

Bird and Mammal Inventory of the Rio Blanco Lake State Wildlife Area Rio Blanco County, Colorado

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COVER PHOTOS

Top: Landscape view of the Rio Blanco Lake State Wildlife Area – Roselund Unit

Bottom (left to right): Mountain Bluebird (*Sialia currucoides*) male (left) and juvenile (right);
Elk (*Cervus canadensis*); Sandhill Crane (*Grus canadensis*)

Mountain Bluebird and Sandhill Crane photos courtesy of Erin Jones

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**Bird and Mammal Inventory of the
Rio Blanco Lake State Wildlife Area
Rio Blanco County, Colorado**

Brian E. Holmes



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EXECUTIVE SUMMARY

This report summarizes the results of a comprehensive inventory of birds and mammals on the Rio Blanco Lake State Wildlife Area (RBL-SWA) located in Rio Blanco County, Colorado. Colorado Parks and Wildlife (CPW) manages approximately 190 State Wildlife Areas totaling >170,000 hectares (420,000 acres) of land and water located throughout the state. These SWAs have been acquired over time to provide or enhance hunting and fishing opportunities for the public or to secure important habitat for key wildlife species (primarily big game and gamebirds) consistent with the agency's traditional funding and management mandates. While the presence, distribution, and abundance of big game species, gamebirds, and rarely a select few species of concern is often fairly well understood on these properties, little or no information generally exists for other small game, nongame, or special status species. I initiated this study to better understand the bird and mammal species that occur on the RBL-SWA and help inform future management. For the remainder of this report the pronoun "we" is used to describe survey effort and findings as this was a highly integrated effort by B. Holmes, L. Reese, A. Spiker, and H. D. Chapman.

We used a variety of field methods to inventory birds and mammals on the RBL-SWA between January 2017 and December 2021. In addition, while we did not specifically conduct surveys for amphibians and reptiles, we did take advantage of significant time spent on the property to accumulate a list of amphibians and reptiles encountered opportunistically during fieldwork for other taxa. We confirmed the presence of 241 vertebrate species (195 birds, 38 mammals, 6 reptiles, and 2 amphibians) on the RBL-SWA. Of these 241 species known to occur on the property, 28 are listed as Species of Greatest Conservation Need in Colorado's 2015 State Wildlife Action Plan, and nine are listed as State Species of Concern by CPW. Two of the big game mammals that we documented as part of this study (mule deer, elk) were already known to occur on the RBL-SWA prior to this work and represent species of significant economic and recreational importance in northwest Colorado. Otherwise, the presence, distribution, and relative abundance of most other wildlife species that utilize the property was poorly understood. We documented a total of six nonnative species (five birds and one reptile) on the property. For its size (486 ha), the bird and mammal diversity documented on the RBL-SWA is very high. We documented 38% of all bird species and 30% of all mammal species currently known to occur in Colorado on the property. We believe the diversity of habitat types found on the property, and in particular the presence of diverse riparian and wetland communities, was the principal driver of this high level of vertebrate species richness.

We believe we detected most, but not all, of the bird and mammal species likely to occur on the RBL-SWA based on: 1) our review of previous work conducted in northwest Colorado, and 2) the development of species accumulation curves to inform inventory completeness. This study provides a baseline of species presence upon which future species-specific monitoring programs could be developed or future inventory work could be compared to assess long-term trend in wildlife populations.

