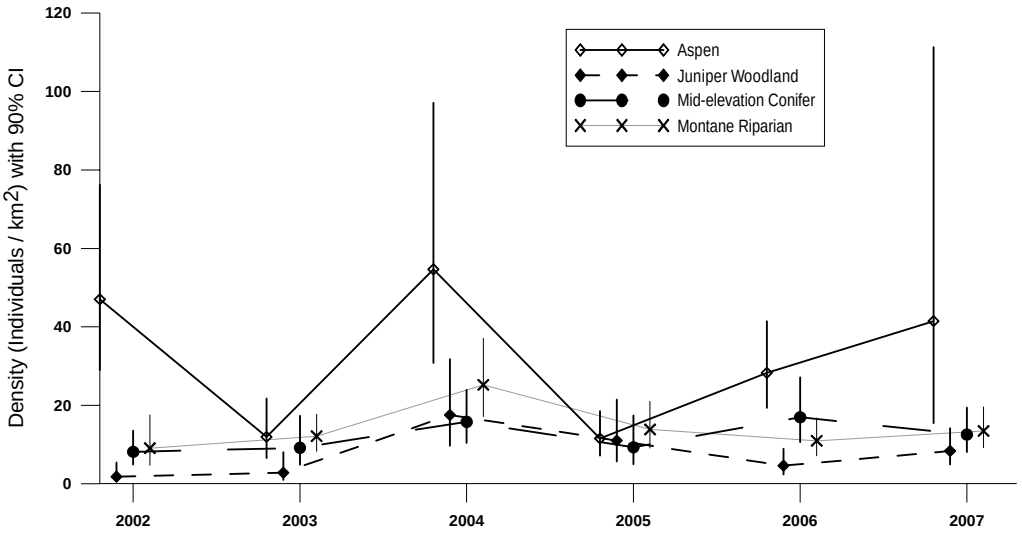


RMBO point-transect locations and detections of Gray Flycatcher on transects in Wyoming, 2007.

Dusky Flycatcher
(*Empidonax oberholseri)*

WY-PIF Level II Priority Species

Dusky Flycatcher uses a wide range of open woodland and shrub habitat, including ponderosa pine savannah, juniper, aspen, cottonwood-riparian, Gambel oak, and riparian shrub throughout Wyoming. In 2007, we detected 341 Dusky Flycatchers in six habitats. We were able to calculate density estimates for Dusky Flycatcher in four habitats statewide, and all three habitats in Shoshone National Forest. The species reached its highest density in aspen habitat. Dusky Flycatcher should be effectively monitored in a range of habitats.



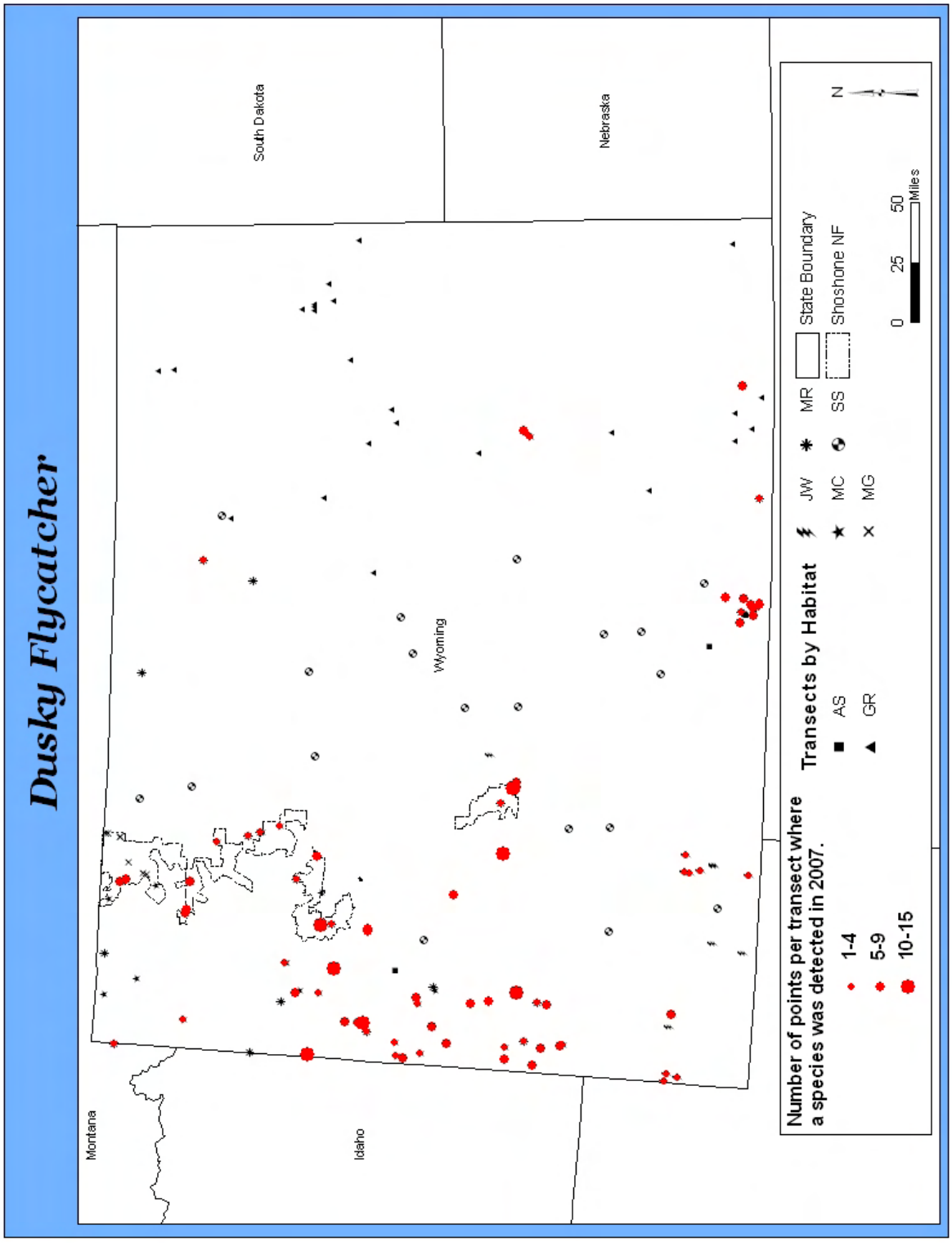
Estimated density (birds/km2) of Dusky Flycatcher, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Dusky Flycatcher on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	13.6	6.4	28.6	45	17	27
SH-MG	11.5	4.3	30.2	58	19	25
SH-MR*	6.3	2.4	16.4	55	8	15
WY-AS	41.5	15.5	111.3	65	135	145
WY-JW	8.3	4.9	14.2	32	14	15
WY-MC	12.5	8.1	19.4	26	42	59
WY-MR	13.5	9.2	19.6	22	68	84
WY-SS	ID	--	--	--	--	4

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*Two of the six transects are part of the 25 WY-MR transects.



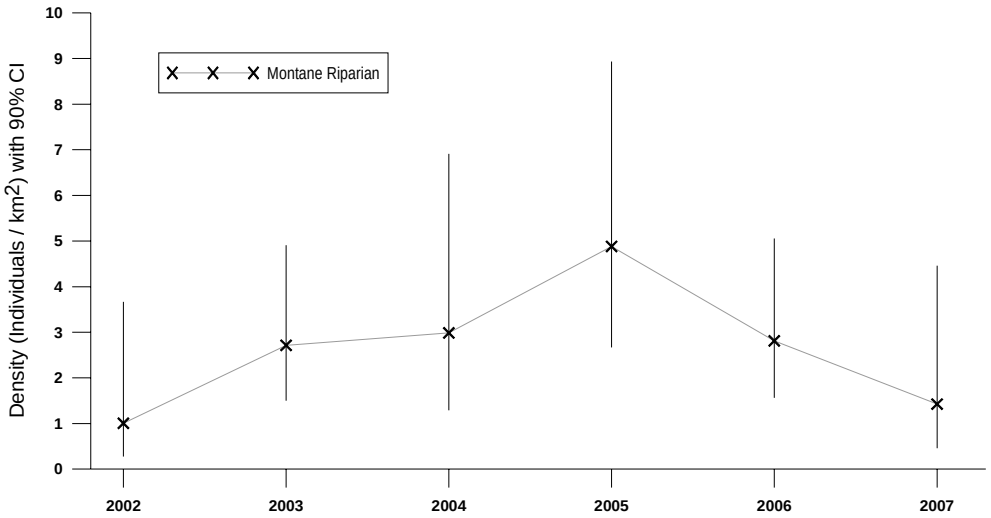
RMBO point-transect locations and detections of Dusky Flycatcher on transects in Wyoming, 2007.

Cordilleran Flycatcher (*Empidonax occidentalis*)

WY-PIF Level II Priority Species

Cordilleran Flycatcher nests in forested areas where cliffs or rocky ledges are present, and is often found in riparian areas. It is also occasionally found in pinyon-juniper stands that have a deciduous component. In 2007, we detected 27 Cordilleran Flycatchers in three habitats, aspen, mid-elevation conifer, and montane riparian.

Cordilleran Flycatcher is detected infrequently in most habitats. This year, due to our pooling data across all years of this project, we were able to calculate a density estimate for the species in montane riparian habitat. In a few years, using data from all years, we may be able to calculate density estimates in aspen and montane riparian, as well. Cordilleran Flycatcher should be effectively monitored in at least montane riparian habitat.



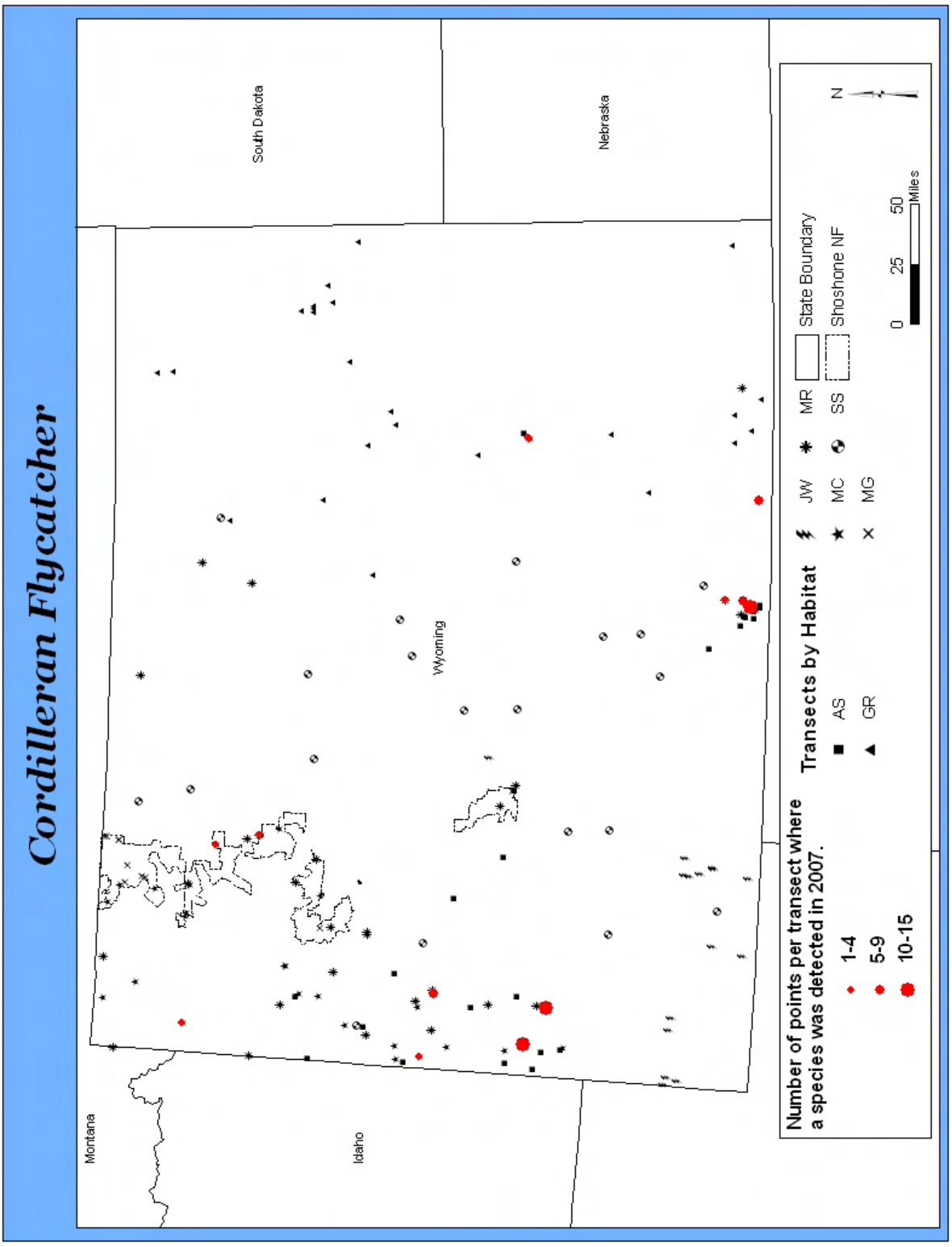
Estimated density (birds/km2) of Cordilleran Flycatcher, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Cordilleran Flycatcher on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	1
SH-MR*	ID	--	--	--	--	1
WY-AS	ID	--	--	--	--	11
WY-MC	ID	--	--	--	--	7
WY-MR	1.4	0.5	4.5	75	7	8

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*This transect is not part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Cordilleran Flycatcher on transects in Wyoming, 2007.

Say's Phoebe
(*Sayornis saya*)

WY-PIF Level III Priority Species

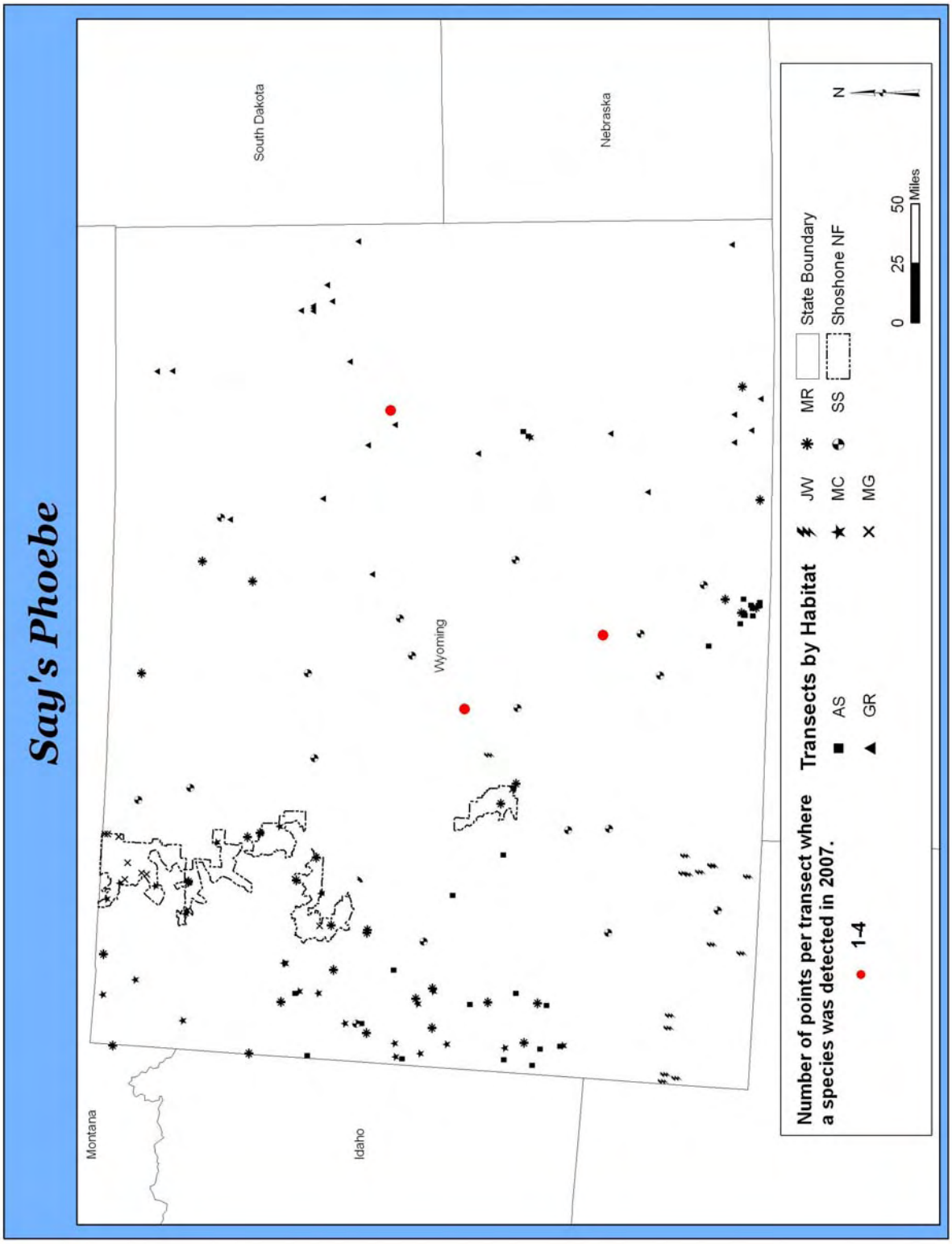
Say's Phoebe inhabits arid, open country with sparse vegetation and nests on rocky ledges, as well as barns and other human structures. The species arrives on its breeding grounds earlier than most other migrants, and as a result we may miss the period when it is most actively singing. In 2007, we detected three Say's Phoebes in shrubsteppe habitat.

We have not yet detected Say's Phoebes in sufficient numbers to provide a density estimate for any habitat in Wyoming.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Say's Phoebe on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-SS	ID	_ -- _	--	--	--	3

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Say's Phoebe on transects in Wyoming, 2007.

Loggerhead Shrike
(*Lanius ludovicianus*)

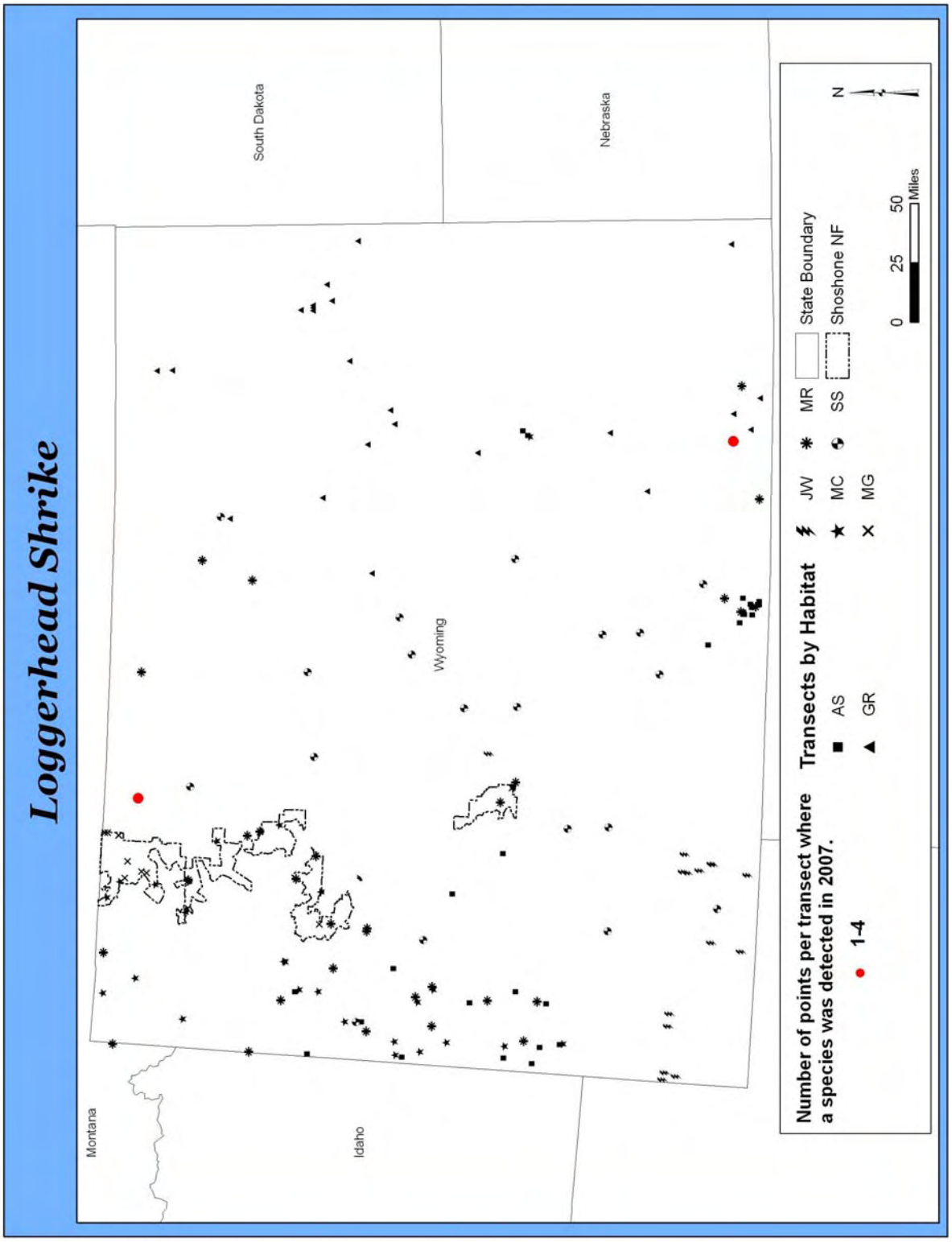
USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WY-PIF Level II Priority Species

Loggerhead Shrike breeds across Wyoming in prairie, sagebrush shrublands, mountain-foothills shrublands, and pine-juniper woodlands. In 2007, we detected two Loggerhead Shrikes in grassland and shrubsteppe habitats. We do not detect the species in sufficient numbers to effectively monitor its population through point-transects in any one habitat or across habitats. Using the line transect data, we may be able to obtain a better estimate of density that we can use for population-trend monitoring.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Loggerhead Shrike on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	1
WY-SS	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Loggerhead Shrike on transects in Wyoming, 2007.

Plumbeous Vireo
(*Vireo plumbeus*)

WY-PIF Level II Priority Species

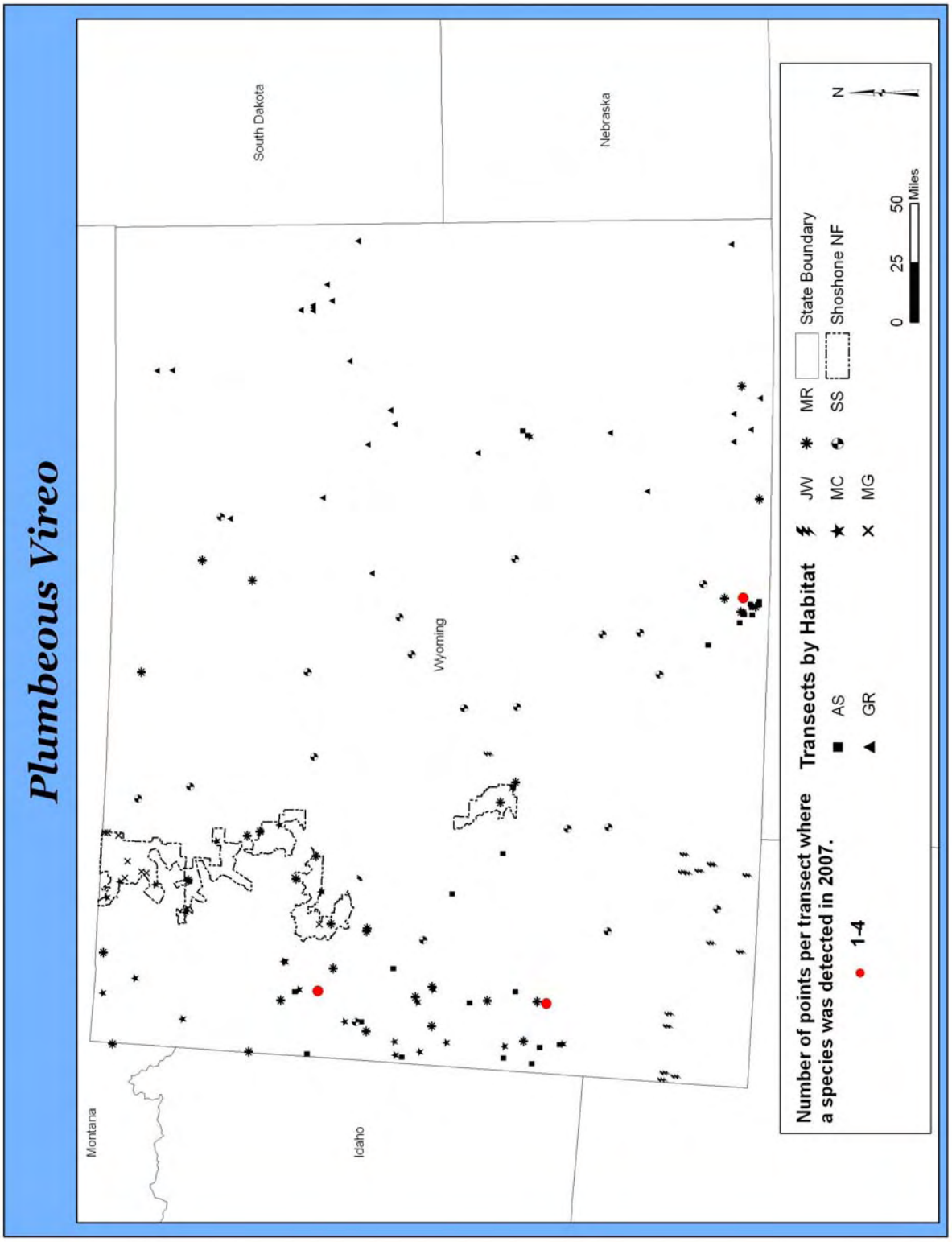
Plumbeous Vireo has a wide habitat tolerance, including coniferous and mixed forests. It will use openings caused by logging and fire, but is apparently sensitive to forest fragmentation. In 2007, we detected three Plumbeous Vireos in two habitats. Plumbeous Vireo is found throughout the foothills of Wyoming; however, we primarily detect the species on juniper woodland transects in the southwestern portion of the state. In the last six years, we have detected a total of 91 Plumbeous Vireos in juniper woodland habitat in Wyoming, with 90 of these being independent detections.

This year we would have had enough detections, by pooling data over the years, to calculate a detection function for Plumbeous Vireo in juniper woodland habitat. However, we did not detect a single Plumbeous Vireo in this habitat, so these data could not be analyzed. This year, juniper woodland transects were not conducted by RMBO field technicians. Hopefully, next year we will record the species in juniper woodland habitat and be able to calculate its estimated density.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Plumbeous Vireo on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	2
WY-MC	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

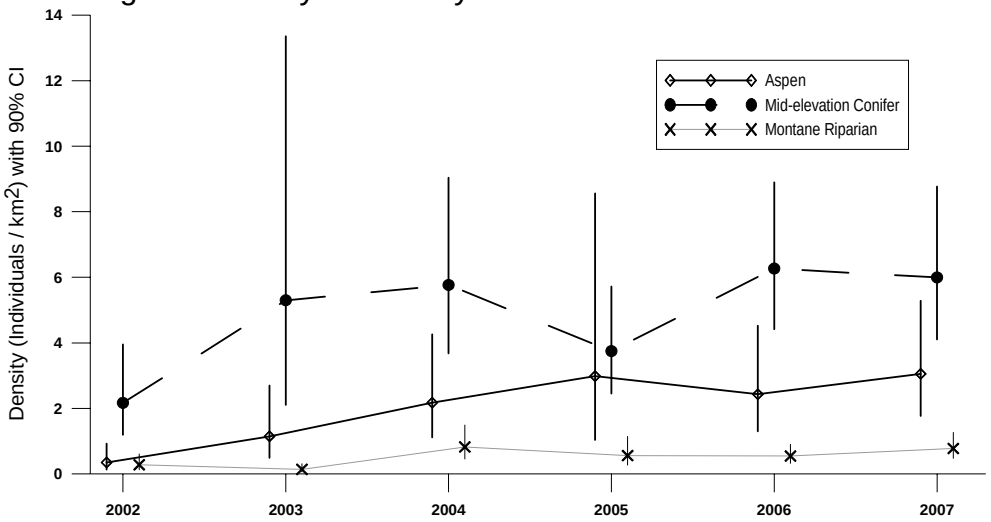


RMBO point-transect locations and detections of Plumbeous Vireo on transects in Wyoming, 2007.

Clark's Nutcracker
(*Nucifraga columbiana*)

WY-PIF Level III Priority Species

Clark's Nutcracker nests in most coniferous habitats; however, it breeds in February and detections in summer include that year's young. In 2007, we detected 194 Clark's Nutcrackers in four habitats. We calculated density estimates for the species in three statewide habitats and two Shoshone habitats. Density estimates for Clark's Nutcracker are higher than they would be if we were only recording breeding adults, but we can still use the estimates to compare changes in density between years.



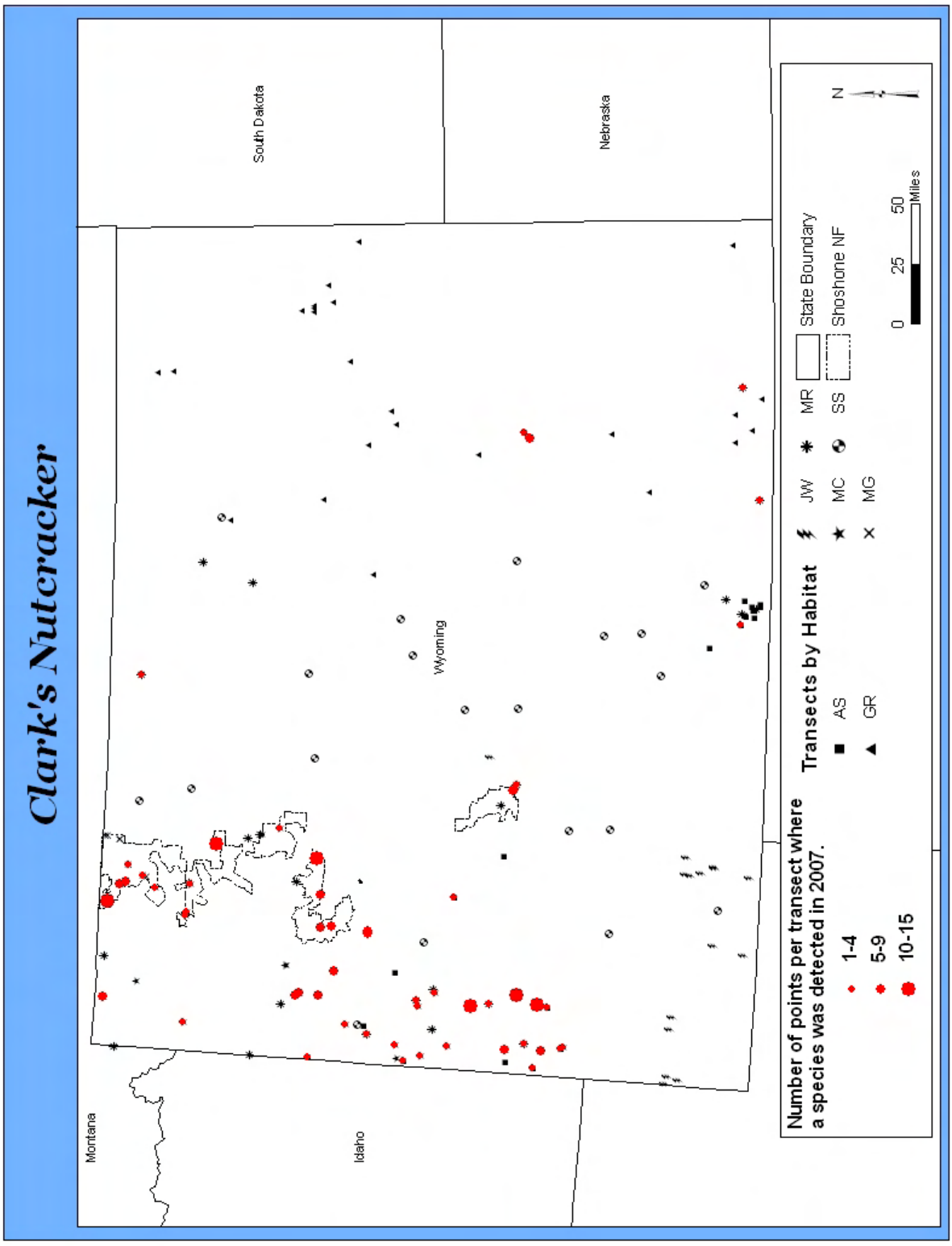
Estimated density (birds/km2) of Clark's Nutcracker, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Clark's Nutcracker for the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	7.6	4.2	13.6	34	33	45
SH-MG	1.0	.5	2.3	49	10	17
SH-MR*	ID	--	--	--	--	11
WY-AS	3.1	1.8	5.3	34	33	46
WY-MC	6.0	4.1	8.8	23	60	84
WY-MR	0.8	0.5	1.3	29	35	47

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*These transects are all part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Clark's Nutcracker on transects in Wyoming, 2007.

Purple Martin
(Progne subis)

USFS Region 2 Sensitive Species

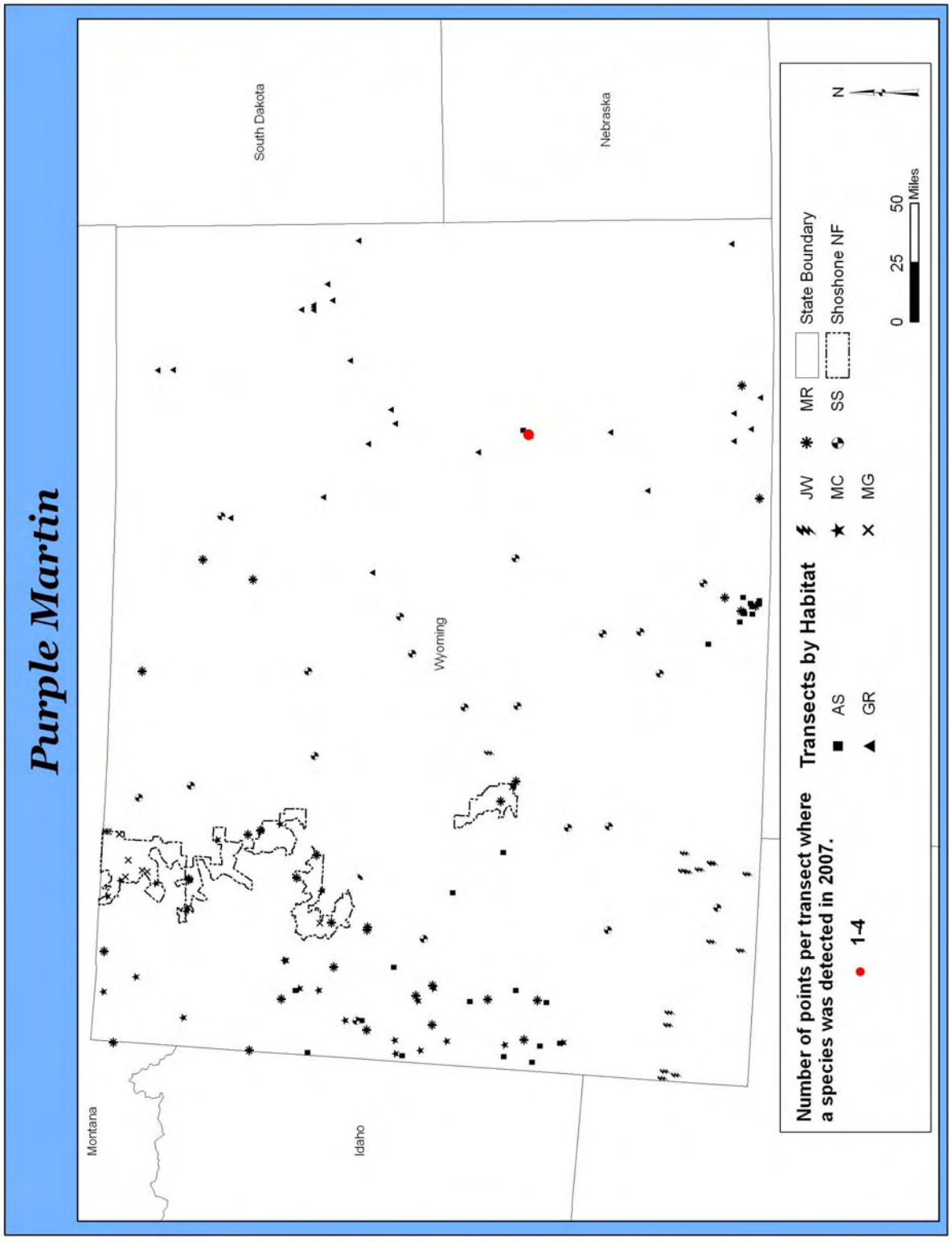
Purple Martin inhabits aspen habitat in Wyoming and nests in abandoned woodpecker holes in dead snags (Poole and Gill 2005). In 2007, we detected one Purple Martin on an Aspen transect, AS39.

The species is rare in Wyoming, and we have only recorded 11 individuals in the history of MWB. It is unlikely that we will be able to effectively monitor Purple Martin in Wyoming, but adding more transects in aspen habitat may increase our ability to detect the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Purple Martin on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Purple Martin on transects in Wyoming, 2007.

Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)

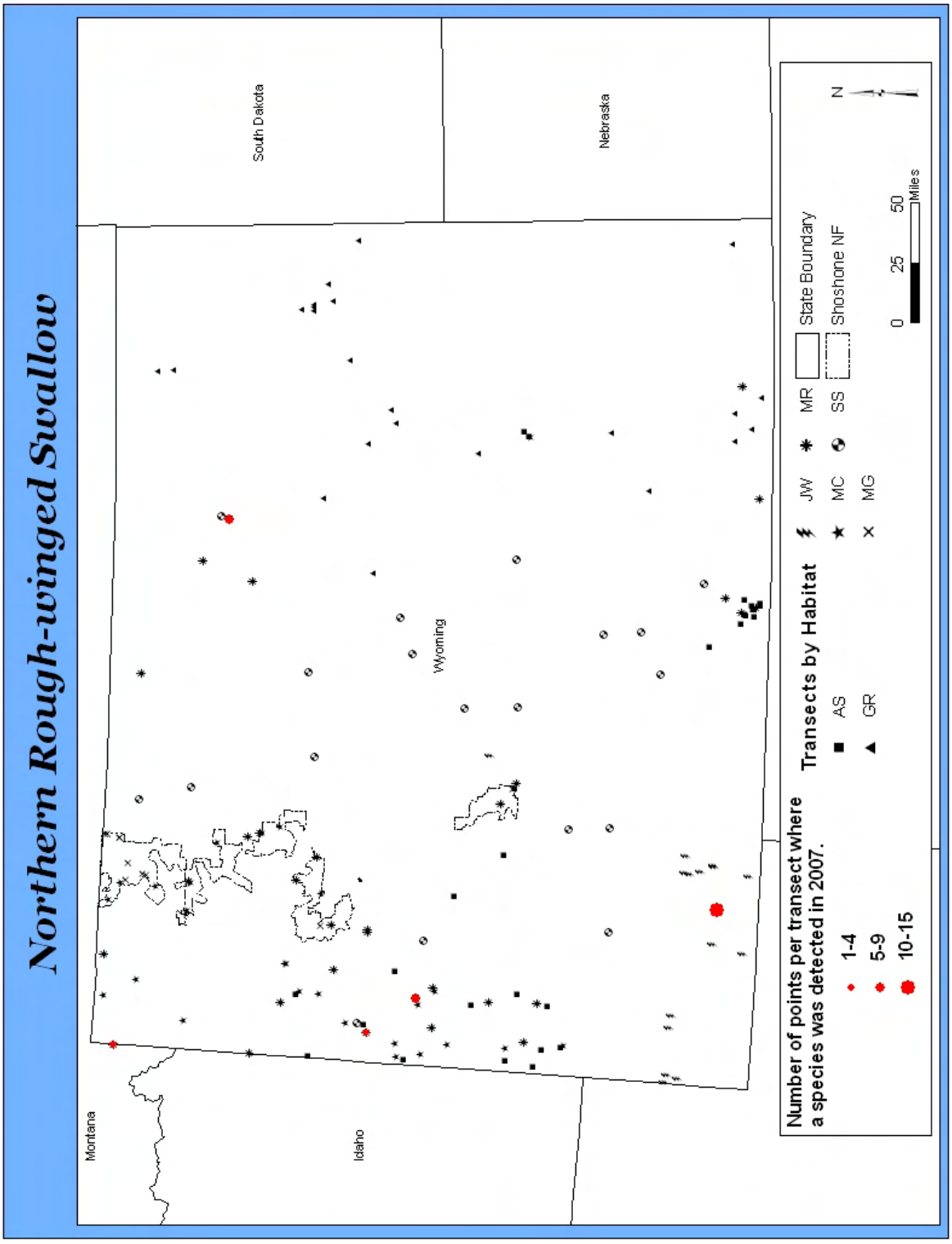
WY-PIF Level III Priority Species

Northern Rough-winged Swallow nests throughout Wyoming below 2,400m elevation in a variety of open areas near water, including woodlands. Typically, the species excavates burrows in stream banks for nesting, but it will also use rock crevices, culverts, bridges, buildings and other human structures. In 2007, we detected 13 Northern Rough-winged Swallows in three habitats. Due to its localized nature and specific nesting requirements, Northern Rough-winged Swallow is not well-monitored by point transects. RBMO has developed a protocol (Bridge Surveys) to count birds that nest on or near bridges and this method may potentially be effective for monitoring the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Northern Rough-winged Swallow on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	ID	--	--	--	--	5
WY-MR	ID	--	--	--	--	5
WY-SS	ID	--	--	--	--	3

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Northern Rough-winged Swallow on transects in Wyoming, 2007.

Pygmy Nuthatch
(*Sitta pygmaea*)

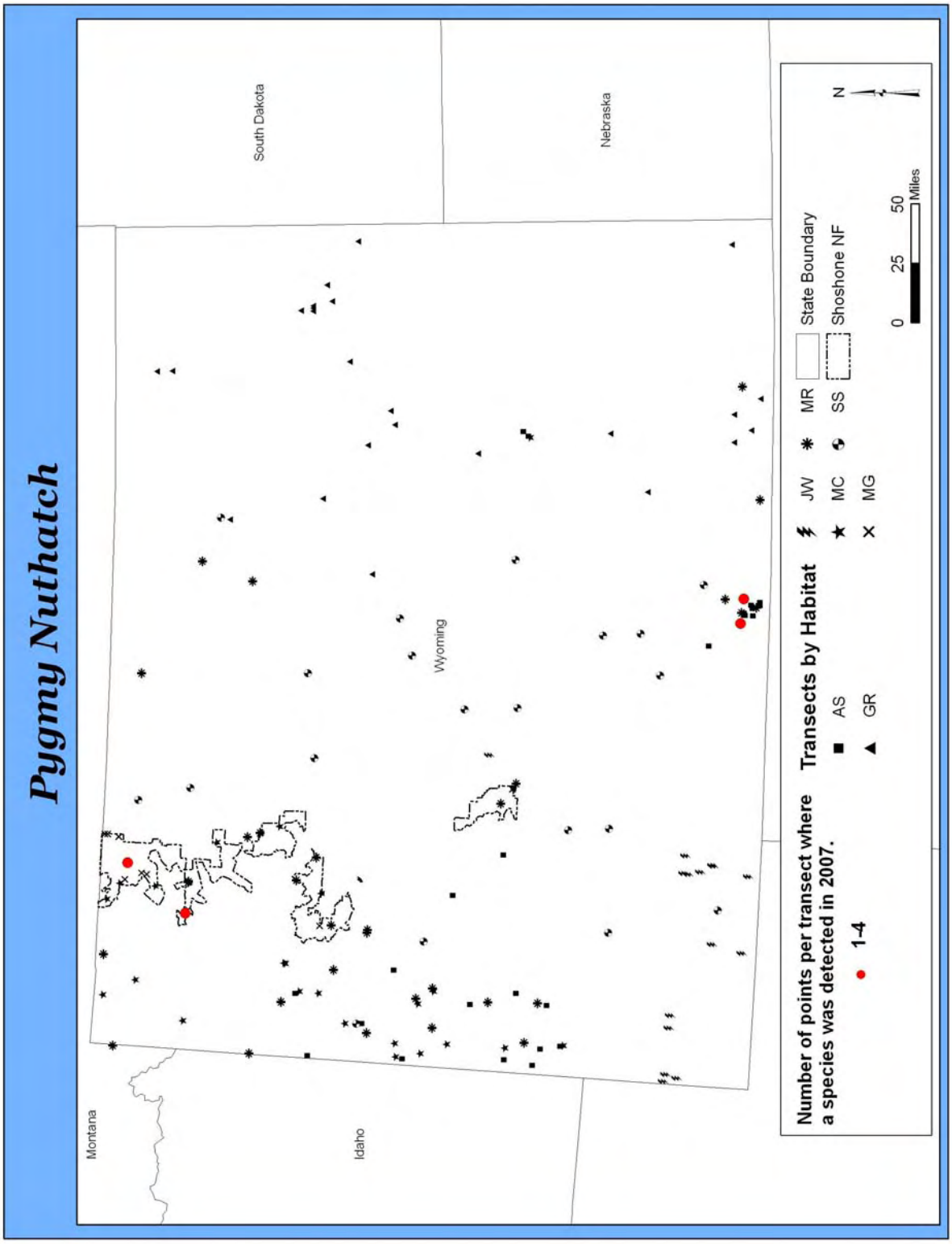
WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

Pygmy Nuthatch is considered a ponderosa pine specialist and prefers mature old growth stands of ponderosa pine with less than 70% canopy cover. The species is found scattered throughout Wyoming, but breeds primarily in the ponderosa pine forests of eastern Wyoming. In 2007, we detected four Pygmy Nuthatches in three habitats. Given the specific habitat requirements of the Pygmy Nuthatch, it is unlikely we will be able to monitor the species with the current level of effort. Adding low-elevation conifer to the list of statewide habitats that we survey would improve our ability to monitor the species. On other RMBO monitoring programs, where we target ponderosa pine habitat, we are usually able to detect Pygmy Nuthatch in sufficient numbers to calculate a density estimate and monitor its status over time.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Pygmy Nuthatch on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	1
SH-MG	ID	--	--	--	--	1
WY-AS	ID	--	--	--	--	2
WY-MC	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Pygmy Nuthatch on transects in Wyoming, 2007.

Brown Creeper
(*Certhia americana*)

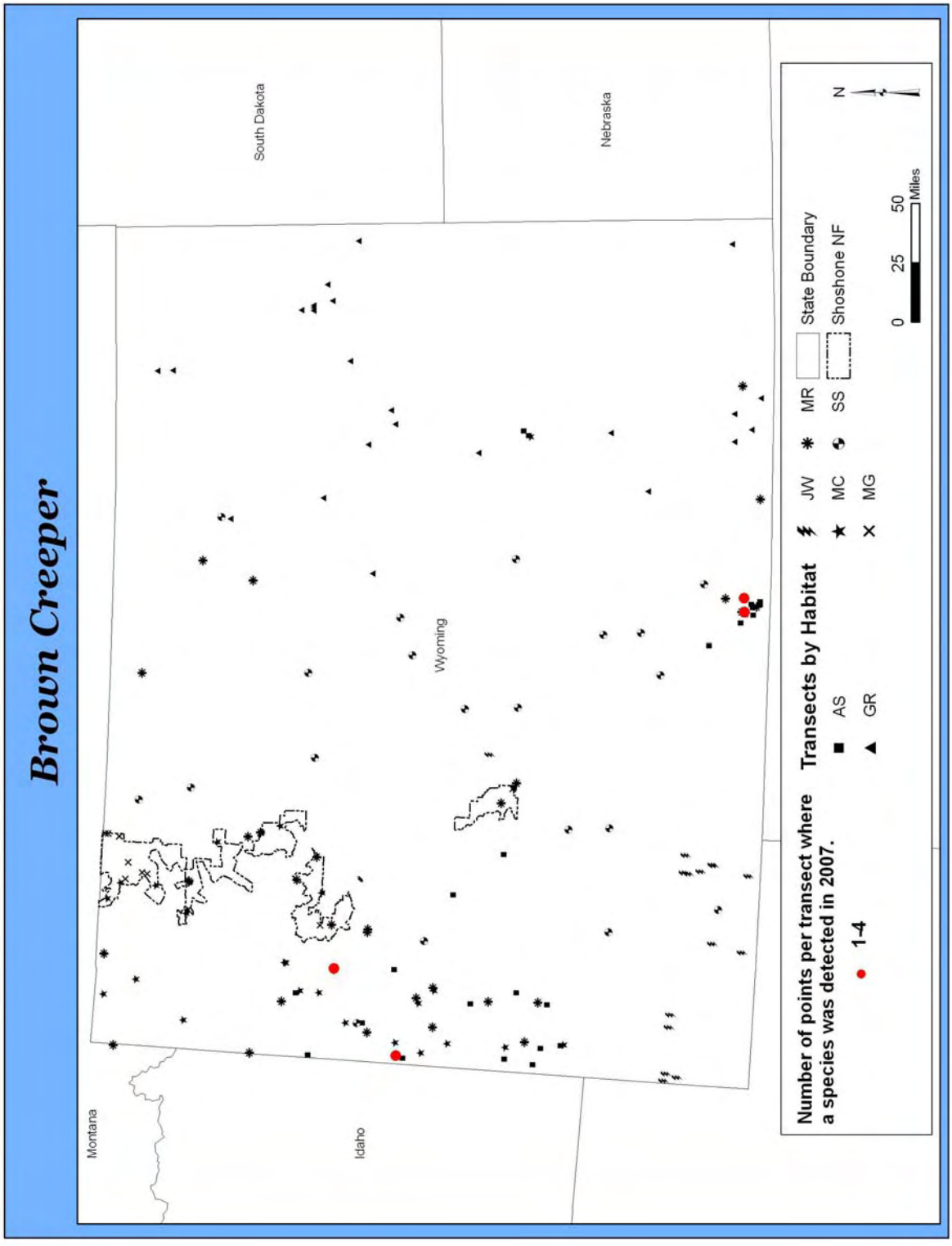
WY-PIF Level II Priority Species

Brown Creeper is found throughout Wyoming during the breeding season in a variety of coniferous forests, including lodgepole pine, Douglas-fir, Engelmann spruce, and subalpine fur. In 2007, we detected five Brown Creepers in three habitats. The number of Brown Creepers detected each year is too low to calculate an estimated density for the species in any habitat. However, using the line transect data, we may be able to improve our power to detect a trend for the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Brown Creeper on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	3
WY-MC	ID	--	--	--	--	1
WY-MR	ID	--	--	--	--	1

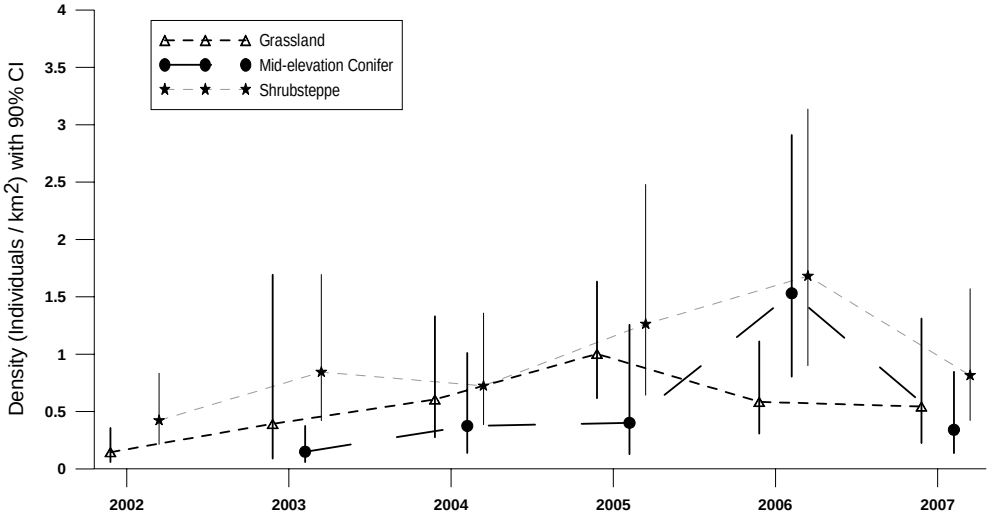
D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Brown Creeper on transects in Wyoming, 2007.