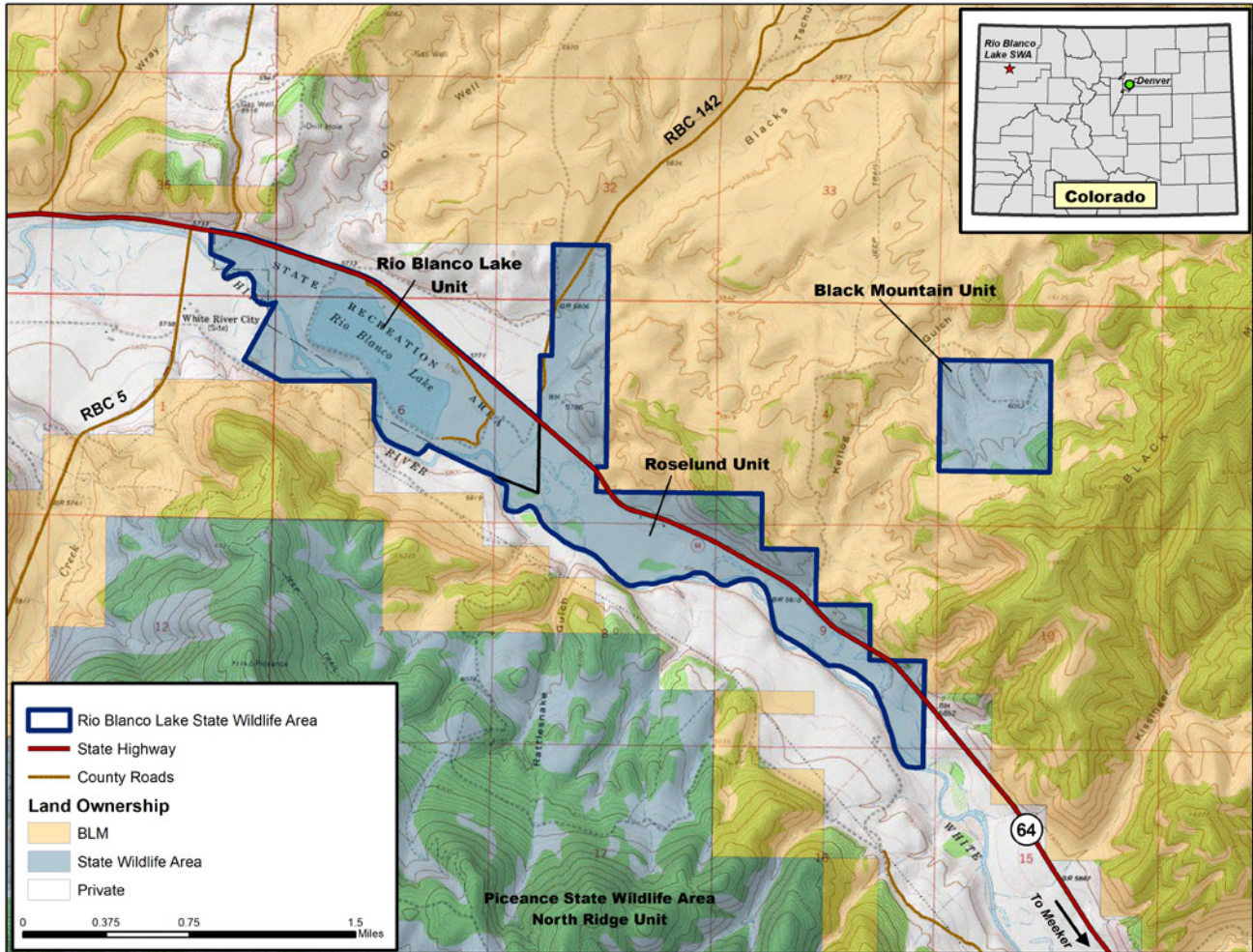


Figure 1. Geographic location of the Rio Blanco Lake State Wildlife Area in central Rio Blanco County, Colorado.

CHAPTER 1. INTRODUCTION

Colorado Parks and Wildlife (CPW) holds title to approximately 190 State Wildlife Areas (SWAs) throughout Colorado totaling >170,000 hectares (420,000 acres) that are managed for the benefit of wildlife and wildlife-related recreation. Most SWAs in Colorado have been acquired to: 1) provide or enhance hunting and/or fishing opportunities for the public, or 2) secure important habitat for key wildlife species – primarily big game. While serving these dual purposes, SWAs also provide habitat for numerous other wildlife species representing the diverse native fauna of Colorado including small game, nongame, and special status species.

Effective conservation and management of wildlife species requires knowledge of their distribution, abundance, and habitat associations. Because of traditional funding mechanisms, whereby state wildlife management agencies are primarily funded through the sale of hunting and fishing licenses, the vast majority of our knowledge about wildlife populations is related to game species and sportfish. However, in Colorado, management authority and conservation responsibility for all vertebrate wildlife and fish species is vested with CPW. The state's approach to nongame and endangered species conservation is codified in statute [CRS §33-2-102, et seq.] as “The general assembly finds and declares that it is the policy of this state to manage all nongame wildlife...for human enjoyment and welfare, for scientific purposes, and to ensure their perpetuation as members of ecosystems...” Colorado's State Wildlife Action Plan (SWAP) is the primary umbrella document that identifies and furthers the conservation of species of greatest conservation need (SGCN), most of which are not commonly hunted or fished (CPW 2015). For the 159 SGCN identified in the SWAP, lack of knowledge (about status, trend, abundance, or distribution) is identified as the #1 issue affecting the greatest number of species.

Biological inventories are a point-in-time assessment of species that inhabit an area of interest. Often, assessing species presence is only a precursor to subsequent management planning and/or longer-term monitoring programs (Bogan et al. 1988, Wilson et al. 1996). Knowledge of a species' relative abundance and habitat associations within an area of interest is also important in prioritizing future management emphasis. Aside from most big game species, certain small game species (primarily game birds), and a select few species of concern, quantitative data on the diversity and abundance of wildlife that inhabit most SWAs in Colorado is lacking. Prior to this study, mammal-spe-

cific inventories have been published for three SWAs in the southeastern region of the state (Mellott et al. 1987, Jones 2002) and a comprehensive inventory of vertebrate taxa was completed on the Bitterbrush State Wildlife Area in Moffat County (Holmes and Kircher 2020). Other than those efforts, limited information is available on the biodiversity supported by Colorado's extensive network of SWAs.