Rock Wren
(Salpinctes obsoletus)
WY-PIF Level III Priority Species

Rock Wren is found throughout Wyoming wherever there are landscape features such as rock outcroppings, canyons, and cliffs. In 2007, we detected 113 Rock Wrens in all seven habitats surveyed in Wyoming. We were able to calculate density estimates in five of these habitats: montane grassland, grassland, mid-elevation conifer, and shrubsteppe. We detect the species in sufficient numbers to monitor it effectively in a range of habitats.

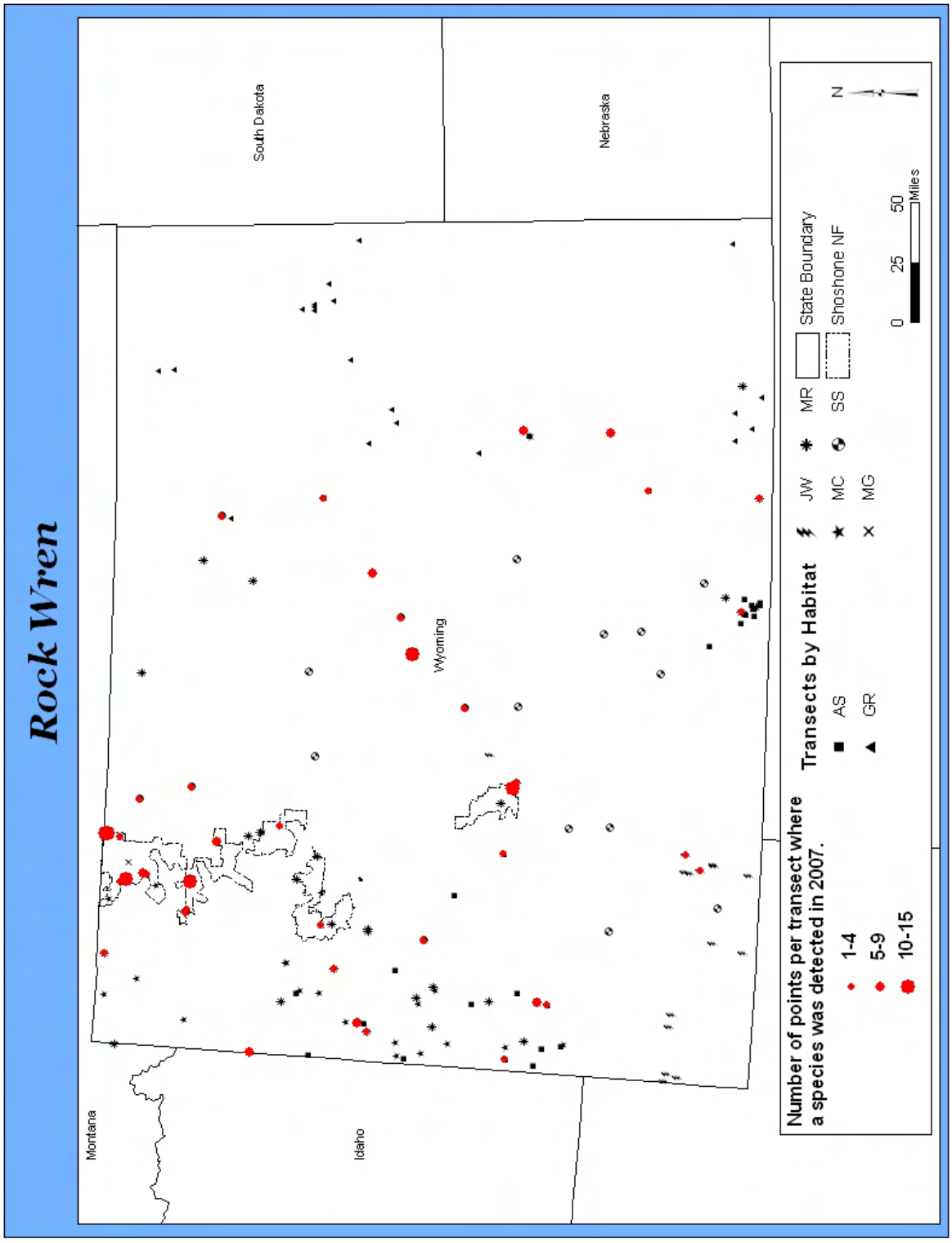


Estimated density (birds/km2) of Rock Wren, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Rock Wren for the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	14
SH-MG	3.8	2.3	6.3	29	17	33
SH-MR*	ID	--	--	--	--	2
WY-AS	ID	--	--	--	--	10
WY-GR	0.5	0.2	1.3	55	11	13
WY-JW**	ID	--	--	--	--	3
WY-MC	0.3	0.1	0.8	57	7	14
WY-MR	ID	--	--	--	--	21
WY-SS	0.8	0.4	1.6	39	13	19

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*These transects are all part of the 25 WY-MR transects.
**This data was not used in analysis due to observer error.



RMBO point-transect locations and detections of Rock Wren on transects in Wyoming, 2007.

Bewick's Wren
(Thryomanes bewickii)

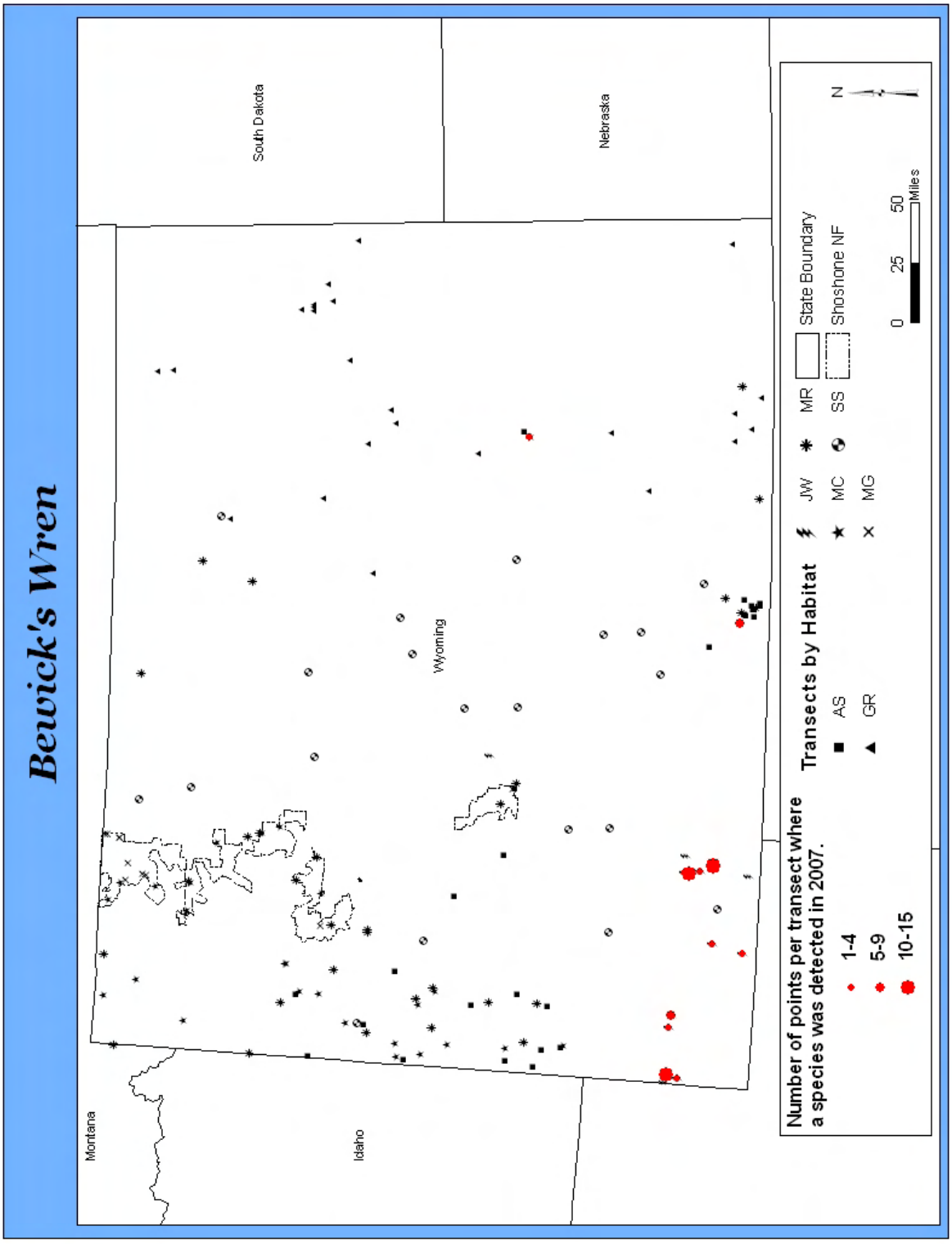
USFWS Bird of Conservation Concern
WY-PIF Level III Priority Species

Bewick's Wren is found in pine-juniper, woodland-chaparral, and mountain-foothills shrublands in southwestern Wyoming. In 2007, we detected 83 Bewick's Wrens in three habitats. Sixty-six of these were recorded in juniper woodland. We were unable to calculate density for the species due to observer error resulting in a relatively low number of detections this year. This year, juniper woodland transects were not conducted by RMBO field technicians. In the future, Bewick's Wren should be effectively monitored in juniper woodland habitat where it is normally one of the most abundant species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Bewick's Wren for the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	16
WY-JW*	ID	--	--	--	--	66
WY-MC	ID	--	--	--	--	1

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*This data was not used in analysis due to observer error.



RMBO point-transect locations and detections of Bewick's Wren on transects in Wyoming, 2007.

American Dipper
(*Cinclus mexicanus*)

WY-PIF Level II Priority Species

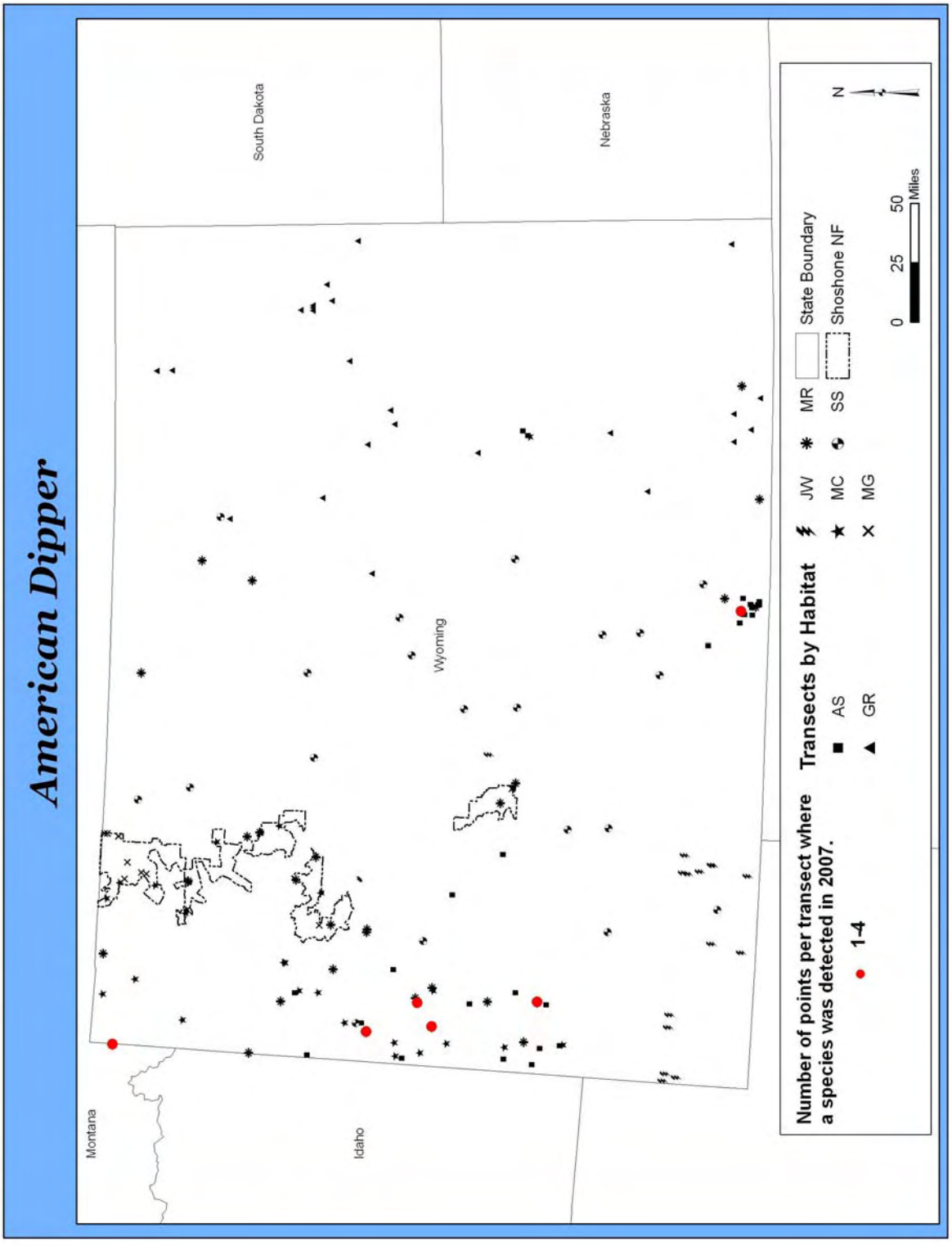
American Dipper inhabits clear, rapidly flowing mountain streams in coniferous forests and is found throughout the state, except in the Wyoming portion of the Black Hills. In 2007, we detected six American Dippers in two habitats, five of which occurred in montane riparian habitat.

American Dipper is detected in small numbers through point transects. However, we may be able to monitor the species in a few years by pooling data over all years of the project. Using this method, we need a minimum of 60 independent detections of the species in a given habitat to have a sufficient sample size in order to estimate density. As of 2007, we have 50 independent detections of American Dipper in montane riparian habitat. Additional transects in montane riparian habitat may improve our ability to monitor the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for American Dipper on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY_MC	ID	--	--	--	--	1
WY-MR	ID	--	--	--	--	5

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



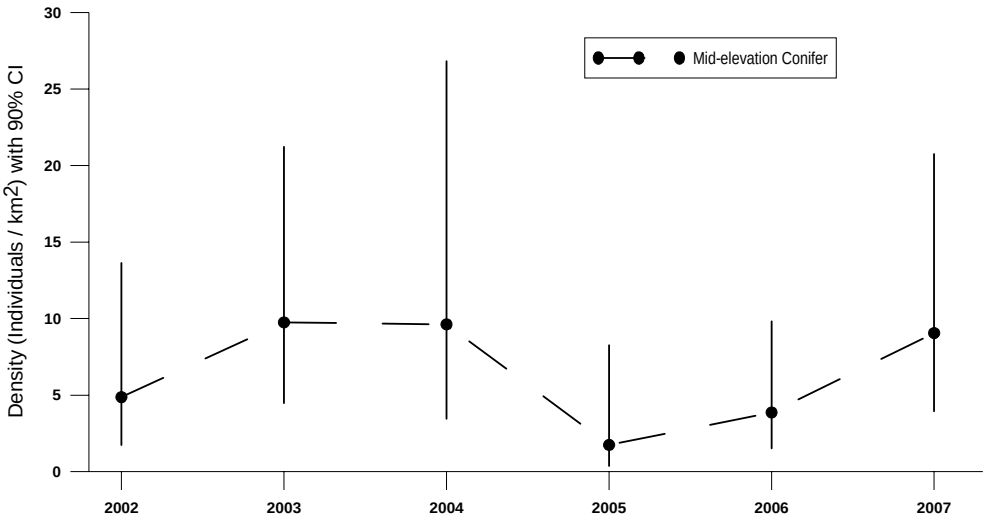
RMBO point-transect locations and detections of American Dipper on transects in Wyoming, 2007.

Golden-crowned Kinglet
(*Regulus satrapa*)

WY-PIF Level II Priority Species

Golden-crowned Kinglet prefers high-elevation coniferous forests that include spruce. In 2007, we detected 34 Golden-crowned Kinglets in three habitats, twenty of which occurred in mid-elevation conifer habitat.

We primarily detected Golden-crowned Kinglets along mid-elevation conifer transects. The number of Golden-crowned Kinglet detections each year is too low to calculate a density in any habitat. However, using all of the detections across years, we were able to calculate a density estimate for the species this year in mid-elevation conifer.

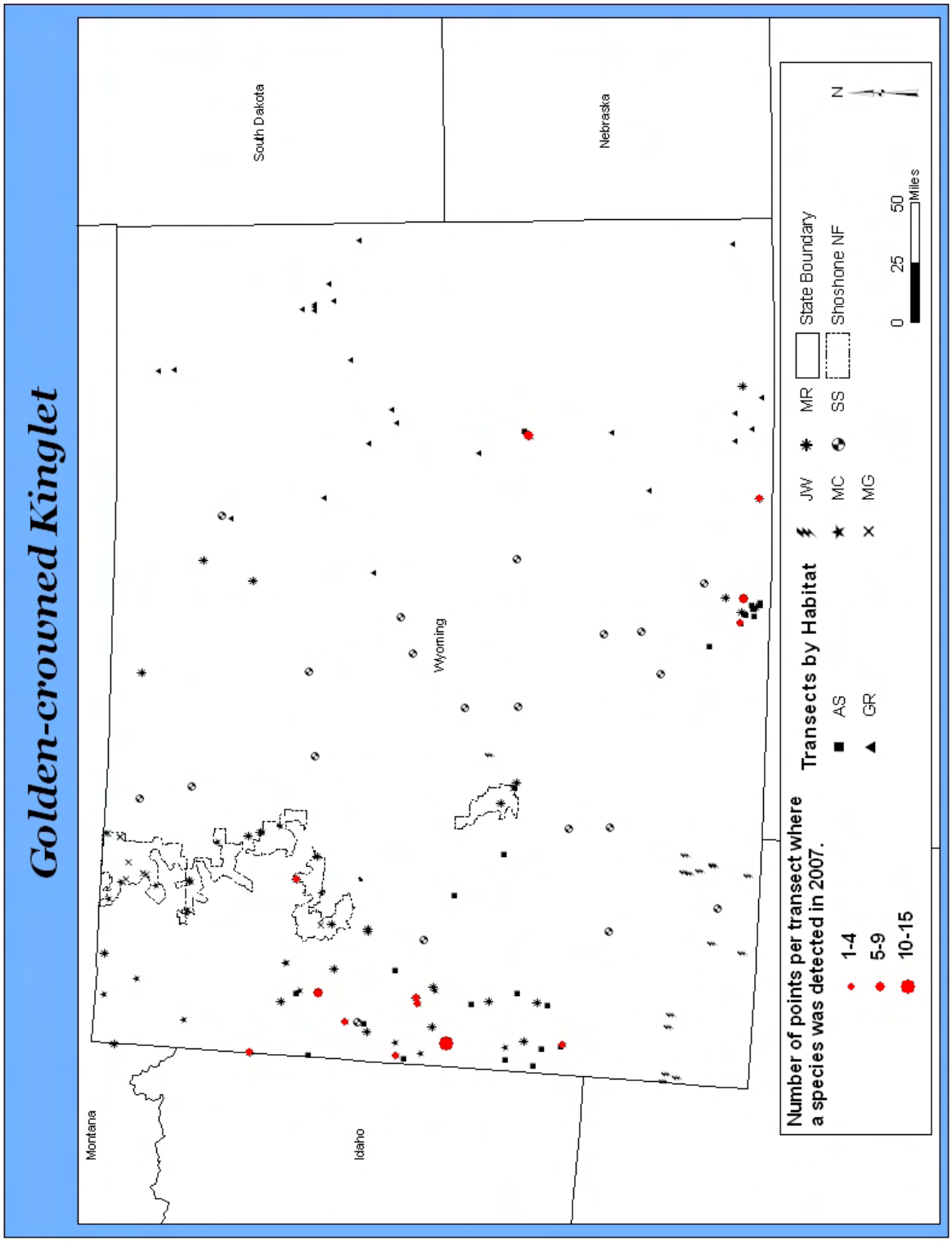


Estimated density (birds/km2) of Golden-crowned Kinglet, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Golden-crowned Kinglet on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MR*	ID	--	--	--	--	2
WY-AS	ID	--	--	--	--	8
WY-MC	9.1	3.9	20.8	52	19	20
WY-MR	ID	--	--	--	--	4

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*These transects are not part of the 25 WY-MR transects.



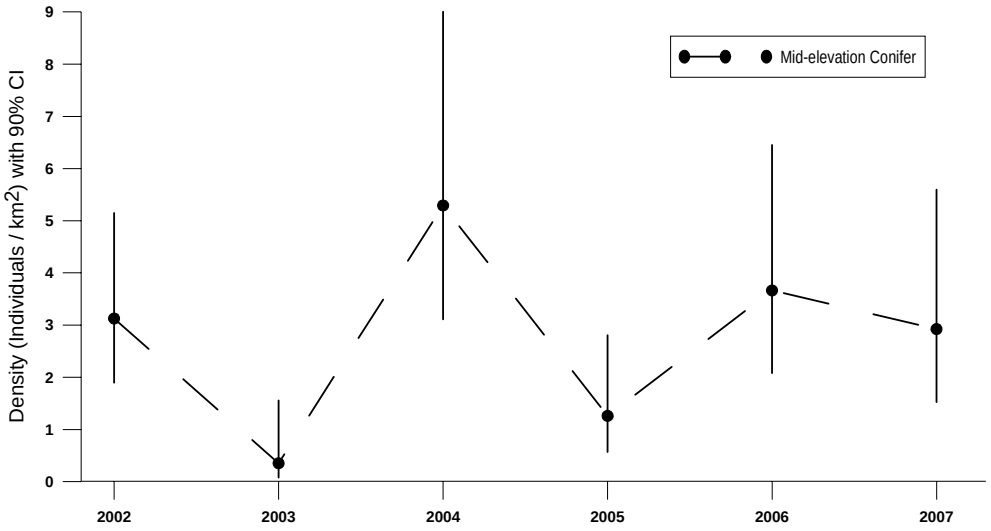
RMBO point-transect locations and detections of Golden-crowned Kinglet on transects in Wyoming, 2007.

Townsend's Solitaire
(*Myadestes townsendi*)

WY-PIF Level II Priority Species

Townsend's Solitaire nests in open coniferous forests throughout the state and usually places its nest on or near the ground. In 2007, we detected 53 Townsend's Solitaires in four habitats, 29 of which occurred on mid-elevation conifer transects.

The species is most often detected in mid-elevation conifer habitat. This year, by pooling our data across all years of the project, we were able to calculate a density estimate for Townsend's Solitaire in this habitat. We anticipate that in the next few years we should also be able to estimate density for the species in aspen habitat. Townsend's Solitaire should be effectively monitored in at least mid-elevation conifer and aspen habitats.

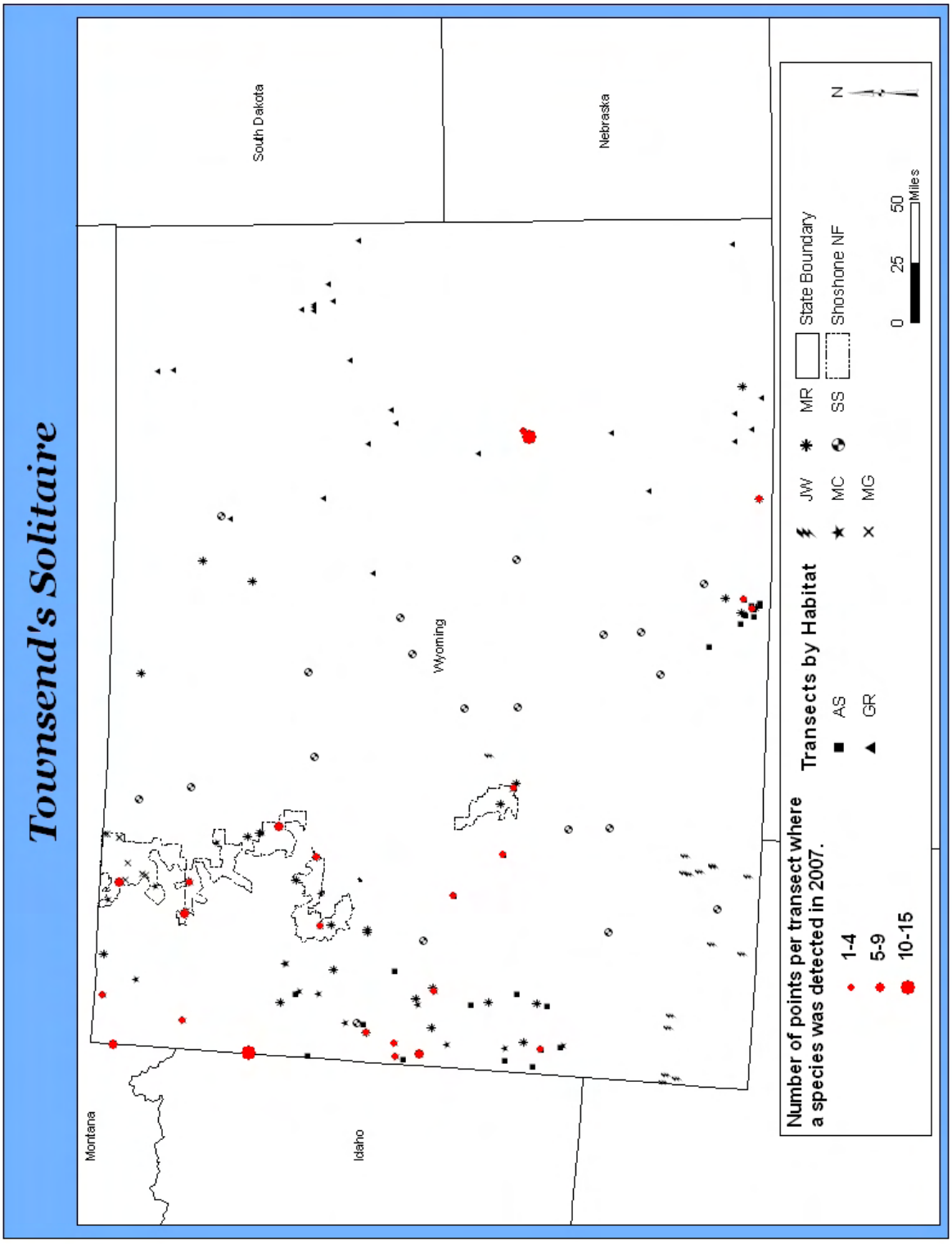


Estimated density (birds/km2) of Townsend's Solitaire, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Townsend's Solitaire on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	14
SH-MG	ID	--	--	--	--	1
SH-MR*	ID	--	--	--	--	1
WY-AS	ID	--	--	--	--	10
WY-MC	2.9	1.5	5.6	40	16	29
WY-MR	ID	--	--	--	--	13

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*This transect is part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Townsend's Solitaire on transects in Wyoming, 2007.

Veery
(Catharus fuscescens)
WY-PIF Level III Priority Species

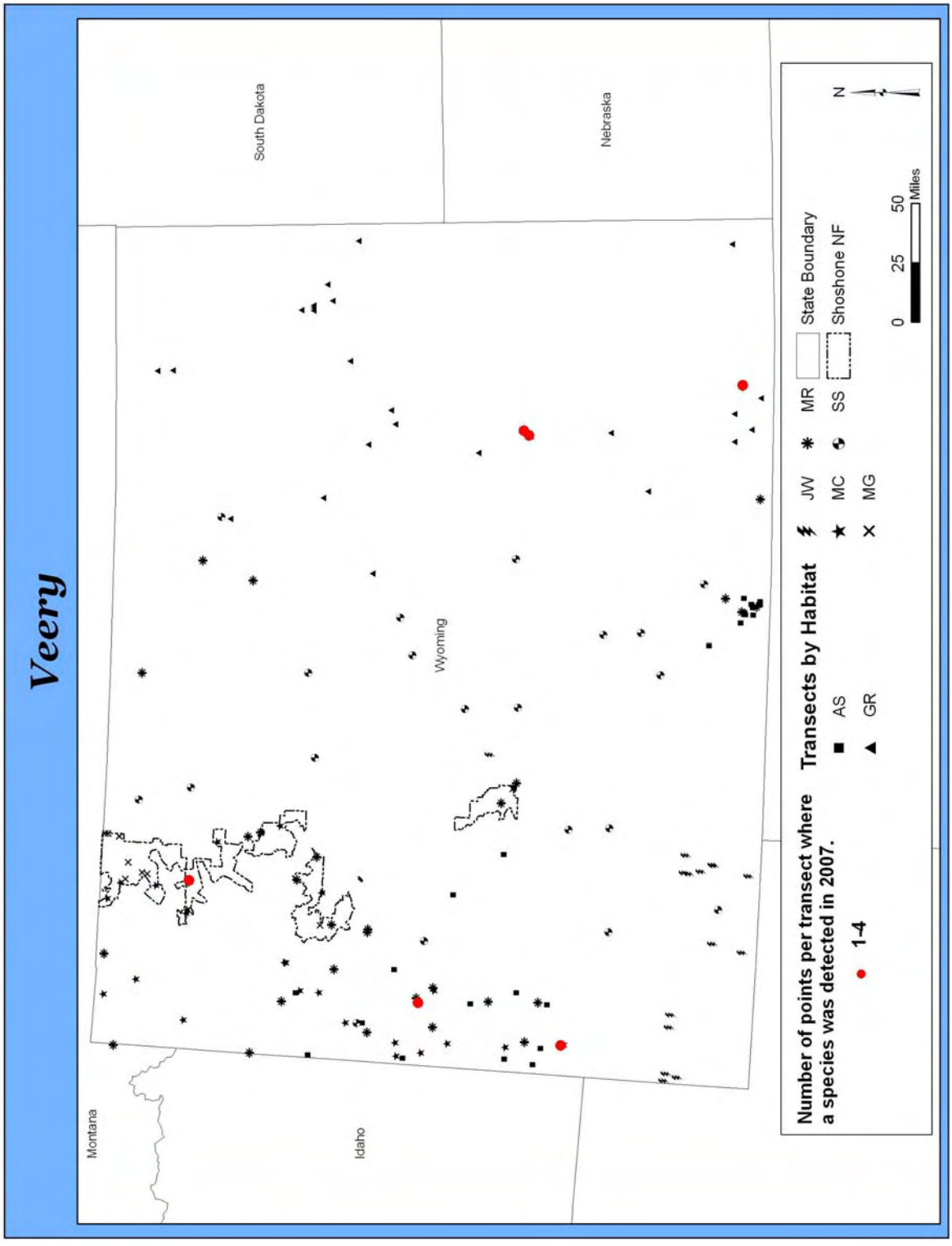
The Veery inhabits cottonwood and willow riparian areas, aspen woodlands, and coniferous forests, usually near water, primarily in the eastern half of the state. In 2007, we had eight Veery detections in three habitats. We have detected Veery on one transect, AS39, for four consecutive years.

We do not detect Veery in sufficient numbers to monitor its status in any habitat.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Veery on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MR*	ID	--	--	--	--	1
WY-AS	ID	--	--	--	--	5
WY-MC	ID	--	--	--	--	1
WY-MR	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*This transect is part of the 25 WY-MR transects.

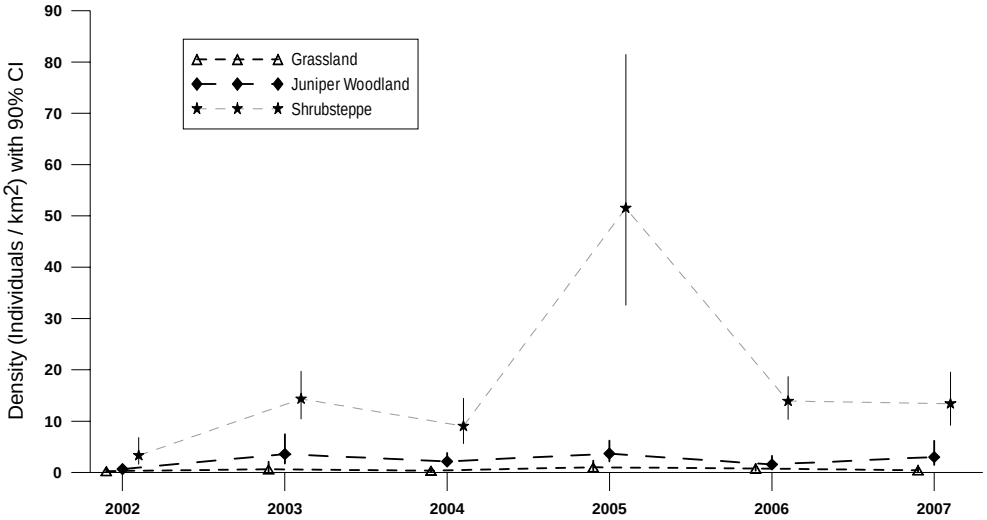


RMBO point-transect locations and detections of Veery on transects in Wyoming, 2007.

Sage Thrasher
(*Oreoscoptes montanus*)

WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

Sage Thrasher is a sagebrush obligate that is found throughout Wyoming in prairie and foothills shrubland habitat where sagebrush is present. In 2007, we detected 217 Sage Thrashers in six habitats, and we were able to calculate a density estimate for the species in grassland, juniper woodland, and shrubsteppe habitats. Sage Thrasher should be effectively monitored in at least juniper woodland and shrubsteppe habitats.

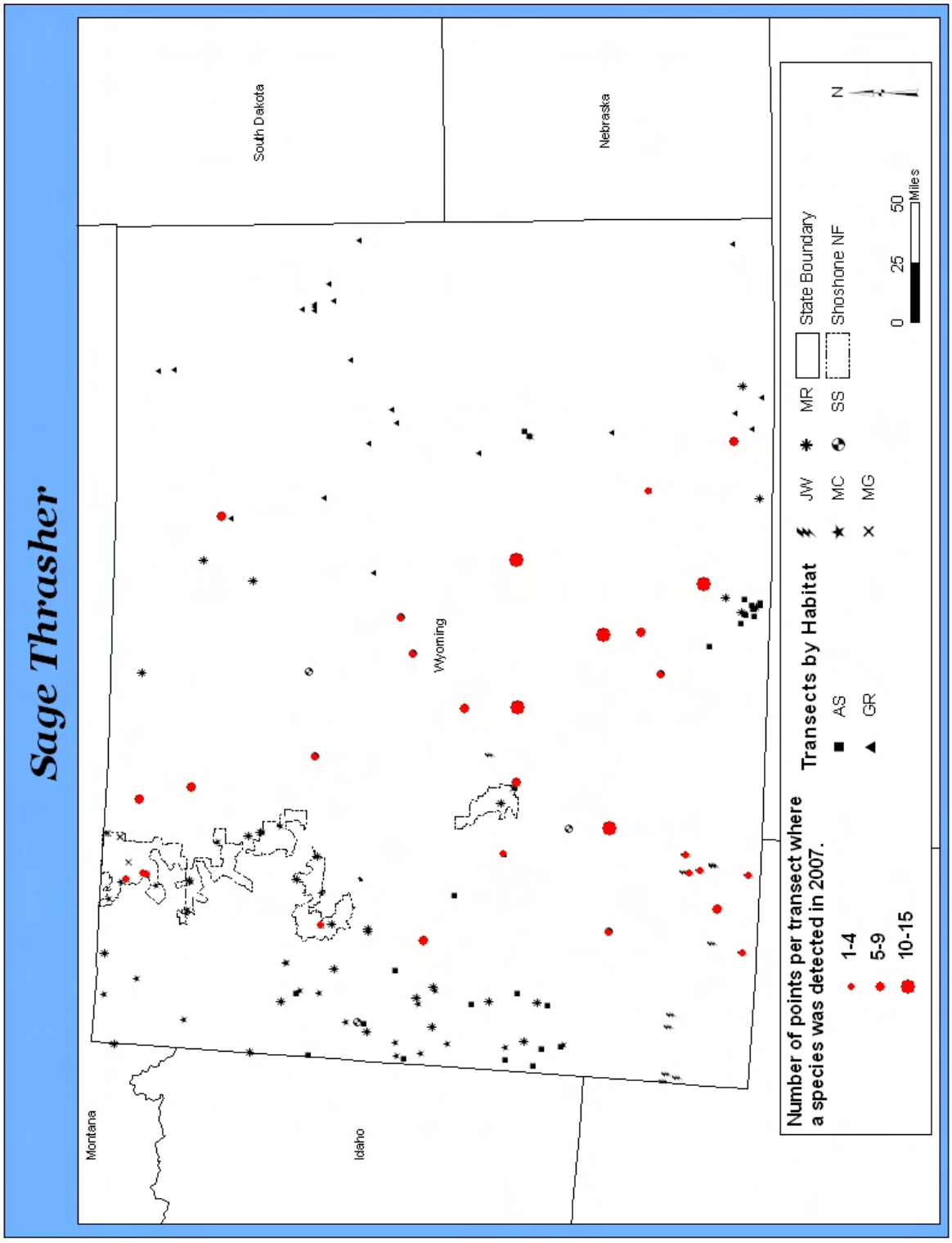


Estimated density (birds/km2) of Sage Thrasher, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Sage Thrasher on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MG	ID	--	--	--	--	9
WY-AS	ID	--	--	--	--	2
WY-GR	0.4	0.1	1.4	77	8	8
WY-JW	3.0	1.5	6.2	44	14	15
WY-MR	ID	--	--	--	--	7
WY-SS	13.4	9.2	19.5	22	164	176

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.



RMBO point-transect locations and detections of Sage Thrasher on transects in Wyoming, 2007.

Black-throated Gray Warbler (*Dendroica nigrescens*)

WY-PIF Level III Priority Species

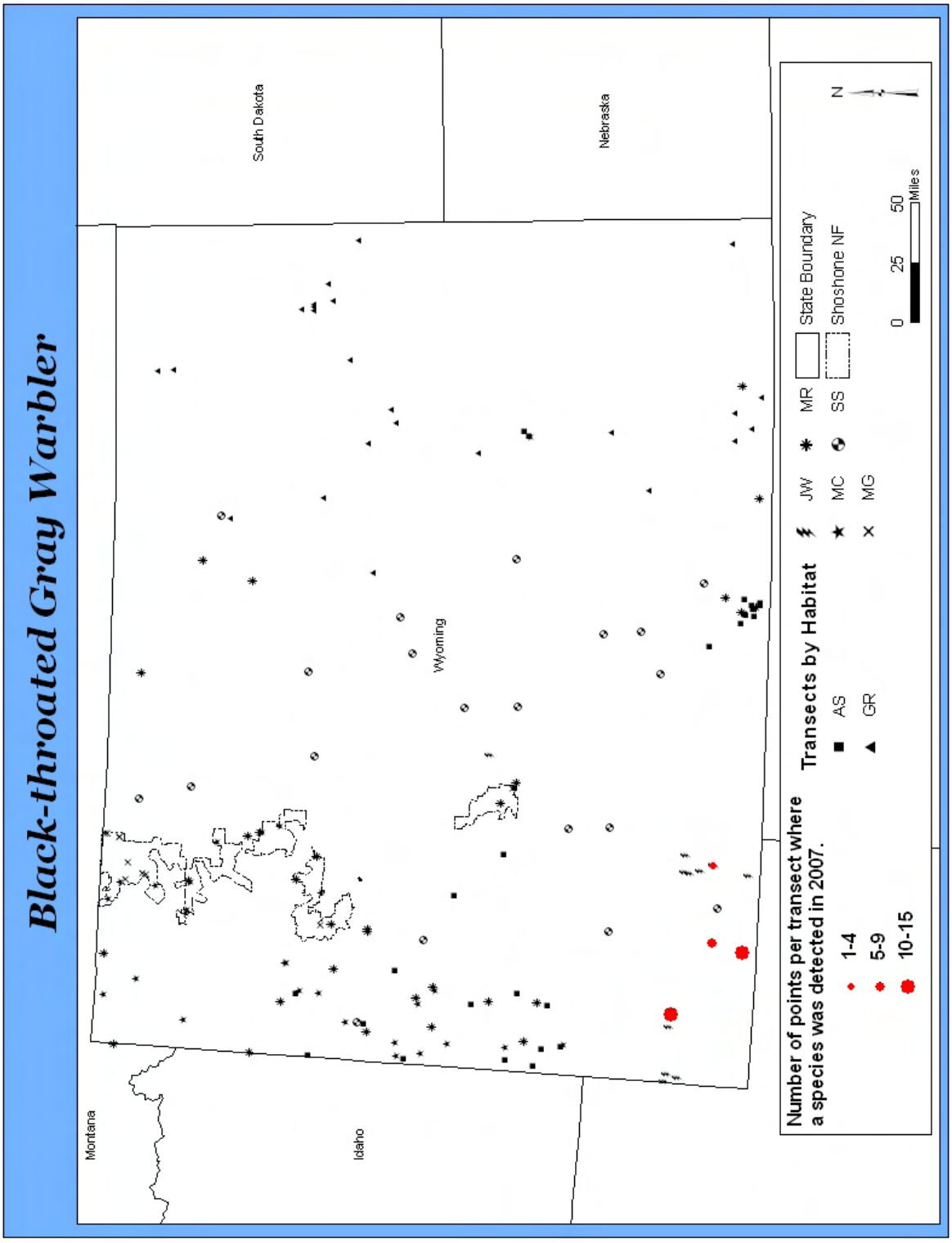
Black-throated Gray Warbler prefers large stands of juniper-dominated woodland in the summer. In 2007, we detected 17 Black-throated Gray Warblers in juniper woodland habitat. Unfortunately, we were unable to calculate a density estimate in this habitat due to observer error resulting in a relatively low number of detections this year. This year, juniper woodland transects were not conducted by RMBO field technicians. In the future, Black-throated Gray Warbler should be effectively monitored through point transects in juniper woodland habitat.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Black-throated Gray Warbler on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-JW*	ID	--	--	--	--	17

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*This data was not used in analysis due to observer error.



RMBO point-transect locations and detections of Black-throated Gray Warbler on transects in Wyoming, 2007.

Ovenbird
(Seiurus aurocapillus)
WY-PIF Level III Priority Species

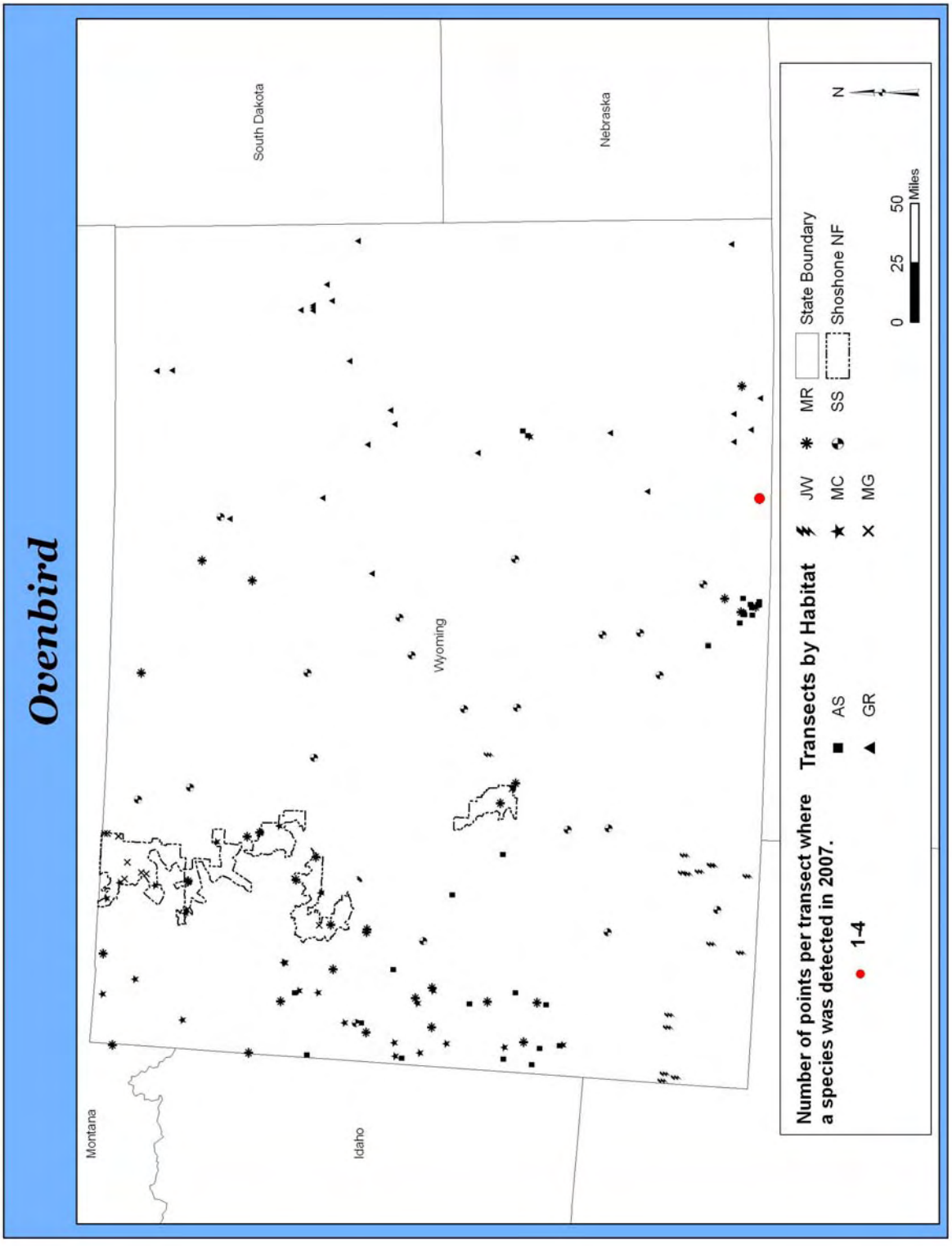
Ovenbird breeds in mid- to high-elevation mature woodlands that have a significant deciduous component. In Wyoming it is most common in the Black Hills, in the northeast corner of the state. In 2007, we detected two Ovenbirds on a montane riparian transect, MR79. This was the third year we detected Ovenbird on a statewide transect.

Given its limited breeding range in the state, it is unlikely we will be able to calculate trends for the species. However, under the current sampling design, adding transects in montane riparian habitat may improve our ability to detect the species.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Ovenbird for the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-MR	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

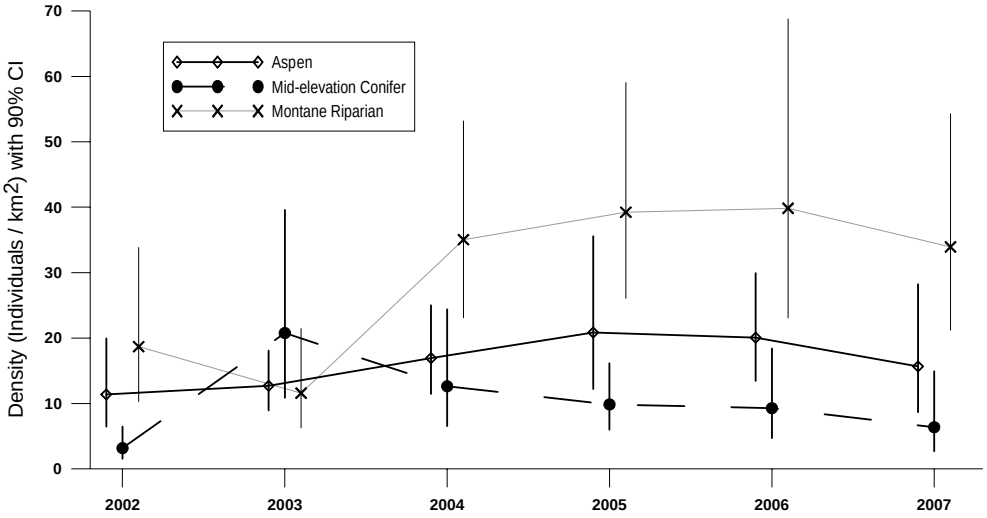


RMBO point-transect locations and detections of Ovenbird on transects in Wyoming, 2007.