The Rio Blanco Lake State Wildlife Area (RBL-SWA) was first acquired by CPW in 1965 and significantly expanded in 2014 and 2015 with additional property acquisitions. In order to better understand the diversity of wildlife that use the RBL-SWA and help inform future management decisions, we conducted an inventory of birds and mammals on the property between January 2017 and December 2021. In addition, while we did not specifically conduct surveys for amphibians and reptiles, we accumulated a list of herpetofauna encountered opportunistically during fieldwork for the other taxa. Our goals were to: 1) document as many species as possible on the RBL-SWA, and 2) report on spatial and seasonal distribution of species inhabiting the RBL-SWA.

CHAPTER 2. STUDY AREA

The RBL-SWA is located in central Rio Blanco County in northwest Colorado approximately 20 km west of the town of Meeker (population ~2,500). The property encompasses 486 ha (1,200 ac) across three separate units – Rio Blanco Lake, Roselund, and Black Mountain. The Rio Blanco Lake and Roselund Units are contiguous and managed as one entity while the Black Mountain Unit is located northeast of the main property and is surrounded by Bureau of Land Management (BLM) lands. The property includes Rio Blanco Lake, an off-channel reservoir with a surface area of approximately 49 ha (120 ac) as well as approximately 8.2 km (5.0 mi) of the White River, which forms the majority of the southern boundary of the SWA. Surrounding land ownership consists of intermixed private and BLM lands as well as the nearby North Ridge Unit of the Piceance State Wildlife Area, also managed by CPW (Figure 1). The BLM's Black Mountain Wilderness Study Area encompasses 4,124 ha (10,191 ac) and is adjacent to the Black Mountain Unit. The RBL-SWA is located in a rural area of northwest Colorado where the primary land uses include livestock (cattle and sheep) grazing, irrigated hay production in the river valleys, and oil and gas production. Recreational big game hunting is also an important economic activity as this area provides habitat used by some of the largest mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) herds in Colorado.

Climate

The climate of northwest Colorado is continental, characterized by relatively long, cold winters and warm, dry summers. Temperature extremes vary widely, with winter lows often reaching -31°C (-25°F) or colder and summer highs exceeding 32°C (90°F). In general, yearly average temperatures tend to decrease with increasing elevation, but cold air masses tend to settle at the lowest elevations during winter, bringing extreme cold to the river valleys of the region. Storm systems mostly originate from the west, southwest, and northwest, with precipitation generally increasing with elevation. The valley bottoms are semiarid, but gains in elevation lead to rapid increases in precipitation.

The RBL-SWA is located roughly midway between two long-term climate recording stations. The Meeker station, located ~20 km east of the property and ~150 m (~500 ft) higher in elevation, received an average of approximately 41 cm (16.2 in) of precipitation annually between 1980 and 2020. The Rangely 1E station, located ~40 km west of the property and ~150 m (~500 ft) lower in elevation, receives an average of approximately 27 cm (10.6 in) of precipitation annually. For both locations approximately half of the annual precipitation comes as winter snowfall. Monthly precipitation reported at the Meeker recording station during the course of this study is presented in Figure 2 (Colorado Climate Center 2022).

Physiography and Topography

The RBL-SWA is located in the Colorado Plateau ecoregion that covers much of western Colorado and which

is centered in the Four Corners area of the southwestern United States. This ecoregion is characterized by diverse topography and consists of rugged tablelands, canyons, mesas, plateaus, and mountains interspersed with sedimentary basins and valley bottoms (Chapman et al. 2006). The topography of the RBL-SWA is generally flat to rolling; elevations on the property range from 1,745 m (5,730 ft) along the western boundary of the property along the White River to 1,900 m (6,235 ft) in the southeastern corner of the Black Mountain Unit. The east-west oriented valley bottom along the White River is mostly flat, but higher elevation benches and low mountains rise up quickly to the north and south. Nearby geographic features include Black Mountain northeast of the SWA, rising to an elevation of 2,196 m (7,205 ft), and North Ridge immediately south of the SWA that reaches an elevation of 2,169 m (7,116 ft).

Land Cover and Vegetation Communities

The majority of the RBL-SWA falls within the valley bottom of the White River which strongly influences land cover and vegetation communities on the property. Riparian communities along the White River in this area are largely intact and highly diverse, both structurally and botanically. In addition, Rio Blanco Lake itself provides additional habitat diversity in the form of open water, shoreline, mudflat and emergent marsh habitats that are manmade yet attract a suite of species that otherwise would not be present in this area. There are also a suite of upland shrub and woodland communities on the SWA that, although relatively small in overall acreage, represent widespread native habitats characteristic of this region. The distribution of land cover classes