MacGillivray's Warbler (*Oporornis tolmiei*)

WY-PIF Level II Priority Species

MacGillivray's Warbler occurs in a variety of shrub-dominated habitat, including burned or cut areas in early succesional stages, and montane riparian. In 2007, we detected 148 MacGillivray's Warblers in four habitats, and we were able to calculate a density estimate for the species in aspen, mid-elevation conifer, and montane riparian habitats. MacGillivray's Warbler should be effectively monitored in at least aspen, mid-elevation conifer, and montane riparian habitats.



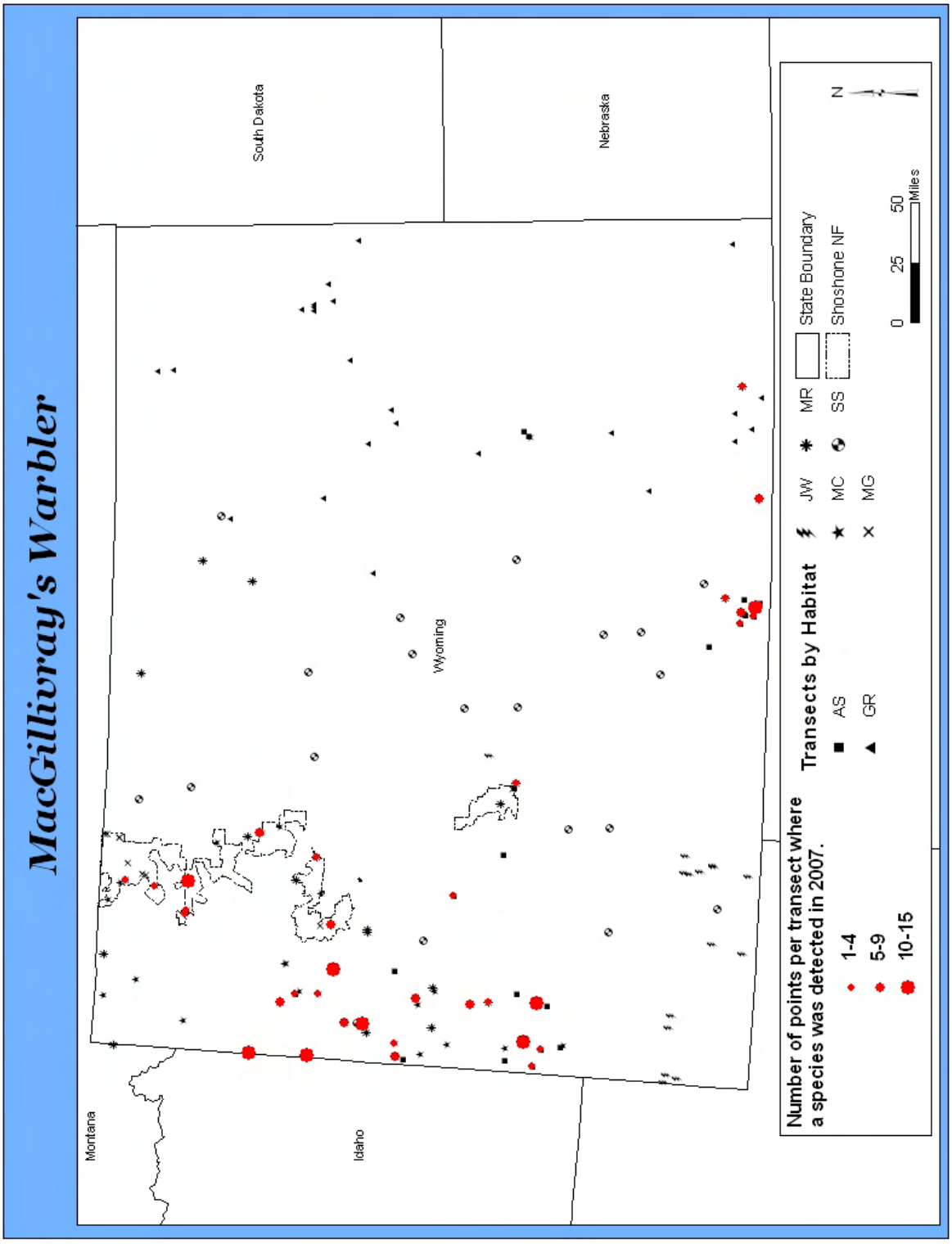
Estimated density (birds/km2) of MacGillivray's Warbler, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for MacGillivray's Warbler on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	6
SH-MG	ID	--	--	--	--	1
SH-MR*	ID	--	--	--	--	20
WY-AS	15.7	8.7	28.2	36	38	39
WY-MC	6.4	2.7	14.9	53	16	22
WY-MR	33.9	21.2	54.3	28	65	73

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*Three of the five transects are part of the 25 WY-MR transects.



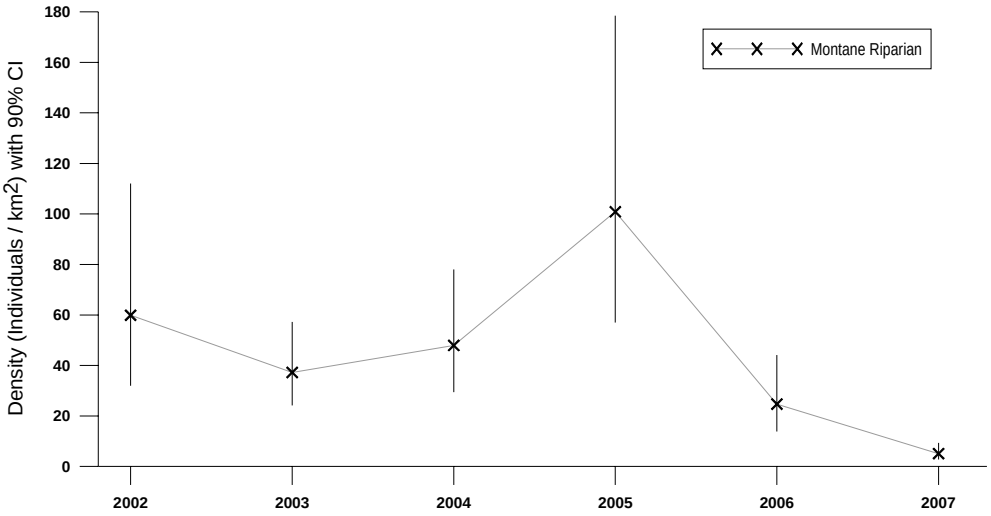
RMBO point-transect locations and detections of MacGillivray's Warbler on transects in Wyoming, 2007.

Wilson's Warbler
(Wilsonia pusilla)

WY-PIF Level II Priority Species

Wilson's Warbler breeds in high-elevation areas that are dominated by willow shrubs, including alpine tundra. In 2007, we detected 54 Wilson's Warblers in three habitats, 50 of which came from montane riparian habitat.

We were able to calculate a density estimate for the species in montane riparian habitat. The species has also been detected in large numbers in Bighorn National Forest, but we did not survey Bighorn NF in 2007. Wilson's Warbler should be effectively monitored in montane riparian habitat, both statewide and on the Bighorn National Forest.



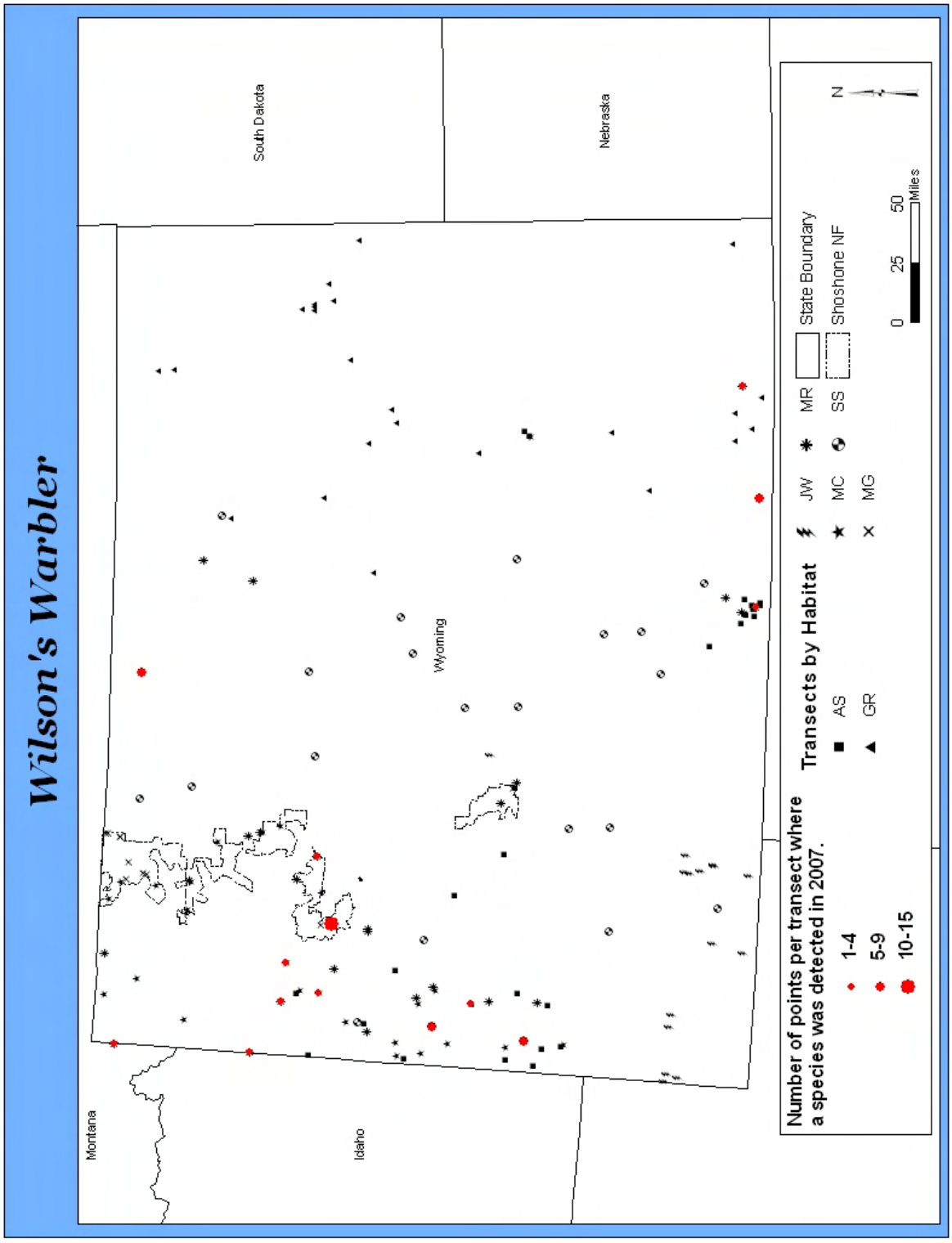
Estimated density (birds/km2) of Wilson's Warbler, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Wilson's Warbler on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MR*	ID	--	--	--	7	7
WY-AS	ID	--	--	--	9	9
WY-MC	ID	--	--	--	5	5
WY-MR	42	25	69	31	56	61

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*These transect s are all part of the 25 WY-MR transects.

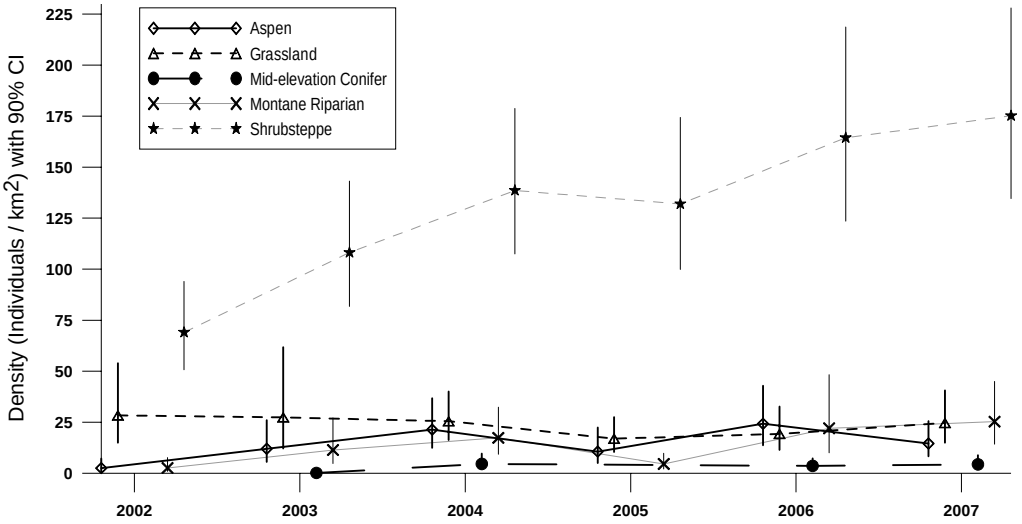


RMBO point-transect locations and detections of Wilson's Warbler on transects in Wyoming, 2007.

Brewer's Sparrow
(*Spizella breweri)*

USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

Brewer's Sparrow prefers sagebrush and other shrubby habitat. In 2007, we detected 1,050 Brewer's Sparrows in seven habitats. We were able to calculate density estimates for the species in six of the seven habitats surveyed this year. Brewer's Sparrow should be effectively monitored in a variety of habitats.

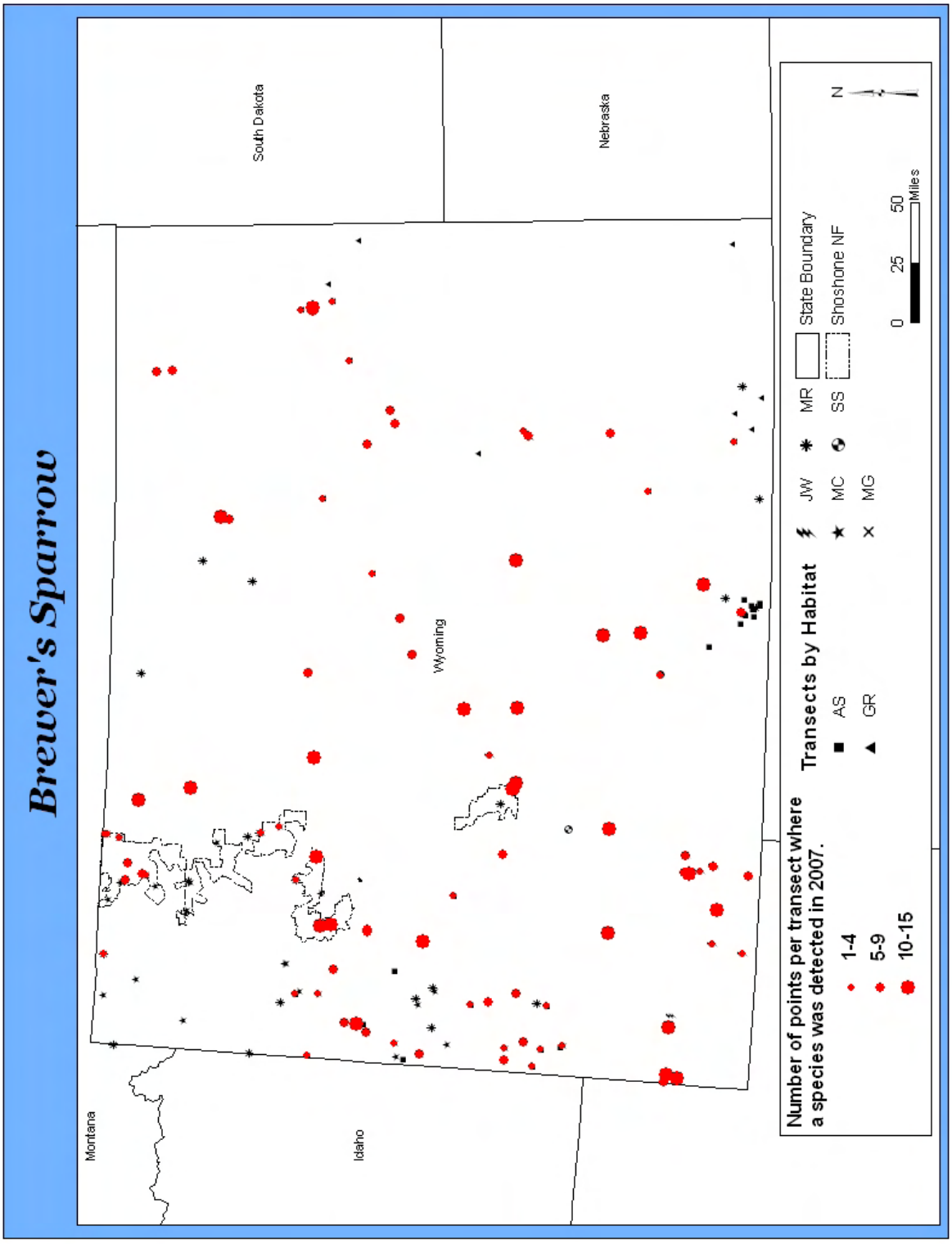


Estimated density (birds/km2) of Brewer's Sparrow, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Brewer's Sparrow on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	8
SH-MG	31.8	17.7	57.3	34	61	82
SH-MR*	ID	--	--	--	--	46
WY-AS	14.6	8.3	25.6	34	48	61
WY-GR	24.7	15.0	40.6	30	117	132
WY-JW**	ID	--	--	--	--	118
WY-MC	4.4	2.2	8.8	44	22	31
WY-MR	25.3	14.2	45.0	35	92	115
WY-SS	175.2	134.7	228.0	16	427	510

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*Two of the three transects are part of the 25 WY-MR transects.
**This data was not used in analysis due to observer error.

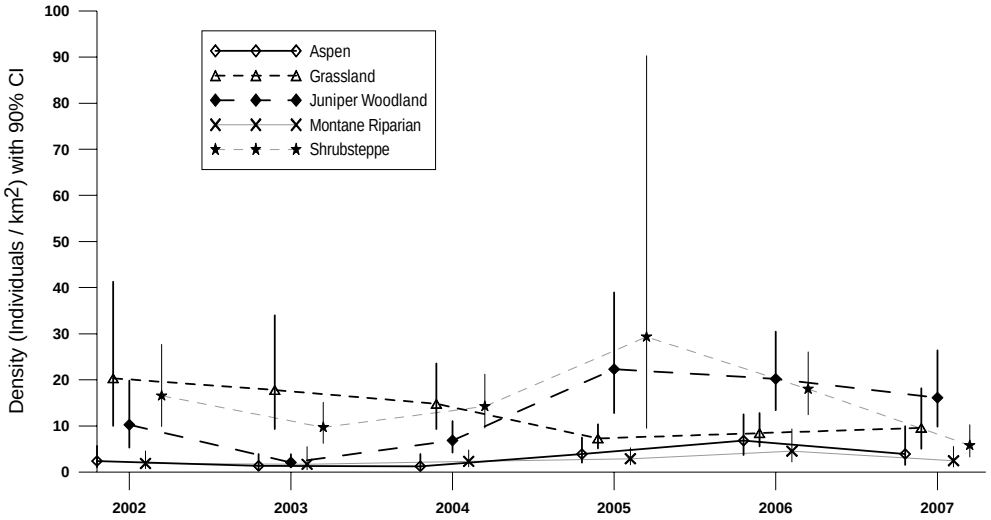


RMBO point-transect locations and detections of Brewer's Sparrow on transects in Wyoming, 2007.

Vesper Sparrow
(*Pooecetes gramineus*)

WY-PIF Level II Priority Species

Vesper Sparrow occurs throughout the state in basin-prairie shrublands, mountain-foothills shrublands, grasslands, and agricultural areas. In 2007, we detected 369 Vesper Sparrows in six habitats and we were able to calculate a density estimate for the species in all six of these habitats. Vesper Sparrows should be effectively monitored in a range of habitats, especially grassland, juniper woodland, and shrubsteppe.

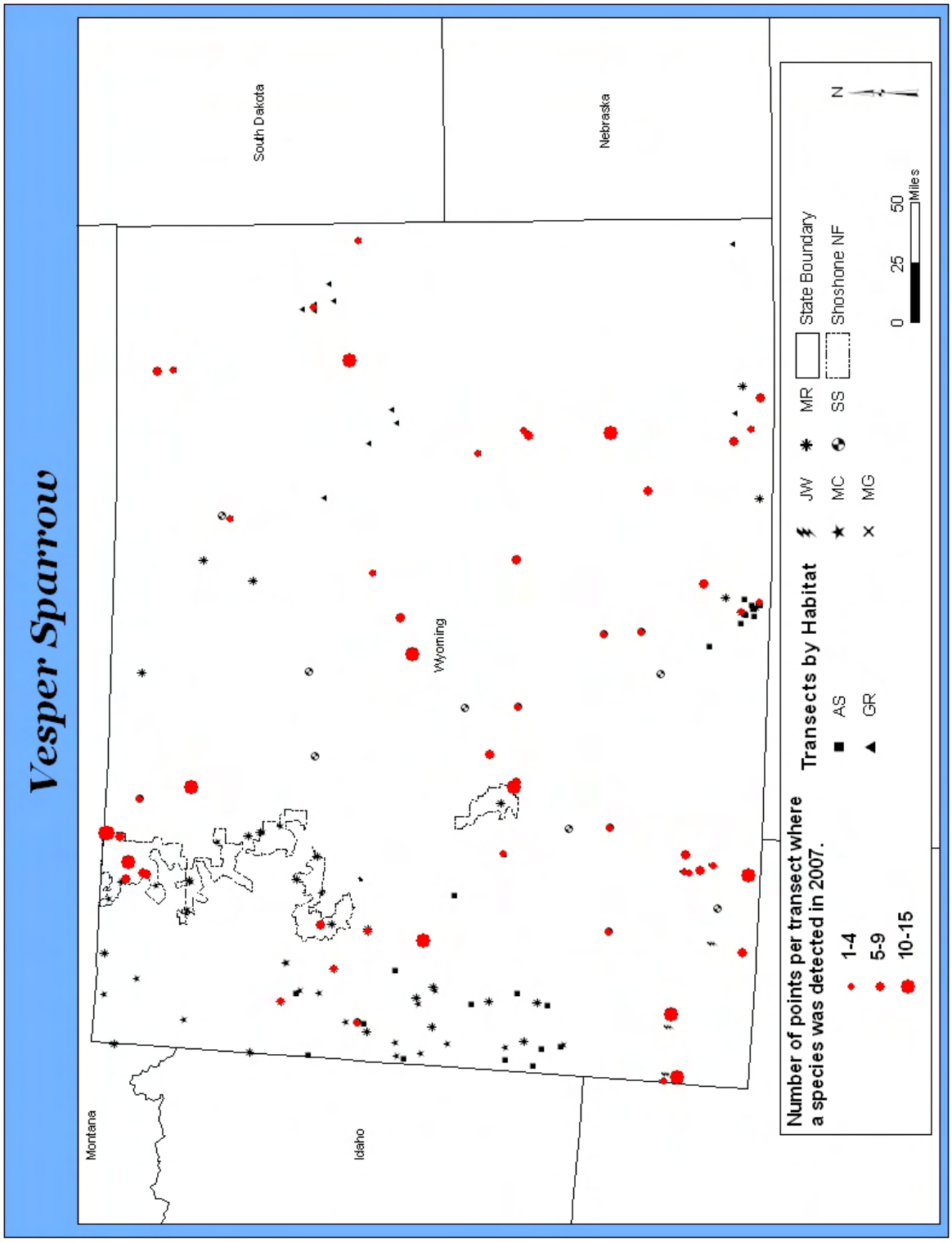


Estimated density (birds/km2) of Vesper Sparrow, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Vesper Sparrow on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MG	12.8	9.1	18.0	20	78	102
WY-AS	3.9	1.6	10.0	59	26	27
WY-GR	9.6	5.1	18.2	40	66	75
WY-JW	16.1	9.9	26.4	29	68	73
WY-MR	2.5	1.1	5.6	51	13	13
WY-SS	5.8	3.3	10.3	35	72	79

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

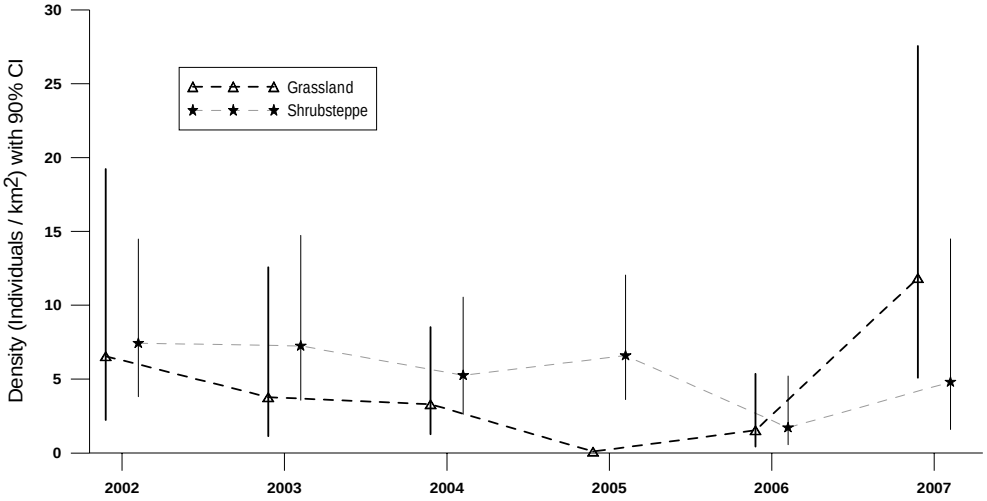


RMBO point-transect locations and detections of Vesper Sparrow on transects in Wyoming, 2007.