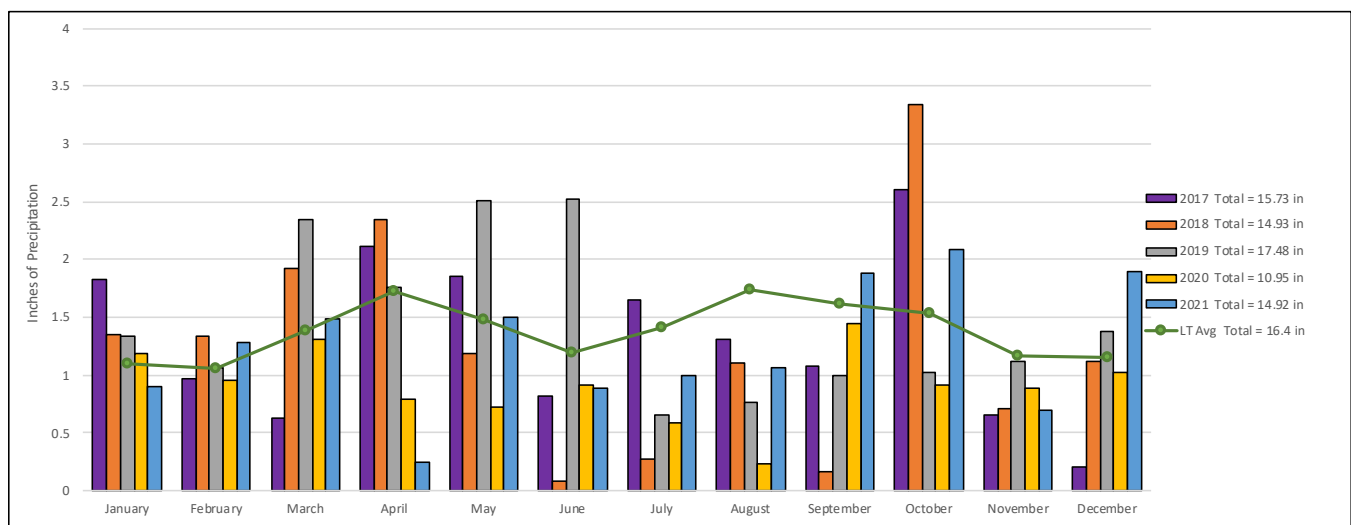


Figure 2. Precipitation for Meeker, CO: 30-year (1981-2010) average monthly precipitation (green line) and monthly records during the study period (2017-2021). Data from Colorado Climate Center (2022).