Lark Sparrow
(*Chondestes grammacus*)

WY-PIF Level II Priority Species

Lark Sparrow breeds in a variety of locations including prairies, roadsides, farms, open woodlands, and mesas across Wyoming. In 2007, we detected 139 Lark Sparrows in seven habitats. We were able to calculate density estimates for the species in three habitats: montane grassland, grassland, and shrubsteppe. We should be able to effectively monitor Lark Sparrows in grassland habitat.



Estimated density (birds/km2) of Lark Sparrow, with 90% confidence intervals, on MWB transects 2002-2007.

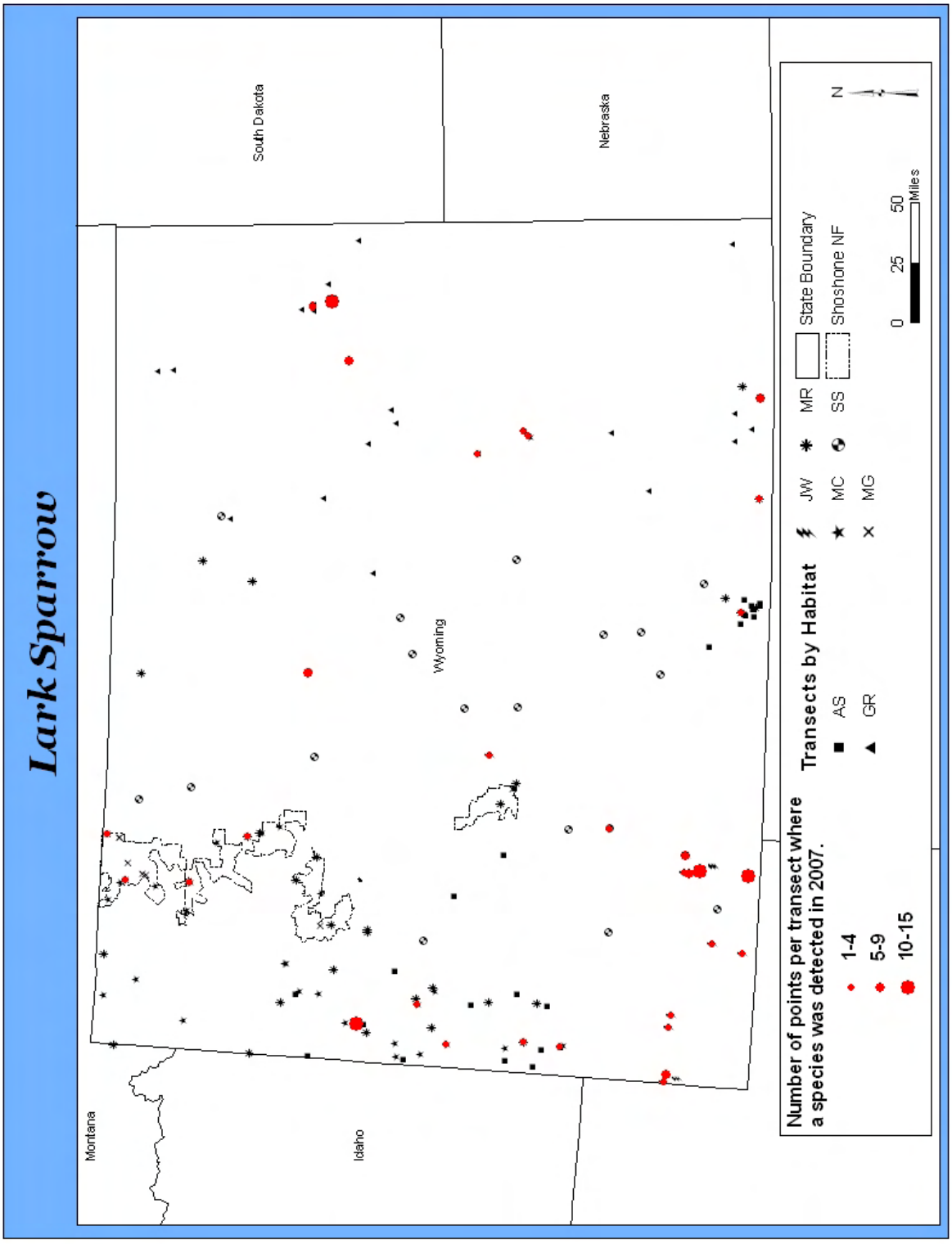
Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Lark Sparrow on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	1
SH-MG	0.4	0.1	1.5	85	1	2
SH-MR*	ID	--	--	--	--	1
WY-AS	ID	--	--	--	--	4
WY-GR	11.8	5.1	27.6	53	30	34
WY-JW**	ID	--	--	--	--	62
WY-MC	ID	--	--	--	--	6
WY-MR	ID	--	--	--	--	8
WY-SS	4.8	1.6	14.5	72	15	22

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*These transects are not part of the 25 WY-MR transects.

**This data was not used in analysis due to observer error.

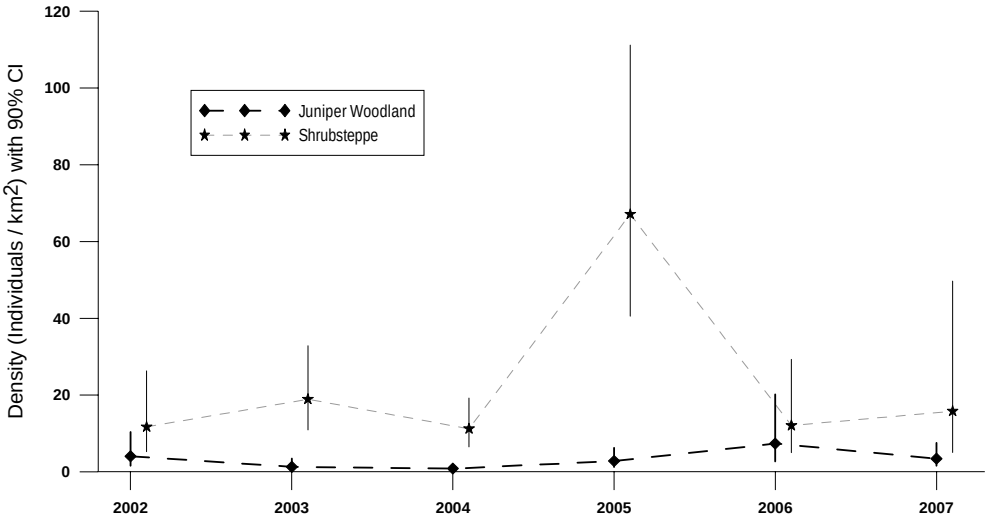


RMBO point-transect locations and detections of Lark Sparrow on transects in Wyoming, 2007.

Sage Sparrow
(*Amphispiza belli*)

USFS Region 2 Sensitive Species
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

Sage Sparrow is a sagebrush obligate that occurs throughout western and central Wyoming. In 2007, we detected 127 Sage Sparrows in four habitats, and 111 of these occurred in shrubsteppe habitat. This year, using data pooled across all years of the project, we were able to calculate density estimates for the species in juniper woodland and shrubsteppe habitats. Sage Sparrow should be effectively monitored in at least these two habitats.

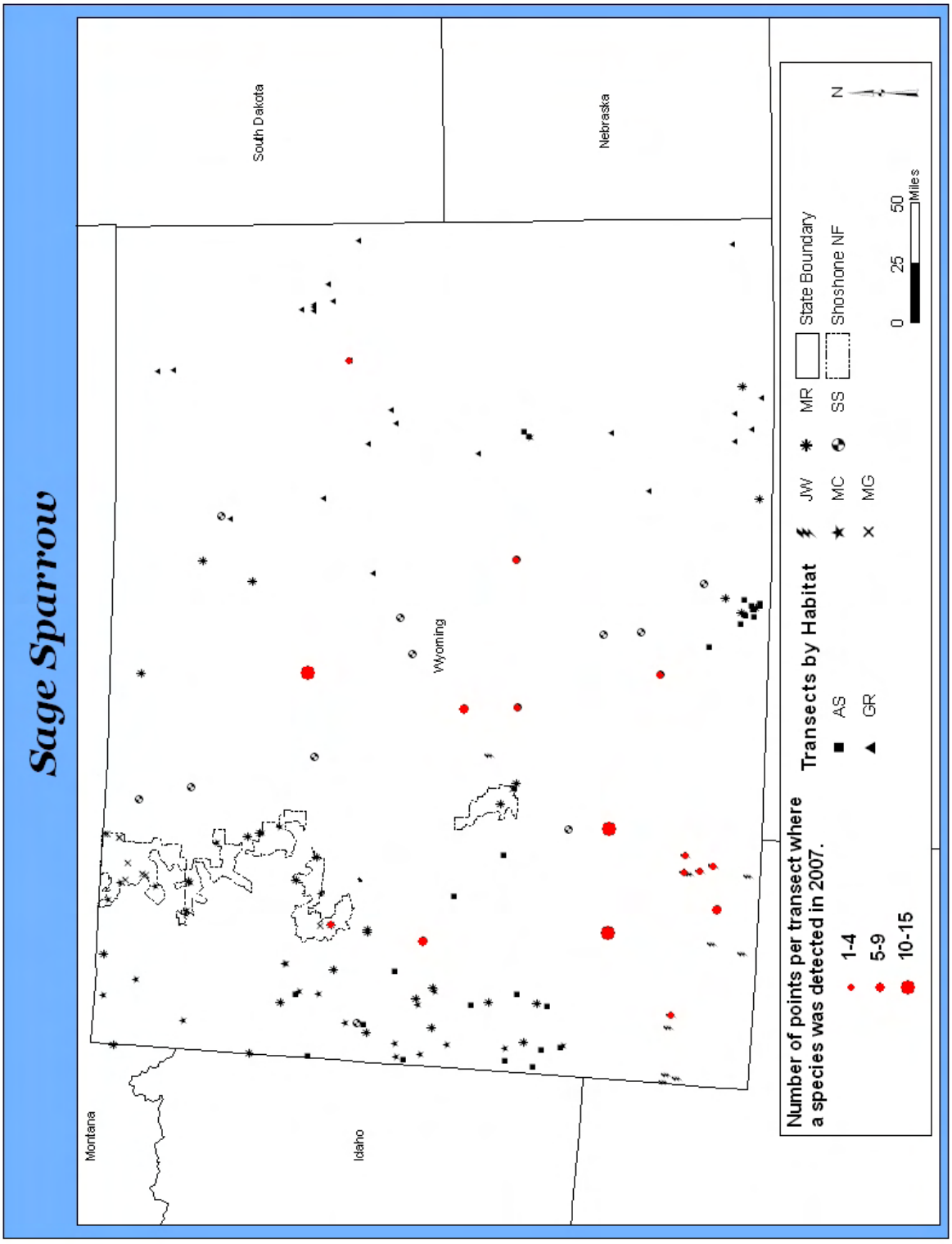


Estimated density (birds/km2) of Sage Sparrow, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Sage Sparrow on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MR*	ID	--	--	--	--	1
WY-GR	ID	--	--	--	--	1
WY-JW	3.4	1.5	7.5	49	11	14
WY-MR	ID	--	--	--	--	1
WY-SS	15.8	5.0	49.7	78	97	111

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.
*This transect is part of the 25 WY-MR transects.

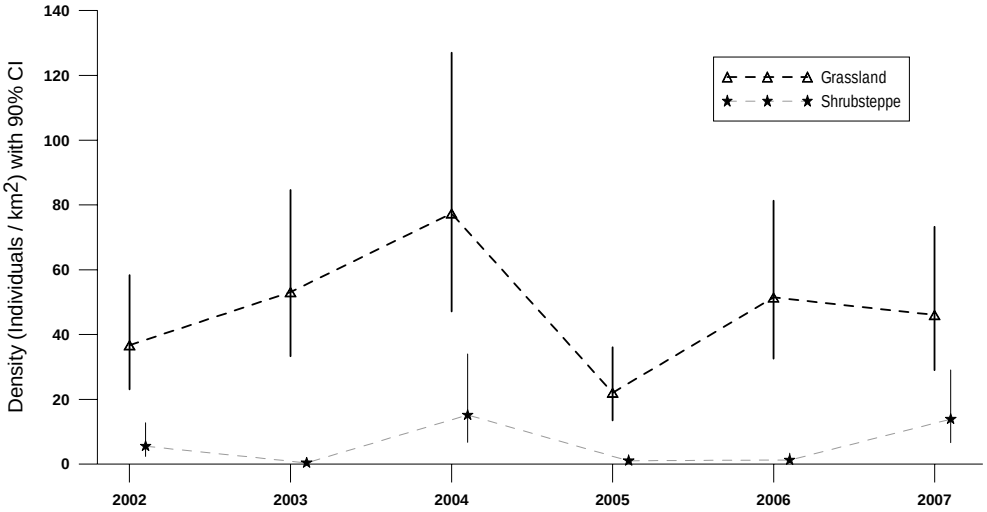


RMBO point-transect locations and detections of Sage Sparrow on transects in Wyoming, 2007.

Lark Bunting
(*Calamospiza melanocorys*)

WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

Lark Bunting is found throughout Wyoming primarily in open habitats such as native prairie, shrubsteppe and agricultural areas. It is most common in the eastern third of the state. In 2007, we detected 769 Lark Buntings in two habitats, grassland and shrubsteppe. We were able to calculate density estimates for the species in both of these habitats. Lark Bunting should be effectively monitored in grassland and shrubsteppe habitats.

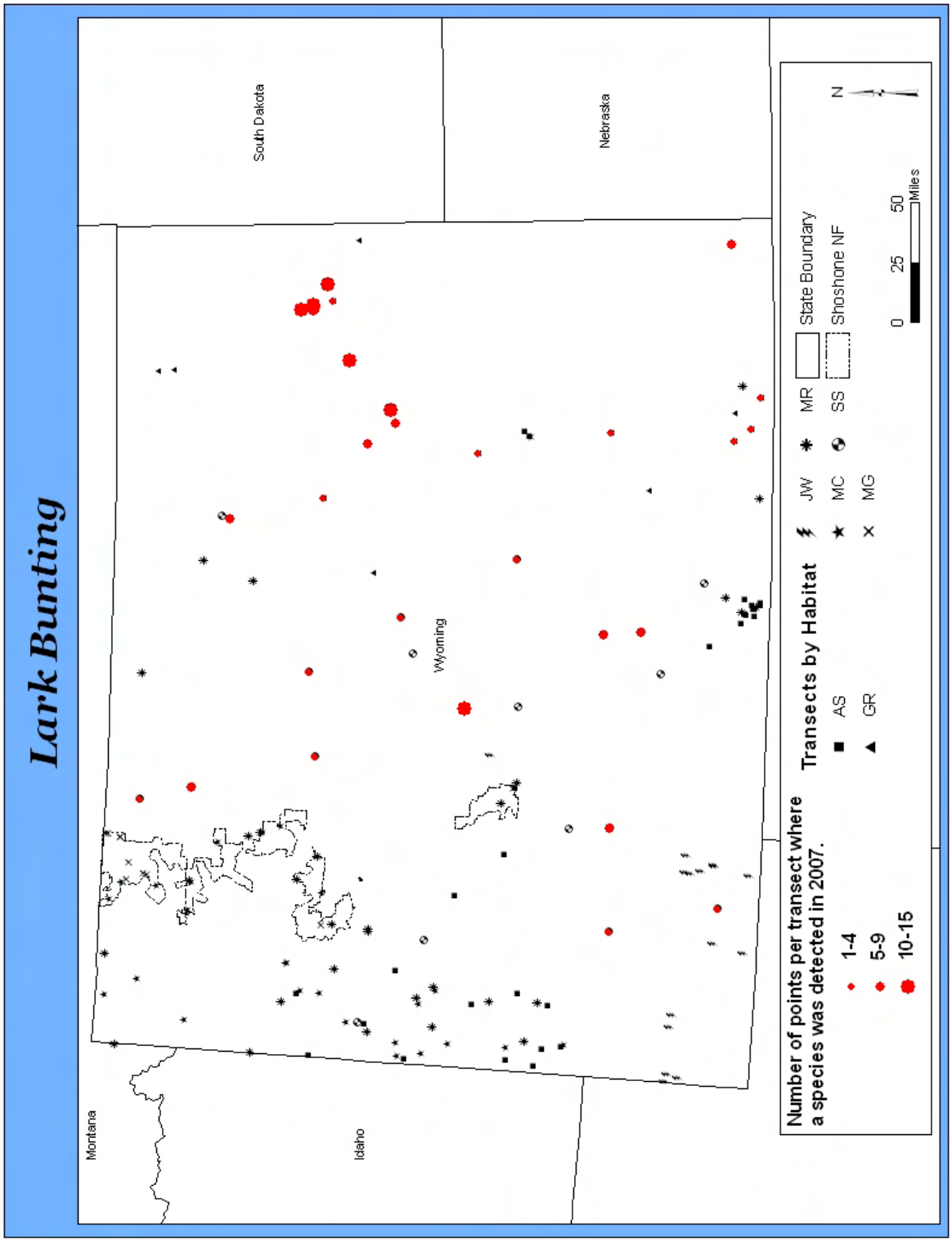


Estimated density (birds/km2) of Lark Bunting, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Lark Bunting on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	46.1	29.0	73.2	28	368	605
WY-SS	13.9	6.6	29.1	46	132	164

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

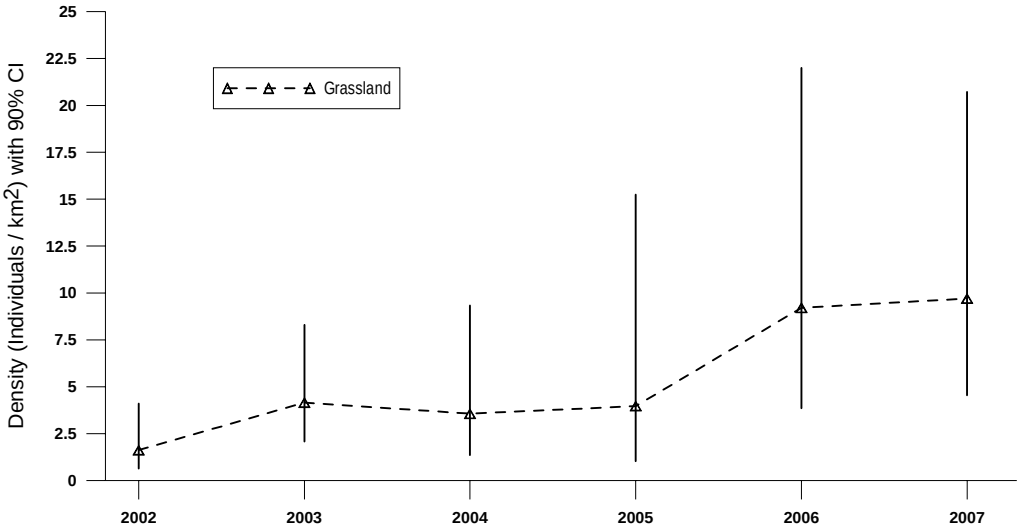


RMBO point-transect locations and detections of Lark Bunting on transects in Wyoming, 2007.

Grasshopper Sparrow
(*Ammodramus savannarum*)

USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

Grasshopper Sparrow breeds mostly in the eastern half of Wyoming in open habitats including grasslands, open grassy sagesteppe, and agricultural areas. In 2007, we detected 57 Grasshopper Sparrows in three habitats, with 54 of these occurring in grassland habitat. Grasshopper Sparrow should be effectively monitored in grassland habitat.

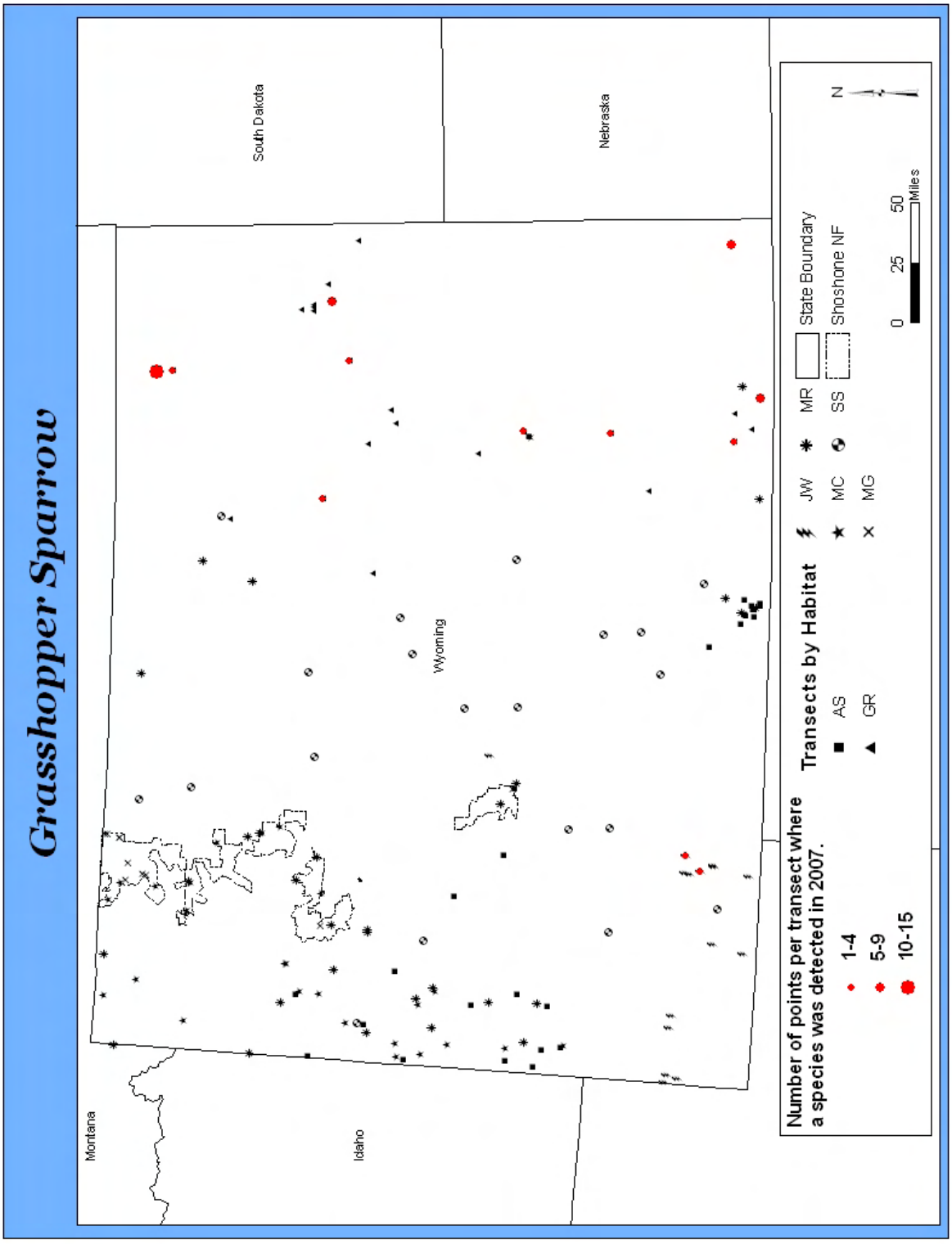


Estimated density (birds/km2) of Grasshopper Sparrow, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Grasshopper Sparrow on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-AS	ID	--	--	--	--	1
WY-GR	9.7	4.5	20.7	47	53	54
WY-JW	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

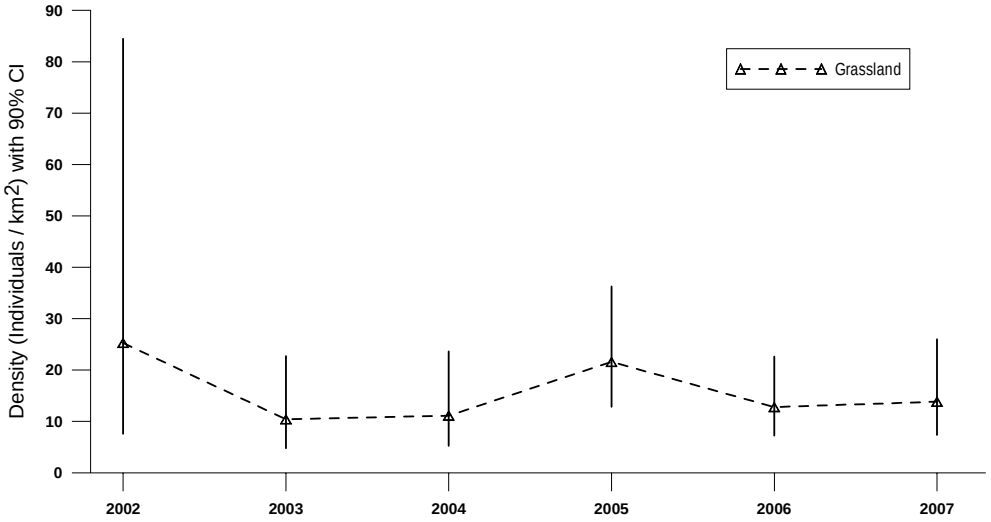


RMBO point-transect locations and detections of Grasshopper Sparrow on transects in Wyoming, 2007.

McCown's Longspur
(Calcarius mccownii)

USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level I Priority Species

McCown's Longspur is found in prairie habitat throughout eastern Wyoming. In 2007, we detected 125 McCown's Longspurs in two habitats, 115 of which occurred in grassland habitat. McCown's Longspur should be effectively monitored in grassland habitat.

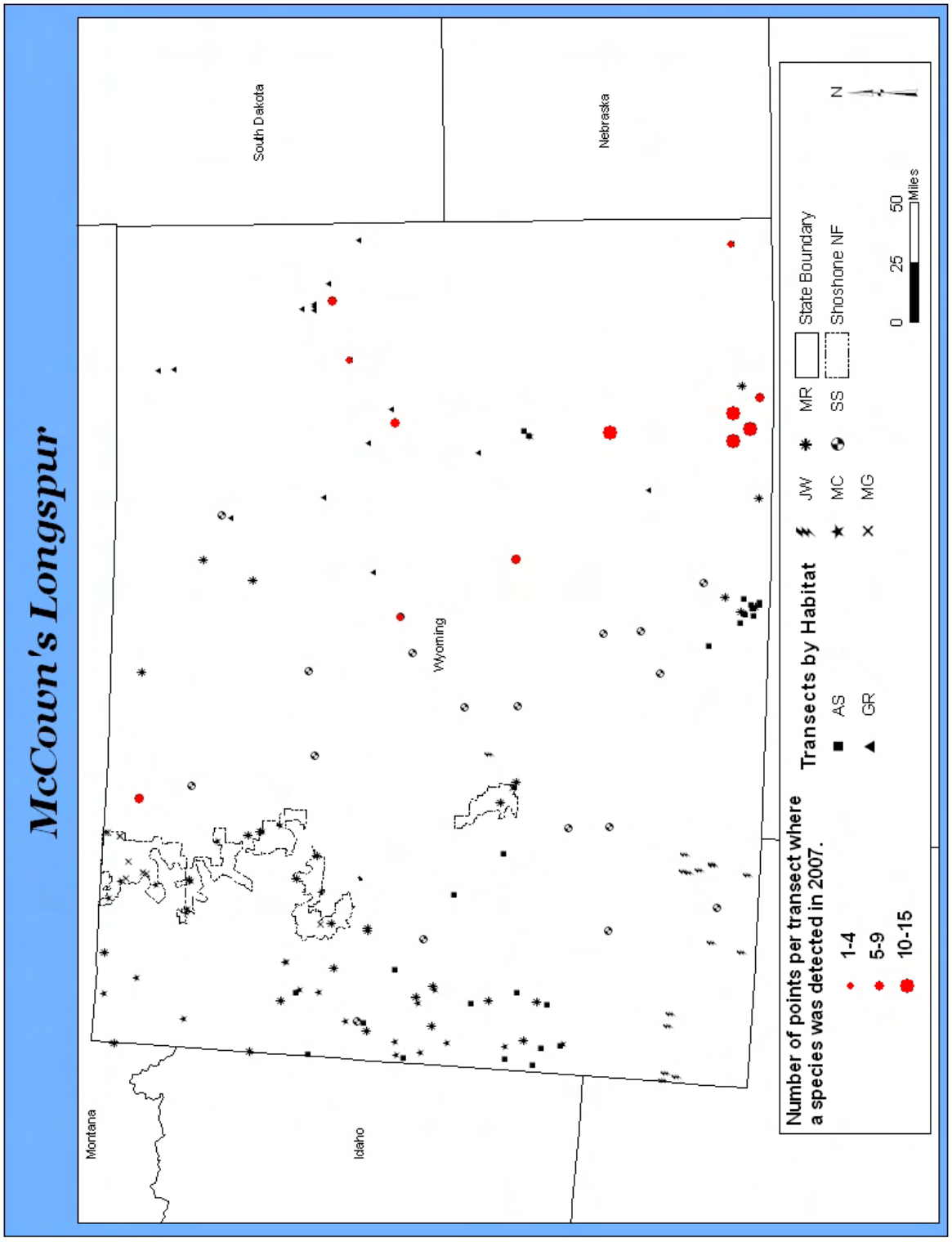


Estimated density (birds/km2) of McCown's Longspur, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for McCown's Longspur on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	13.8	7.4	26.0	38	103	115
WY-SS	ID	--	--	--	--	10

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

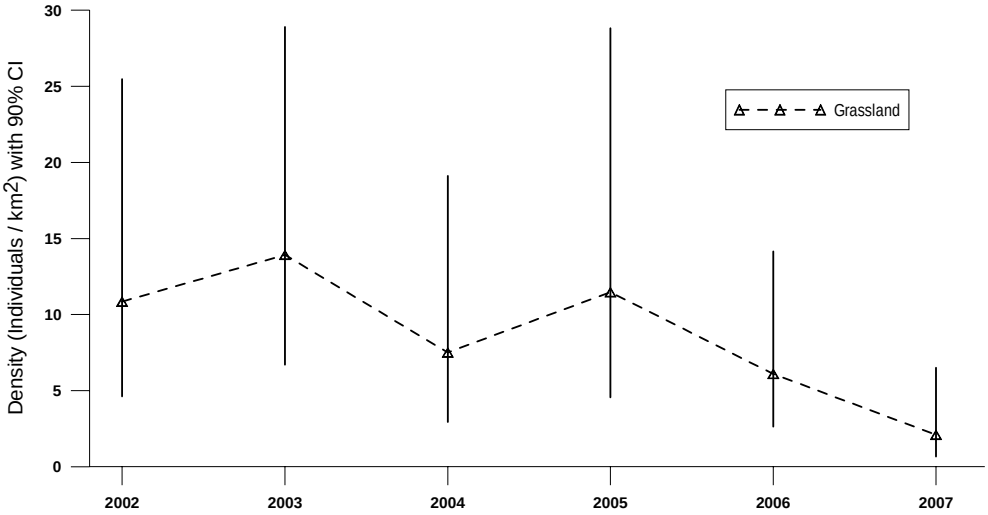


RMBO point-transect locations and detections of McCown's Longspur on transects in Wyoming, 2007.

Chestnut-collared Longspur
(*Calcarius ornatus)*

USFS Region 2 Sensitive Species
USFWS Bird of Conservation Concern
WGFD Species of Greatest Conservation Need
WY-PIF Level II Priority Species

Chestnut-collared Longspur is found mainly in the eastern half of Wyoming, in shortgrass and mixed-grass prairies that sometimes have a shrub component. In 2007, we detected 17 Chestnut-collared Longspurs in grassland habitat. There are three transects, GR01, GR13 and GR37, where we have detected the species every year. Chestnut-collared Longspur should be effectively monitored in grassland habitat.

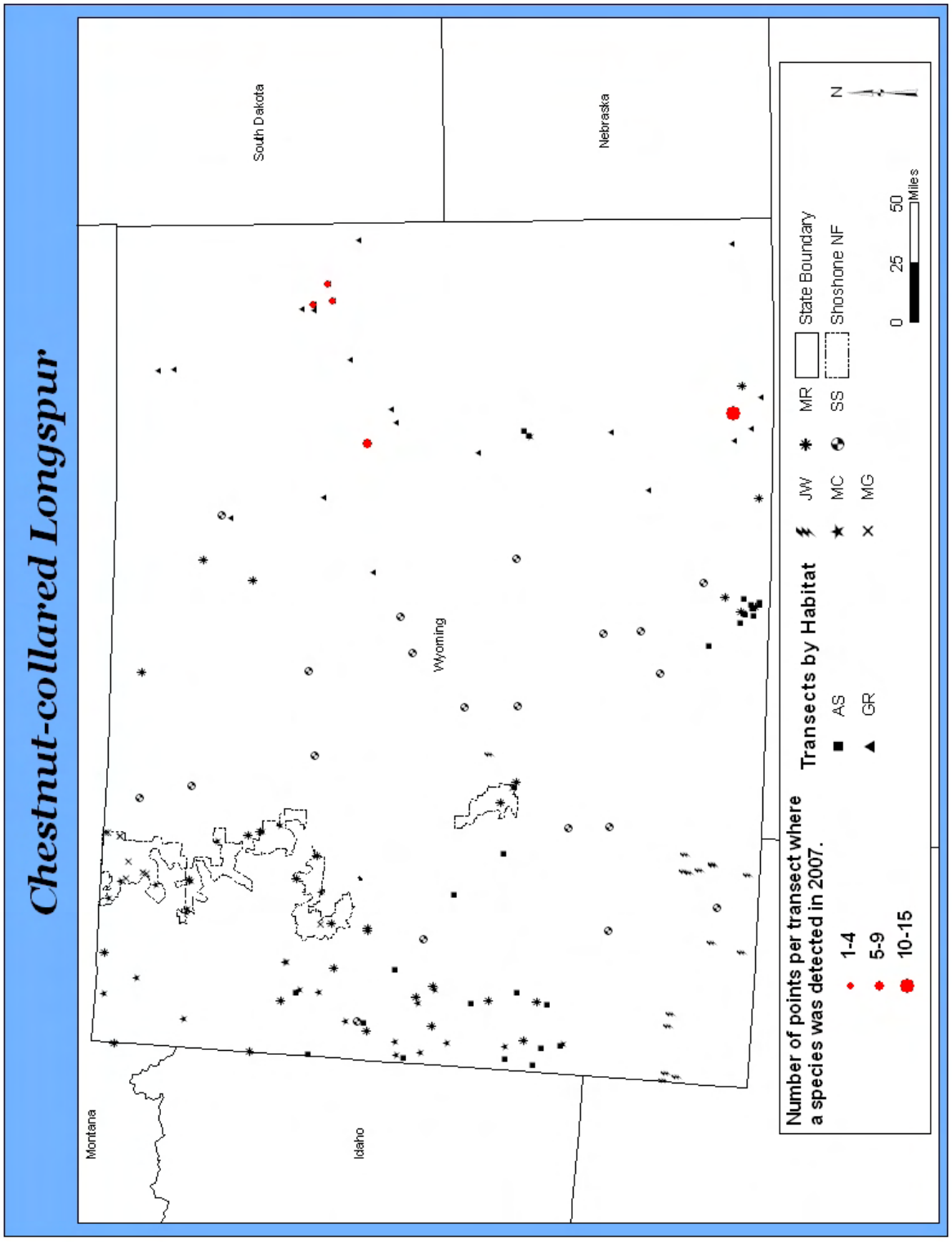


Estimated density (birds/km2) of Chestnut-collared Longspur, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Chestnut-collared Longspur on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
WY-GR	2.1	0.7	6.5	74	15	17

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

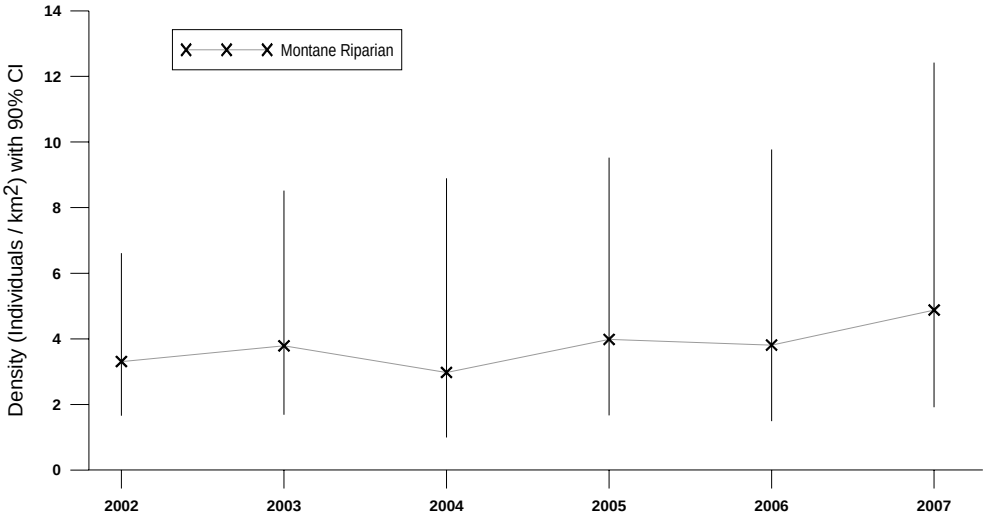


RMBO point-transect locations and detections of Chestnut-collared Longspur on transects in Wyoming, 2007.

Lazuli Bunting
(Passerina amoena)

WY-PIF Level III Priority Species

Lazuli Bunting is widespread in Wyoming and is found in areas that are dominated by deciduous shrubs. In 2007, we detected 46 Lazuli Buntings in three habitats. On one transect, MR78, we have detected the species for five consecutive years. We were able to calculate a density estimate for the species in montane riparian habitat. Lazuli Bunting should be effectively monitored in montane riparian habitat.



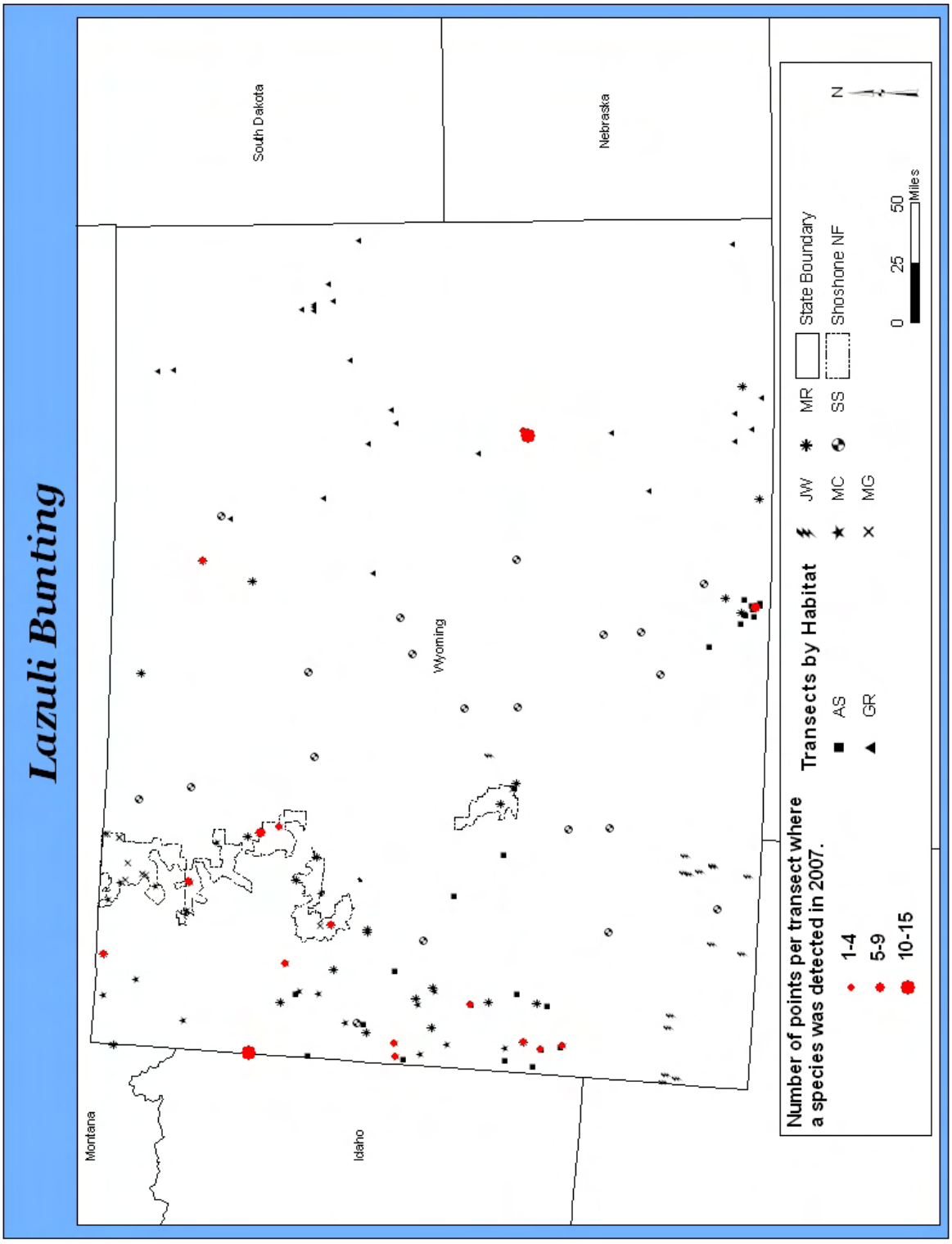
Estimated density (birds/km2) of Lazuli Bunting, with 90% confidence intervals, on MWB transects 2002-2007.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Lazuli Bunting on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MC	ID	--	--	--	--	9
SH-MR*	ID	--	--	--	--	3
WY-AS	ID	--	--	--	--	8
WY-MC	ID	--	--	--	--	16
WY-MR	4.9	1.9	12.4	59	20	21

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*Two of the three transects are part of the 25 WY-MR transects.



RMBO point-transect locations and detections of Lazuli Bunting on transects in Wyoming, 2007.

Bullock's Oriole
(Icterus bullockii)

WY-PIF Level III Priority Species

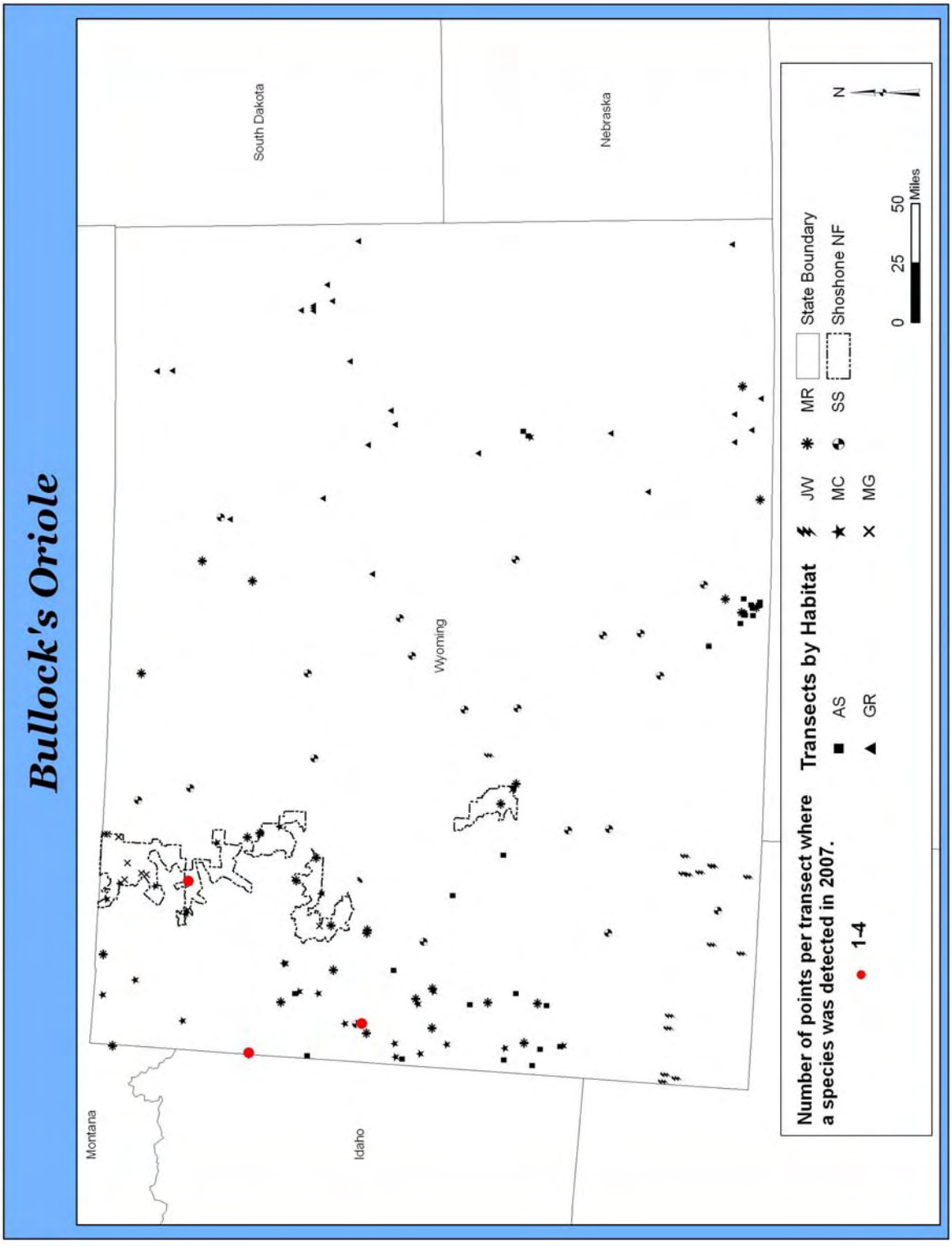
Bullock's Oriole can be found throughout Wyoming in riparian woodland, along forest edges, and around human habitation. In 2007, we detected four Bullock's Orioles in two habitats. We detected two individuals on AS90, where we detected this species in 2004 and 2005. Overall, we detect Bullock's Oriole too infrequently on point transects to effectively monitor this species under the current sampling design. Given the species low population density, effective monitoring will likely require a more intensive and focused effort.

Total number of independent detections used to estimate density, number of individuals, and habitat-specific density estimates for Bullock's Oriole on the MWB monitoring project, 2007.

Habitat	D	LCL	UCL	%CV	n	N
SH-MR*	ID	--	--	--	--	1
WY-AS	ID	--	--	--	--	2
WY-MR	ID	--	--	--	--	2

D = estimated density (birds/km^2); LCL and UCL = lower and upper 90% confidence limits on D; %CV = percent coefficient of variation of D; n = number of independent detections used to estimate D; N = number of individuals; ID = insufficient data.

*This transect is part of the 25 WY-MR transects



RMBO point-transect locations and detections of Bullock's Oriole on transects in Wyoming, 2007.

APPENDIX B. BIRDS DETECTED ON WYOMING STATEWIDE TRANSECTS

List of all bird species observed during point-count transects in Wyoming from 2002-2007, with management designation and species totals.