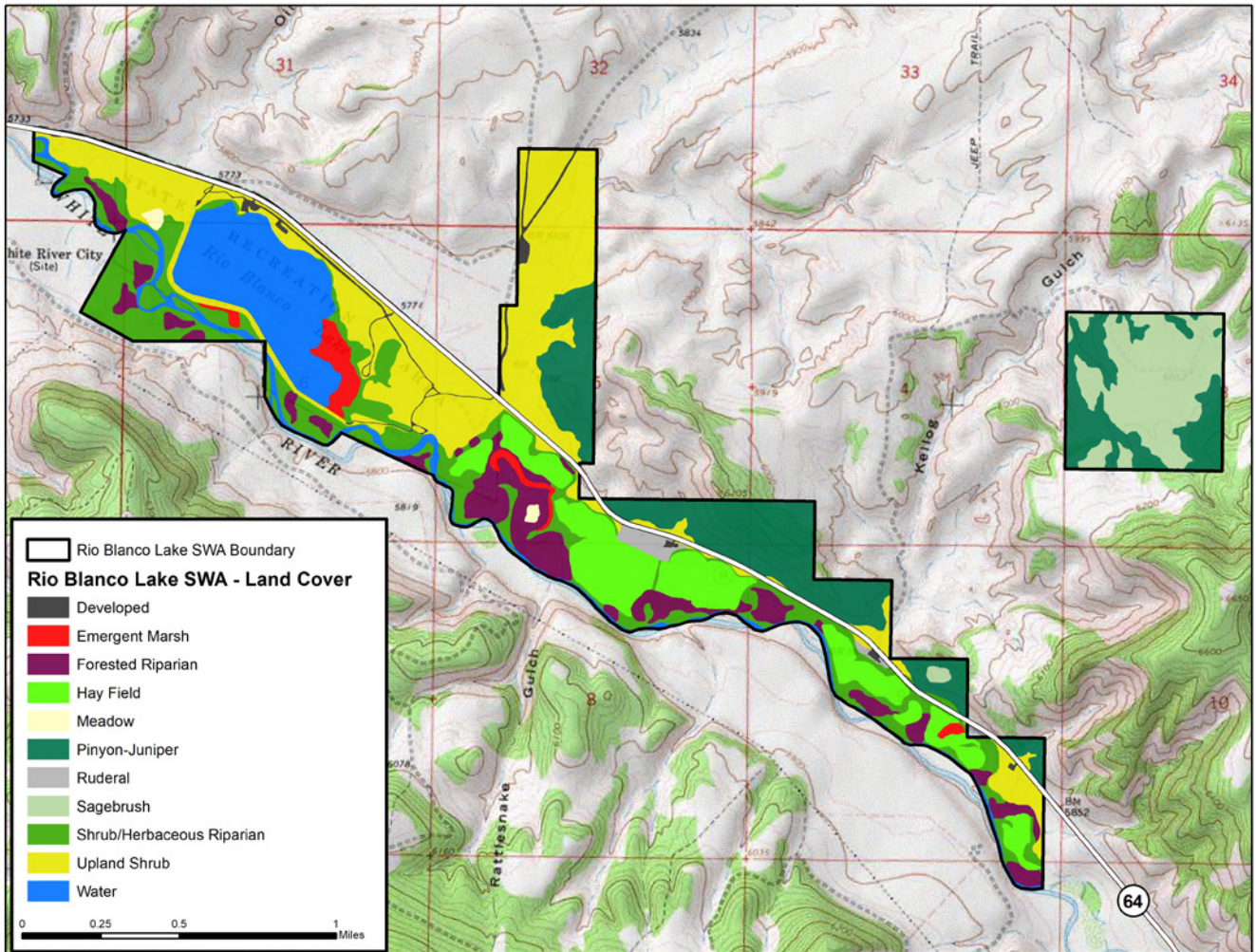


Figure 3. Distribution of land cover classes on the Rio Blanco Lake State Wildlife Area.

on the RBL-SWA is shown in Figure 3. The extent of each class, percent of overall total, and a description of vegetation commonly associated with those areas on the property are included below. Use of Latin names for plants follows Ackerfield (2015).

Emergent Marsh (9 ha – 2%): Emergent marsh habitats are found in areas with nearly year-round soil saturation along the margins of Rio Blanco Lake as well as in other low-lying areas and old oxbow channels of the White River. Emergent marsh habitats along the margins of Rio Blanco Lake are dominated by bulrush (*Schoenoplectus/Scirpus* sp.; Figure 4) whereas emergent marshes associated with old oxbow channels and low-lying areas that collect irrigation water tend to be dominated by cattail (*Typha* sp.; Figure 5).

Forested Riparian (37 ha – 8%): The forested riparian habitats on the RBL-SWA are highly diverse and consist of a multi-layered canopy of deciduous trees and shrubs. The primary overstory species is narrowleaf cottonwood (*Populus angustifolia*), however Fremont (plains) cottonwood (*Populus deltoids*) also occurs in small numbers throughout the property. The shrub and small-stature tree layer in these forested riparian areas is highly diverse and includes the following species that grow in various combinations and densities across the property: willow hawthorn (*Crataegus saligna*), red-osier dogwood (*Cornus sericea*), boxelder (*Acer negundo*), silver buffaloberry (*Shepherdia*

argentea), skunkbush sumac (*Rhus trilobata*), golden currant (*Ribes aureum*), Woods' rose (*Rosa woodsia*), snowberry (*Symphoricarpos* sp.), thinleaf alder (*Alnus incana*), and willows (*Salix* sp.). The non-native species tamarisk (*Tamarix chinensis*) also occurs in small quantities on the property, occasionally intermixed with native shrubs. However, it does not dominate streambank areas here as it can in low elevation river systems further downstream. A wide variety of both native and introduced herbaceous understory plants occur in these riparian systems. Native species include yarrow (*Achillea millefolium*), wild asparagus (*Asparagus officinalis*), horsetail (*Equisetum* sp.), milkweed (*Asclepias* sp.), American licorice (*Glycyrrhiza lepidota*), sedges (*Carex* sp.), rushes (*Juncus* sp.), wheatgrass (*Elymus* sp.), and common reed (*Phragmites australis*). Nonnative species include Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), houndstongue (*Cynoglossum officinale*), common burdock (*Arctium minus*), and orchardgrass (*Dactylis glomerata*).

Shrub/Herbaceous Riparian (70 ha – 14%): The shrub and herbaceous riparian communities found on the RBL-SWA are essentially identical to the forested riparian communities except that they lack a large tree (cottonwood) overstory component. Otherwise, species composition is basically the same. These areas can include one or more of



Figure 4. Emergent marsh dominated by bulrush along the southeastern margin of Rio Blanco Lake.

the deciduous small tree and/or shrub species listed above, or can be largely dominated by herbaceous species.

Meadow (2 ha – 0.5%): Two small, natural meadows are found on the RBL-SWA (Figure 6). They are small in size but represent a rare habitat type that has largely been converted to cultivation throughout the White River Valley.

Hay Field (48 ha – 10%): There are eight hay fields of varying size spread across the property that are flood irrigated from approximately May through August annually with water from the Imes-Reynolds Ditch and cut once per year (Figure 7). Plant species common in these fields include timothy (*Phleum* sp.), smooth brome (*Bromus inermis*), sedge, wheatgrass, orchardgrass, alfalfa (*Medicago sativa*), and curly dock (*Rumex crispus*).

Upland Shrub (116 ha – 24%): Upland shrub communities on the RBL-SWA occur on more xeric sites with deep, often alkaline, soils that are outside the influence of season-long ground water or irrigation. These communities are widespread in central and western Rio Blanco County at elevations below 1,980 m (6,500 ft) and dominated by a mixture of big sagebrush (*Artemisia tridentata*), black greasewood (*Sarcobatus vermiculatus*), rabbitbrush (*Chrysothamnus* sp.), and saltbush (*Atriplex* sp.). Common understory species found in these commu-

nities include plains pricklypear (*Opuntia polyacantha*), western wheatgrass (*Pascopyrum smithii*), galleta (*Hilaria jamesii*), bluegrass (*Poa* sp.), scarlet globemallow (*Sphaeralcea coccinea*), and fleabane (*Erigeron* sp.). Several invasive species also occur in this community, including cheatgrass (*Bromus tectorum*), bulbous bluegrass (*Poa bulbosa*), desert madwort (*Alyssum desertorum*), and bur buttercup (*Ceratocephala orthoceras*).

Sagebrush (41 ha – 8%): Sagebrush shrublands differ only slightly from the upland shrub community described above in that big sagebrush is the dominant shrub and lesser amounts of other shrubs occur as sub-dominant components. Sagebrush shrublands are most common on the Black Mountain Unit at slightly higher elevations on less alkaline soils.

Pinyon-Juniper Woodland (88 ha – 18%): These woodlands occur on steeper slopes and areas with shallow/rocky soil on low mountains and ridges throughout central and western Rio Blanco County, forming one of the most common vegetation communities in the region. The dominant tree species are pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). On the RBL-SWA, pinyon-juniper woodlands occur in more rugged areas north of State Highway 64 on the Roselund Unit and intermixed with sagebrush shrublands on the Black Mountain



Figure 5. Emergent marsh dominated by cattail in an old oxbow channel on the Roselund Unit. Willows and alder grow along the margin of this marsh and a mixture of forested and shrub riparian habitats are also located nearby. South-facing slopes with a sparse cover of upland shrub intermixed with pinyon-juniper and rock outcrops are visible in the background.

Unit. Common shrub species found in the understory of this woodland include big sagebrush, greasewood, rabbitbrush, shadscale saltbush (*A. confertifolia*), broom snakeweed (*Gutierrezia sarothrae*), and antelope bitterbrush (*Purshia tridentata*). Common herbaceous species include galleta, bluegrass, Indian ricegrass (*Oryzopsis hymenoides*), needle-and-thread (*Hesperostipa comata*), prairie junegrass (*Koeleria macrantha*), cheatgrass, stemless mock goldenweed (*Stenotus acaulis*), Hood's phlox (*Phlox hoodia*), and desert madwort.

Ruderal (4 ha – 1%): Ruderal areas are areas that have been disturbed but still largely have vegetation cover, although often consisting of less desirable species and/or weeds. Two small areas on the Roselund Unit that formerly contained ranch infrastructure, corrals, etc. are included in this class.

Developed (12 ha – 2.5%): Developed areas include graveled roads and parking lots as well as the surface of State Highway 64.

Water (59 ha – 12%): Between Rio Blanco Lake and the White River, surface water covers approximately 12% of the SWA. When the lake is below full pool, a small band of shoreline and exposed mudflats emerge along the eastern margin, creating habitat conditions ideal for

migrating wading birds and shorebirds. In most years, the lake is frozen for two to three months during the winter.

Water Resources

Rio Blanco Lake and the White River are major components of the property that heavily influence the distribution of habitats and wildlife. Rio Blanco Lake is a man-made, off-channel reservoir adjacent to the White River that was originally known as Johnnie Johnson Reservoir. Constructed in the 1960s, it has a storage volume of 1,036 acre-feet and a surface area of approximately 49 ha (120 ac) at full pool (Figure 8). The lake provides abundant open water, emergent marsh, and shoreline habitats important to a suite of wildlife species. The White River forms the majority of the southern boundary of the property and approximately 8.2 km (5.0 mi) river miles are present on the property. In addition to the main channel of the river itself, several old side channels and backwaters occur throughout the property. The bottomland riparian and wetland communities associated with the river along this reach are diverse and productive, providing unique habitat resources for



Figure 6. Native grass meadow surrounded by forested riparian habitat on the Roselund Unit.

wildlife in a region that is otherwise dominated by arid uplands.

Other water resources on the property include the Imes-Reynolds Ditch, recently-developed shallow water wetlands, and several small ponds. The Imes-Reynolds Ditch originates just upstream of the SWA but flows through the majority of the property providing irrigation water for the hay fields. The ditch also supplies water to two shallow managed wetlands that were recently installed on the property, each approximately 1.5 ha (4 ac) in size. There are three small upland ponds formed by small earthen impoundments located just north of State Highway 64 on the Roselund Unit and one pond on the Black Mountain Unit. These ponds catch runoff from spring snowmelt and seasonal rain events but are also susceptible to drying out later in the year, particularly during drought years. There is one other small pond on the Rio Blanco Lake Unit located in the riparian zone between the south side of the lake and the White River that holds water year-round.