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007						Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	AS	GR	JW	MC	MR	SS	2002	2003	2004	2005	2006	2007
Canada Goose					5	52	9	1	10	39	10	1	25	73	115	116
Trumpeter Swan	R2SS		SGCN	WY-I					6		0	0	0	0	0	6
Gadwall						2					1	1	5	6	4	2
American Wigeon						2			1		0	0	13	1	11	3
Mallard						3	2		12		12	2	29	34	29	17
Blue-winged Teal											0	1	6	2	4	0
Cinnamon Teal											1	2	7	2	4	0
Northern Shoveler							1				0	0	0	2	2	1
Northern Pintail			SGCN								2	0	6	4	3	0
Green-winged Teal									2	2	0	0	8	3	13	4
Canvasback			SGCN								0	0	0	3	4	0
Redhead			SGCN								0	0	0	5	0	0
Ring-necked Duck											1	0	8	8	0	0
Lesser Scaup			SGCN						1		1	0	14	13	8	1
Bufflehead									9		0	0	2	2	2	9
Barrow's Goldeneye			SGCN						4		0	1	9	2	2	4
Common Merganser					2				18		3	8	18	32	28	20
Chukar										6	2	1	7	2	15	6
Ring-necked Pheasant											1	2	3	7	7	0
Ruffed Grouse					2			4			35	7	5	3	10	6
Greater Sage-Grouse	R2SS		SGCN	WY-I	10	15				28	3	0	3	24	77	53
Dusky Grouse				WY-III	21			11		2	15	23	31	7	13	34
Sharp-tailed Grouse	R2SS		SGCN	WY-I	3						0	0	0	6	0	3

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007						Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	AS	GR	JW	MC	MR	SS	2002	2003	2004	2005	2006	2007
Wild Turkey						1					0	7	1	0	0	1
Common Loon			SGCN	WY-II		1					0	0	0	0	1	1
Pied-billed Grebe											0	0	0	1	3	0
Western Grebe			SGCN								0	0	0	1	3	0
Clark's Grebe			SGCN	WY-III							0	0	0	2	0	0
American White Pelican			SGCN	WY-II					3	5	0	0	2	2	16	8
Double-crested Cormorant											0	0	0	0	6	0
Great Blue Heron			SGCN			1			2		5	3	10	9	11	3
Great Egret						4					0	0	0	0	0	4
Black-crowned Night-Heron			SGCN			2				1	0	0	0	0	0	3
Turkey Vulture					3	3		3	1	1	7	16	19	14	17	11
Osprey					1				2		1	1	1	5	2	3
Bald Eagle			SGCN, T	WY-I	1						0	1	1	4	1	1
Northern Harrier	R2SS	BCC		WY-III		4	2		3	2	3	6	11	9	30	11
Sharp-shinned Hawk								1			3	3	7	5	5	1
Cooper's Hawk											1	6	3	5	10	0
Northern Goshawk	R2SS		SGCN	WY-I	1			2	1		1	0	5	8	5	4
Swainson's Hawk		BCC	SGCN	WY-I	2	2				4	2	2	8	4	13	8
Red-tailed Hawk					10	8	15	12	16	3	28	33	51	57	79	64
Ferruginous Hawk	R2SS	BCC	SGCN	WY-I		6					2	5	9	8	11	6
Golden Eagle		BCC		WY-III		4		1		1	2	5	9	8	14	6
American Kestrel					4	8	10	3	2	6	11	10	32	40	38	33
Merlin			SGCN	WY-II							2	0	1	0	0	0
Peregrine Falcon	R2SS	BCC	SGCN	WY-I					1		0	0	0	0	1	1
Prairie Falcon		BCC		WY-III		4	1		1		2	6	2	3	15	6
Sora									1		0	2	3	0	7	1
Broad-winged Hawk											0	0	1	1	0	0
American Coot											0	0	3	2	0	0

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007						Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	AS	GR	JW	MC	MR	SS	2002	2003	2004	2005	2006	2007
Sandhill Crane			SGCN		6		3	10	18	8	11	6	20	34	45	45
Killdeer						28			13	12	32	42	46	50	64	53
Mountain Plover	R2SS	BCC	SGCN	WY-I		2					2	16	1	10	4	2
American Avocet				WY-III		2					0	0	3	6	6	2
Spotted Sandpiper					2			6	73	2	55	69	56	41	75	83
Willet				WY-III		6	1				0	0	2	8	11	7
Upland Sandpiper		BCC	SGCN	WY-I							0	2	10	7	6	0
Long-billed Curlew		BCC	SGCN	WY-I		2				2	0	0	1	1	4	4
Wilson's Snipe					11	1		4	18	1	13	20	42	56	49	35
Wilson's Phalarope		BCC		WY-I							0	0	32	69	15	0
Franklin's Gull			SGCN	WY-I							0	0	0	1	2	0
Ring-billed Gull											0	0	1	0	1	0
California Gull						14	2		1	15	0	0	5	1	86	32
Forster's Tern			SGCN	WY-I							0	0	0	0	2	0
Rock Pigeon						8					0	0	3	8	0	8
Mourning Dove					68	31	115	18	43	36	132	153	385	282	498	311
Great Horned Owl					2		3		1		0	2	1	3	3	6
Northern Pygmy-Owl			SGCN								0	1	0	1	1	0
Burrowing Owl	R2SS	BCC	SGCN	WY-I							0	0	3	0	1	0
Great Gray Owl			SGCN	WY-II				1			0	0	0	1	1	1
Long-eared Owl											0	0	0	0	1	0
Short-eared Owl	R2SS	BCC	SGCN	WY-I							0	0	9	0	2	0
Common Nighthawk						1	27	1	5	1	7	10	8	14	20	35
Common Poorwill				WY-III	1		1				0	1	0	1	1	2
White-throated Swift				WY-II							7	2	14	17	16	0
Black-chinned Hummingbird				WY-II					2		0	0	1	1	1	2
Calliope Hummingbird				WY-II	1			1	11		1	1	2	15	14	13
Broad-tailed Hummingbird				WY-II	23		1	9	65	1	53	99	129	166	104	99

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007						Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	AS	GR	JW	MC	MR	SS	2002	2003	2004	2005	2006	2007
Rufous Hummingbird				WY-II							0	3	1	16	1	0
Belted Kingfisher								1	2		5	1	6	9	10	3
Lewis's Woodpecker	R2SS	BCC	SGCN	WY-II							0	0	0	1	0	0
Red-headed Woodpecker		BCC		WY-III							0	0	0	0	2	0
Williamson's Sapsucker		BCC		WY-II	4			4	2		10	14	10	6	7	10
Red-naped Sapsucker		BCC		WY-II	44			29	36		34	76	152	125	148	109
Downy Woodpecker					17			6	7		9	30	38	30	39	30
Hairy Woodpecker					65			76	15	2	27	39	65	55	69	158
American Three-toed Woodpecker	R2SS		SGCN	WY-II	3						2	6	13	18	12	3
Black-backed Woodpecker	R2SS		SGCN	WY-II				1			1	0	0	0	0	1
Northern Flicker					127	5	14	81	71	6	84	137	178	249	380	306
Olive-sided Flycatcher	R2SS			WY-II	1			9	12		17	20	56	53	46	22
Western Wood-Pewee					91			15	37		71	45	97	160	172	143
Willow Flycatcher			SGCN	WY-II	3				28		13	15	25	29	34	31
Least Flycatcher											2	0	0	0	10	0
Hammond's Flycatcher				WY-II	10			23	17		11	50	74	92	74	50
Gray Flycatcher				WY-II			7				175	145	154	164	311	7
Dusky Flycatcher				WY-II	145		15	59	84	4	157	147	347	297	268	307
Cordilleran Flycatcher				WY-II	11			7	8		7	24	34	51	38	26
Say's Phoebe				WY-III						3	10	26	21	25	23	3
Ash-throated Flycatcher			SGCN	WY-II							10	8	7	16	14	0
Cassin's Kingbird				WY-II							0	0	2	0	0	0
Western Kingbird						2					12	6	19	5	7	2
Eastern Kingbird						4					2	2	29	10	6	4
Loggerhead Shrike	R2SS	BCC		WY-II		1				1	5	6	28	19	19	2
Gray Vireo		BCC									0	0	0	6	0	0
Plumbeous Vireo				WY-II	2			1			42	8	15	38	24	3
Warbling Vireo					411			117	103	1	208	292	566	644	499	632

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007						Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	AS	GR	JW	MC	MR	SS	2002	2003	2004	2005	2006	2007
Red-eyed Vireo											0	0	1	0	0	0
Gray Jay					3			28	1		15	20	26	31	24	32
Steller's Jay					3			23	5		44	26	18	15	53	31
Blue Jay								1	1		0	0	0	0	0	2
Western Scrub-Jay			SGCN	WY-II							9	5	5	10	2	0
Pinyon Jay							19				34	59	120	97	90	19
Clark's Nutcracker				WY-III	46			84	47		49	90	153	188	177	177
Black-billed Magpie					3	2	76		14	12	38	48	57	85	103	107
American Crow					9	3	16	7	16	14	3	14	29	79	67	65
Common Raven					43	20	13	31	25	37	86	84	150	134	203	169
Horned Lark					1	584	63		1	416	627	1074	1924	1943	2173	1065
Purple Martin	R2SS				1						2	0	0	6	2	1
Tree Swallow					40			15	35	33	57	93	62	67	98	123
Violet-green Swallow					16	1	46	9	23	5	54	70	146	145	195	100
Northern Rough-winged Swallow				WY-III		5			5	3	4	6	3	8	40	13
Bank Swallow						1				1	2	3	5	3	7	2
Cliff Swallow						26	18	10	12	68	16	13	97	57	93	134
Barn Swallow						4			2	19	4	3	32	16	12	25
Black-capped Chickadee					35		1	3	6		84	23	20	26	35	45
Mountain Chickadee					97		13	207	43	1	303	321	312	383	339	361
Juniper Titmouse			SGCN	WY-II							11	25	10	7	57	0
Bushtit			SGCN	WY-II							0	5	18	18	10	0
Red-breasted Nuthatch					38			74	5	2	146	166	210	174	87	119
White-breasted Nuthatch					13			9			0	7	9	64	9	22
Pygmy Nuthatch			SGCN	WY-II	2			1			9	0	0	2	6	3
Brown Creeper				WY-II	3			1	1		3	19	39	21	11	5
Rock Wren				WY-III	10	13	3	14	21	19	92	141	213	255	387	80
Canyon Wren				WY-III							0	1	0	3	2	0

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007						Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	AS	GR	JW	MC	MR	SS	2002	2003	2004	2005	2006	2007
Bewick's Wren		BCC		WY-III	16		66	1			44	31	160	253	321	83
House Wren					174			20	24	1	135	226	299	483	325	219
Winter Wren											0	0	0	1	0	0
American Dipper				WY-II				1	5		12	19	10	7	11	6
Golden-crowned Kinglet				WY-II	8			20	4		14	24	28	21	16	32
Ruby-crowned Kinglet					86			163	71		377	456	536	549	368	320
Blue-gray Gnatcatcher							108				46	42	82	123	137	108
Western Bluebird				WY-II							2	0	0	0	0	0
Mountain Bluebird					22		116	20	10	3	94	186	293	322	398	171
Townsend's Solitaire				WY-II	10			29	13		37	15	52	41	47	52
Veery				WY-III	5			1	2		9	15	9	2	14	8
Swainson's Thrush					35			30	42		37	77	111	96	100	107
Hermit Thrush					59			83	13		62	111	203	183	153	155
American Robin					345		18	328	340	14	457	645	840	899	1211	1045
Gray Catbird					3			2	24		3	3	8	33	27	29
Northern Mockingbird											1	0	2	0	4	0
Sage Thrasher			SGCN	WY-II	2	8	15		7	176	79	232	258	326	490	208
Brown Thrasher											4	0	0	0	2	0
European Starling						8			1		2	1	62	42	22	9
American Pipit											0	0	1	2	2	0
Cedar Waxwing					6			7	36		14	3	38	38	38	49
Orange-crowned Warbler					70			20	8		27	33	50	79	77	98
Virginia's Warbler		BCC		WY-III							0	0	2	4	6	0
Yellow Warbler					78	5		25	297		175	146	252	346	400	405
Yellow-rumped Warbler					167			148	101	5	480	335	489	484	540	421
Black-throated Gray Warbler				WY-III			17				56	47	78	109	113	17
American Redstart									1		0	0	0	2	0	1
Ovenbird				WY-III					2		0	0	0	2	1	2

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007						Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	AS	GR	JW	MC	MR	SS	2002	2003	2004	2005	2006	2007
Northern Waterthrush									1		5	2	0	3	0	1
MacGillivray's Warbler				WY-II	39			22	73		62	112	140	202	200	134
Common Yellowthroat					5				20		1	2	11	14	17	25
Wilson's Warbler				WY-II	1			3	50		86	69	78	107	75	54
Yellow-breasted Chat									2		1	0	0	2	10	2
Western Tanager					82		2	134	32	1	78	135	174	151	224	251
Green-tailed Towhee					173		60	52	107	25	216	290	352	410	469	417
Spotted Towhee								2	4	7	6	21	23	23	62	13
Cassin's Sparrow	R2SS	BCC									0	0	0	0	1	0
Chipping Sparrow					110		179	166	49	8	306	463	811	966	530	512
Brewer's Sparrow	R2SS	BCC	SGCN	WY-I	61	132	118	31	115	510	478	770	1262	1179	1527	967
Field Sparrow											0	0	2	0	0	0
Vesper Sparrow				WY-II	27	75	73		13	79	329	339	601	666	724	267
Lark Sparrow				WY-II	4	34	62	6	8	22	82	77	72	83	58	136
Black-throated Sparrow											0	0	0	0	1	0
Sage Sparrow	R2SS		SGCN	WY-I		1	14		1	111	86	107	110	128	232	127
Lark Bunting			SGCN	WY-II		605				164	477	603	1592	743	1312	769
Savannah Sparrow						2			49	6	35	64	49	93	93	57
Grasshopper Sparrow	R2SS	BCC	SGCN	WY-II	1	54	2				20	42	35	37	87	57
Baird's Sparrow		BCC		WY-I							0	0	0	1	0	0
Fox Sparrow					1				9		8	11	16	21	24	10
Song Sparrow					15	2		18	210	4	224	124	140	192	291	249
Lincoln's Sparrow					81			32	209		129	167	243	254	309	322
White-crowned Sparrow					45			49	209		170	213	217	177	247	303
Dark-eyed Junco					244		1	433	129	2	390	394	624	578	771	809
McCown's Longspur	R2SS	BCC	SGCN	WY-I		115				10	71	81	138	236	270	125
Chestnut-collared Longspur	R2SS	BCC	SGCN	WY-II		17					74	132	48	97	112	17
Black-headed Grosbeak					12			12	17		30	18	33	34	64	41

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007						Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	AS	GR	JW	MC	MR	SS	2002	2003	2004	2005	2006	2007
Blue Grosbeak								2			0	1	8	1	2	2
Lazuli Bunting				WY-III	8			16	21		27	23	33	59	45	45
Red-winged Blackbird					10	23			11	11	41	45	62	149	119	55
Western Meadowlark					17	669	21		10	283	402	769	1507	1832	1982	1000
Yellow-headed Blackbird											4	5	8	3	2	0
Brewer's Blackbird					12	30	12	4	53	6	59	54	173	160	254	117
Common Grackle					5				4	1	13	14	22	10	9	10
Brown-headed Cowbird					25	2	4	9	42	11	88	93	174	230	200	93
Orchard Oriole											0	0	1	0	1	0
Bullock's Oriole				WY-III	2				2		0	5	13	15	10	4
Baltimore Oriole											0	0	0	0	2	0
Scott's Oriole			SGCN	WY-II							0	5	3	5	1	0
Pine Grosbeak									1		8	9	14	6	14	1
Cassin's Finch					9			31			52	57	89	192	73	40
House Finch					3		4				27	24	40	26	131	7
Red Crossbill					49			24	10		10	25	88	291	101	83
White-winged Crossbill								1			5	1	0	50	10	1
Pine Siskin					106			313	186	9	197	146	615	894	342	614
Lesser Goldfinch									2		0	0	0	0	0	2
American Goldfinch					8			2	28		7	14	45	77	84	38
Evening Grosbeak					2			1	2		4	1	1	15	17	5
House Sparrow							7				0	0	0	7	4	7
Red Squirrel					62			111	49		22	47	86	200	103	222

[1] Common Names are from the A.O.U. Check-list of North American Birds, Seventh Edition (2003).
[2] Special management designations: USFS=United States Forest Service, R2SS=USFS Region 2 Sensitive Species; USFWS=U.S. Fish and Wildlife Service, BCC=USFWS Bird of Conservation Concern for Region 6 (Mountain-Prairie Region); WGFD=Wyoming Game and Fish Department, T=Threatened Species, E=Endangered Species, SGCN=Species of Greatest Conservation Need (Wyoming Comprehensive Wildlife Conservation Strategy 2005); WY-PIF=Wyoming Partners in Flight, WY-I=Wyoming Partners In Flight Level I Priority (Conservation Action), WY-II=Wyoming Partners In Flight Level II Priority (Monitoring); WY-III=Wyoming Partners in Flight Level III Priority (Local Interest).
[3] Habitats: AS=aspen; GR=grassland; JW=juniper woodland; MC=mid-elevation conifer; MR=montane riparian; SS=shrubsteppe
[4] The number and types of habitats surveyed each year may vary.

APPENDIX C. BIRDS DETECTED ON SHOSHONE NATIONAL FOREST TRANSECTS

List of all bird species observed during point-count transects in Shoshone National Forest, 2002-2007, with management designation and species totals.

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007			Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	MC	MG	MR	2002	2003	2004	2005	2006	2007
Canada Goose								6	0	0	0	0	0
Mallard							7	4	0	0	0	0	7
Green-winged Teal							1	2	0	0	0	0	1
Common Merganser								4	0	0	0	0	0
Chukar						1		0	0	4	2	6	1
Ruffed Grouse								10	5	0	1	2	0
Greater Sage-Grouse	R2SS		SGCN	WY-I				3	0	0	2	0	0
Dusky Grouse				WY-III	3			4	2	1	1	3	3
Clark's Grebe			SGCN	WY-III				0	0	0	0	1	0
American White Pelican			SGCN	WY-II				0	0	0	1	0	0
Great Blue Heron			SGCN				1	0	0	0	0	5	1
Turkey Vulture					1			0	0	0	0	0	1
Osprey	R2SS			WY-II		1		0	0	1	2	1	1
Northern Harrier	R2SS	BCC					2	0	0	0	0	1	2
Sharp-shinned Hawk					1			1	1	0	1	2	1
Cooper's Hawk								0	0	2	2	3	0
Northern Goshawk	R2SS		SGCN	WY-I	1			0	0	3	2	0	1
Red-tailed Hawk					7	2	2	4	10	7	10	15	11
Ferruginous Hawk	R2SS	BCC	SGCN	WY-I		1		0	0	0	0	0	1
Golden Eagle		BCC		WY-III	1	1		2	2	3	1	1	2
American Kestrel					3	2		1	0	3	7	10	5
Merlin			SGCN	WY-II				0	0	0	0	1	0

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007			Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	MC	MG	MR	2002	2003	2004	2005	2006	2007
Prairie Falcon		BCC		WY-III				0	0	1	1	1	0
Sora							1	0	0	1	1	1	1
Sandhill Crane			SGCN		2	1	1	0	0	1	5	3	4
Killdeer								2	0	1	0	4	0
Spotted Sandpiper					2	1	18	40	50	15	14	20	21
Long-billed Curlew		BCC	SGCN	WY-I				0	1	0	0	0	0
Wilson's Snipe							1	1	0	1	1	5	1
Mourning Dove					4	6	7	5	6	13	4	15	17
Great Horned Owl								0	0	2	1	2	0
Northern Pygmy-Owl			SGCN					0	0	0	1	1	0
Common Nighthawk					1	3		0	0	1	4	1	4
White-throated Swift				WY-II				0	0	31	4	6	0
Calliope Hummingbird				WY-II				0	0	0	4	0	0
Broad-tailed Hummingbird				WY-II			1	0	3	5	1	1	1
Rufous Hummingbird				WY-II				0	2	1	1	0	0
Belted Kingfisher					1	1		2	1	2	1	0	2
Williamson's Sapsucker		BCC		WY-II	2			2	3	2	0	1	2
Red-naped Sapsucker		BCC		WY-II	1	7	2	2	13	15	8	15	10
Downy Woodpecker								1	3	0	0	1	0
Hairy Woodpecker					25	1	3	4	7	9	16	10	29
American Three-toed Woodpecker	R2SS		SGCN	WY-II				0	3	2	5	2	0
Black-backed Woodpecker	R2SS		SGCN	WY-II	1			0	0	0	0	0	1
Northern Flicker					32	28	15	11	22	42	50	58	75
Olive-sided Flycatcher	R2SS			WY-II	6	1	2	2	6	6	9	10	9
Western Wood-Pewee					4	2	14	1	5	7	15	7	20
Willow Flycatcher			SGCN	WY-II				0	0	0	0	2	0
Least Flycatcher							2	2	0	0	0	0	2
Hammond's Flycatcher				WY-II	13	3	13	3	39	6	14	13	29

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007			Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	MC	MG	MR	2002	2003	2004	2005	2006	2007
Gray Flycatcher				WY-II				1	2	0	1	0	0
Dusky Flycatcher				WY-II	27	25	15	12	44	63	86	68	67
Cordilleran Flycatcher				WY-II	1		1	8	10	2	3	1	2
Say's Phoebe				WY-III				0	0	0	0	1	0
Eastern Kingbird							1	0	0	0	0	0	1
Warbling Vireo					31	31	57	25	54	95	133	69	119
Gray Jay					9		1	4	3	7	6	3	10
Steller's Jay					5			2	3	2	1	2	5
Clark's Nutcracker				WY-III	45	17	11	34	19	57	42	53	73
Black-billed Magpie						18	2	13	6	11	11	21	20
American Crow					1	2	1	1	8	0	2	5	4
Common Raven					3	18	10	15	8	21	20	45	31
Horned Lark						24		17	2	8	7	12	24
Tree Swallow							1	1	0	1	3	8	1
Violet-green Swallow					1	3	13	3	5	29	40	30	17
Northern Rough-winged Swallow				WY-III				0	0	0	0	4	0
Cliff Swallow					10			12	0	0	0	4	10
Barn Swallow						1		0	0	0	0	0	1
Black-capped Chickadee								6	8	1	1	0	0
Mountain Chickadee					72	9	30	87	60	61	81	47	111
Red-breasted Nuthatch					31	3	2	27	29	55	58	25	36
White-breasted Nuthatch					3	1		0	1	0	7	2	4
Pygmy Nuthatch			SGCN	WY-II	1	1		0	0	0	0	0	2
Brown Creeper				WY-II				2	3	2	1	2	0
Rock Wren				WY-III	14	33	2	48	40	101	62	104	49
House Wren					5	3	13	4	26	5	29	5	21
American Dipper				WY-II				10	12	2	0	0	0
Golden-crowned Kinglet				WY-II			2	0	7	1	0	1	2

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007			Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	MC	MG	MR	2002	2003	2004	2005	2006	2007
Ruby-crowned Kinglet					64	18	21	112	70	114	100	85	103
Western Bluebird				WY-II				1	0	0	0	0	0
Mountain Bluebird					14	27	2	10	17	40	90	28	43
Townsend's Solitaire				WY-II	14	1	1	7	8	23	9	19	16
Veery				WY-III			1	2	0	2	0	1	1
Swainson's Thrush					3		3	3	19	6	3	4	6
Hermit Thrush					33	7	10	5	13	57	51	24	50
American Robin					97	57	100	88	84	122	150	144	254
Gray Catbird								0	2	0	0	0	0
Sage Thrasher			SGCN	WY-II		9		0	9	5	1	14	9
American Pipit								1	0	0	37	0	0
Cedar Waxwing					1		11	0	0	0	0	0	12
Orange-crowned Warbler							1	0	4	2	2	1	1
Virginia's Warbler		BCC		WY-III				0	0	0	0	1	0
Yellow Warbler					1		44	18	33	16	24	33	45
Yellow-rumped Warbler					35	5	64	105	130	90	87	65	104
MacGillivray's Warbler				WY-II	6	1	20	1	7	9	17	9	27
Common Yellowthroat							3	0	0	0	0	3	3
Wilson's Warbler				WY-II			22	33	1	1	1	7	22
Western Tanager					19	7	10	1	14	29	16	26	36
Green-tailed Towhee					6	26	8	29	38	43	53	40	40
Spotted Towhee					1			0	0	0	1	1	1
Chipping Sparrow					48	15	17	35	49	53	69	80	80
Brewer's Sparrow	R2SS	BCC	SGCN	WY-I	8	82	46	56	49	79	19	98	136
Vesper Sparrow				WY-II		102		94	91	137	64	88	102
Lark Sparrow				WY-II	1	2	1	24	9	13	13	6	4
Sage Sparrow	R2SS		SGCN	WY-I			1	0	0	0	0	0	1
Savannah Sparrow						3		7	10	19	6	7	3

Species[1]	Species Management Designation[2]				Total #individuals observed per habitat[3], 2007			Total #individuals observed per year (in all habitats surveyed[4])					
	USFS	USFWS	WGFD	WY-PIF	MC	MG	MR	2002	2003	2004	2005	2006	2007
Grasshopper Sparrow	R2SS	BCC	SGCN	WY-II				0	0	0	0	3	0
Song Sparrow					4		15	93	24	19	15	29	19
Lincoln's Sparrow					7	6	74	0	56	19	13	20	87
White-crowned Sparrow					8	8	70	60	27	16	9	26	86
Dark-eyed Junco					125	29	49	39	82	132	136	113	227
Black-headed Grosbeak							2	1	0	0	5	0	2
Blue Grosbeak					2			0	1	0	0	0	2
Lazuli Bunting				WY-III	9		3	1	2	2	15	14	12
Red-winged Blackbird						1	2	1	4	5	4	3	3
Western Meadowlark						89	1	90	134	134	87	121	90
Brewer's Blackbird						10	3	1	4	23	18	17	13
Common Grackle							8	26	0	0	1	0	8
Brown-headed Cowbird						1	1	5	5	4	7	0	2
Bullock's Oriole				WY-III			1	0	0	0	0	0	1
Pine Grosbeak								0	0	0	1	2	0
Cassin's Finch					11		3	15	7	14	9	2	14
Red Crossbill					7	1	2	0	0	19	0	8	10
Pine Siskin					109	31	51	11	38	165	128	53	191
American Goldfinch						1	4	0	1	0	1	0	5
Evening Grosbeak								0	1	0	0	0	0
Abert's Squirrel			SGCN			1		0	0	0	0	0	1
Red Squirrel					37	15	26	18	33	0	50	22	78

[1] Common Names are from the A.O.U. Check-list of North American Birds, Seventh Edition (2003).
[2] Special management designations: USFS=United States Forest Service, R2SS=USFS Region 2 Sensitive Species; USFWS=U.S. Fish and Wildlife Service, BCC=USFWS Bird of Conservation Concern for Region 6 (Mountain-Prairie Region); WGFD=Wyoming Game and Fish Department, T=Threatened Species, E=Endangered Species, SGCN=Species of Greatest Conservation Need (Wyoming Comprehensive Wildlife Conservation Strategy 2005); WY-PIF=Wyoming Partners in Flight, WY-I=Wyoming Partners In Flight Level I Priority (Conservation Action), WY-II=Wyoming Partners In Flight Level II Priority (Monitoring); WY-III=Wyoming Partners in Flight Level III Priority (Local Interest).
[3] Habitats: MC=mid-elevation conifer; MG=montane grassland; MR=montane riparian
[4] The number and types of habitats surveyed each year may vary.