History of Acquisition

The original RBL-SWA was first acquired by CPW (then known by the name Colorado Game, Fish and Parks) in

1965 with the state's purchase of 162 ha (400 ac) from the Johnson family. The extent of the property at that time was the land including and immediately surrounding Rio Blanco Lake. In 2013, CPW received a 3.2 ha (8 ac) parcel between Rio Blanco Lake and the north bank of the White River as part of a larger land exchange with Exxon Mobil involving other state property in Rio Blanco County. In 2014, CPW acquired two additional parcels via fee title purchase that were added to the RBL-SWA – the 238 ha (588 ac) Roselund Ranch parcel immediately adjacent to the original property and the 65 ha (160 ac) Black Mountain parcel which is located approximately 1 km (0.6 mi) northeast of the Roselund parcel and is completely surrounded by BLM land. In 2015, CPW acquired the 16 ha (39 ac) White River City parcel adjacent to the south boundary of the original SWA via fee title purchase. A final small land exchange, executed in 2020 to clean up boundaries on either side of the White River along the western boundary of the SWA, resulted in a net gain of 2 ha (5 ac) to the property. In total, the property currently encompasses 486 ha (1,200 ac)



Figure 7. Example of the intermixed nature of hay fields, forested riparian, shrub/herbaceous riparian, and upland shrub vegetation types on the Roselund Unit. Pinyon-juniper woodlands typical of surrounding uplands are visible in the background.



Figure 8. Aerial view of Rio Blanco Lake and the White River, looking west/downstream. This photo was taken in early spring prior to green-up in the riparian corridor. State Highway 64 is the paved road visible on the right (north) side of the lake. Photo credit: Lucas Turner, Rio Blanco Herald Times.

Current Management

The RBL-SWA is currently managed with an emphasis on providing recreational fishing and hunting opportunity while also providing habitat for mule deer, elk, and migratory waterfowl. Recreational fishing and boating are popular activities on Rio Blanco Lake and along the approximately 8.2 km (5.0 mi) reach of the White River encompassed by the property. Fishing on the lake occurs year-round, with ice fishing in the winter. Both big game and small game hunting occurs on the property. Because of the proximity of State Highway 64 and developed recreation surrounding Rio Blanco Lake, big game hunting on the property is limited to the use of archery equipment. Dispersed camping is allowed on the Rio Blanco Lake Unit and receives fairly consistent use throughout the spring, summer, and fall with heavy use during fall hunting seasons. There is no camping allowed on the Roselund Unit and access is limited to foot traffic only from two designated parking areas.

The RBL-SWA is leased to a private ranch that is responsible for irrigation and haying operations on the 57 ha (141 ac) of managed hay fields. In addition, a small herd of cattle are often grazed through the property for a short duration in the early spring. Two small, shallow-water wetland developments were recently installed on the property, one on the Rio Blanco Lake Unit and one on the Roselund Unit, both <2 ha (5 ac) in size. The only other notable uses of the property include periodic maintenance of the water delivery system and spring/summer weed management. While the Rio Blanco Lake Unit receives public use year-round, the Roselund and Black Mountain units receive very limited public use outside the fall hunting seasons.

CHAPTER 3. BIRDS

Previous Work

Prior to this study, minimal formal survey work for birds had been conducted on the RBL-SWA. The presence of at least one active bald eagle nest on the property had been known for several years and recorded in the CPW Raptor Nest Database. In addition, there was a known great blue heron rookery on the property recorded in the CPW Species Activity Mapping statewide database. The only other bird species for which we had previous population data from the vicinity of the RBL-SWA was the greater sage-grouse. CPW annually counts male attendance at sage-grouse leks (strutting grounds), including one located within 1.5 km of the RBL-SWA.

Steele and Vander Wall (1985) reported on waterbird species composition and seasonal use along a ~30 km reach of the White River, but their study was undertaken just across the state line in Utah approximately 70 km west of the RBL-SWA. Two statewide breeding bird atlas projects (Kingery 1998, Wickersham 2016) resulted in fairly comprehensive avian surveys of areas near the RBL-SWA. One of the survey blocks from those projects (White River City) encompasses the entire property and included habitats similar to those found on the property. However, the bulk of the actual bird survey work occurred just southeast of the property along the White River and surrounding uplands. Nonetheless, data from these two projects are representative of avian species likely to occur on the property. In total, 96 bird species were documented during the breeding season within the White River City survey block over the course of the two atlas projects.

Methods

We surveyed for birds on the RBL-SWA over a five-year period using repeat-visit area searches that encompassed nearly the entire property. We also recorded all incidental observations of birds on the property. In addition to documenting species presence, we also recorded standard breeding evidence and behavior observations (NAOAC 1990; Kingery 1998) during area searches and for incidental observations to document the breeding status (e.g., possible, probable, or confirmed) for birds on the RBL-SWA. We conducted area searches with one or two observers across all vegetation communities found on the RBL-SWA and during all months of the year. During area searches, observers recorded all bird species detected visually and/or aurally, the number of each species observed, and any observations or behavioral evidence to determine breeding status. We conducted area searches throughout the year during all

five years of this study, accumulating a total of 676 hours of survey effort during 211 area search sessions. Figure 9 shows our survey effort by month over the course of this project.

We chose to confine our survey methodology to non-random area searches because we were interested in: 1) documenting as many species as possible, 2) documenting the seasonal presence of species, and 3) confirming breeding activity for as many species as possible. While not considered as rigorous or repeatable as other methods such as point counts, the unconstrained nature of area searches and the extensive effort we expended served to address our primary survey goals.

Analysis

We tallied the total number of species detected on the property as well as the number of species for which we documented some level of breeding evidence. We also summed the total number of species detected by month to show seasonal trend in species diversity on the property. Finally, while area searches are good for documenting as many species as possible and allow for unconstrained survey effort that permits following individual birds and confirming breeding evidence for many species, they do not allow for rigorous assessment of species abundance or relative abundance. However, with the large number of survey sessions we completed throughout the project (n=211) we calculated the percentage of all survey sessions in which we documented each species as an index of how common a species was. This statistic does not account for detection probability and therefore may have biased results for larger or more conspicuous species. It also favors species with a year-round (or nearly so) presence on the property over those with a more limited seasonal presence.

Results

We detected a total of 195 bird species on the RBL-SWA during this study (Appendix I). We also detected one bird hybrid on the property during this study not included in the overall tally – a bufflehead x common goldeneye. We confirmed breeding for 41 species and 16 additional species had sufficient evidence to be included as probable breeders. The majority of species we detected are only present during migration or in winter and do not breed on the property (Appendix III). Of the 195 bird species we detected, 194 were detected during area searches and one species was detected as an incidental observation. We also detected five bird species with camera traps set primarily to inventory mammals.

However, all five species documented with cameras were also detected during area searches.

We detected five non-native bird species on the RBL-SWA during this study: ring-necked pheasant, chukar, rock pigeon, Eurasian collared-dove, and European starling. The presence of two of those, ring-necked pheasant and chukar, are the result of gamebird releases that occurred during the study. We do not believe these two species persisted on the property beyond the year of release. The only non-native species with breeding evidence on the property was the European starling. One other species we documented, the wild turkey, is native to Colorado but not native to this portion of the state. Wild turkeys historically occurred throughout nearly all of eastern Colorado and parts of southwest Colorado, but they were likely absent from northwest Colorado (Braun et al. 1994).

Figure 10 shows the number of species we documented during each month of the year. The greatest number occurred during spring (April/May) and fall (August/September) migration peaks. Numerous shorebirds, wading birds, and waterfowl, as well as a smaller number of songbirds, stop at the RBL-SWA during spring and/or fall migration. The month of September had the highest number of species documented of any month, with 132 of the 195 total species documented on the property. As expected, the winter months (December through February) had the lowest bird diversity.

The species most commonly encountered during area searches are reported in Figure 11. This figure shows data for all species that were detected during >33% of the 211 survey sessions we completed on the property across all seasons. The black-billed magpie was the species most often detected on the property, followed by the song sparrow and common raven. The two species we documented in the highest numbers (total number of individuals tallied across all survey sessions) were the American coot and Canada goose. For both of these species, we documented groups of 100 to 200 individuals using the property on multiple instances across the years during fall migration.

Inventory Completeness

We documented all 96 bird species previously recorded in the survey block that overlaps the RBL-SWA during two statewide breeding bird atlas projects (Kingery 1998, Wickersham 2016). We also documented all 20 waterbird species recorded by Steele and Vander Wall (1985) along the lower White River ~70 km west of the RBL-SWA.

Records from eBird (2022) include a total of 205 species documented on the RBL-SWA from 1996 through 2021. Species reported on eBird that we did not detect during this study were: 1) nearly all waterfowl, shorebirds, or wading birds that only occur as occasional migrants in our area, and 2) species with records >10 years old. Only one species with recent records from eBird that we did not detect, the white-throated swift, is a fairly common and widespread inhabitant of central Rio Blanco County.

We constructed a species accumulation curve for our bird area search effort (Figure 11) to visually assess inventory completeness. With species accumulation curves, total survey effort on the horizontal axis is plotted against a cumulative number of species detected

on the vertical axis. As the curve reaches an asymptote, fewer species are detected per unit effort until few or no more species are detected. A species accumulation curve that reaches this asymptote indicates that a survey effort has neared a complete inventory of species that occur within an area of interest that can be detected using a particular survey method. The species accumulation curve for our area search effort suggests that we documented the majority of species expected to occur on the RBL-SWA. For example, in our final ~100 hours of effort, spanning late 2020 through December 2021, we only added two bird species that were not detected earlier in our survey. We feel confident that we documented most (>95%) of the bird species that occur on the

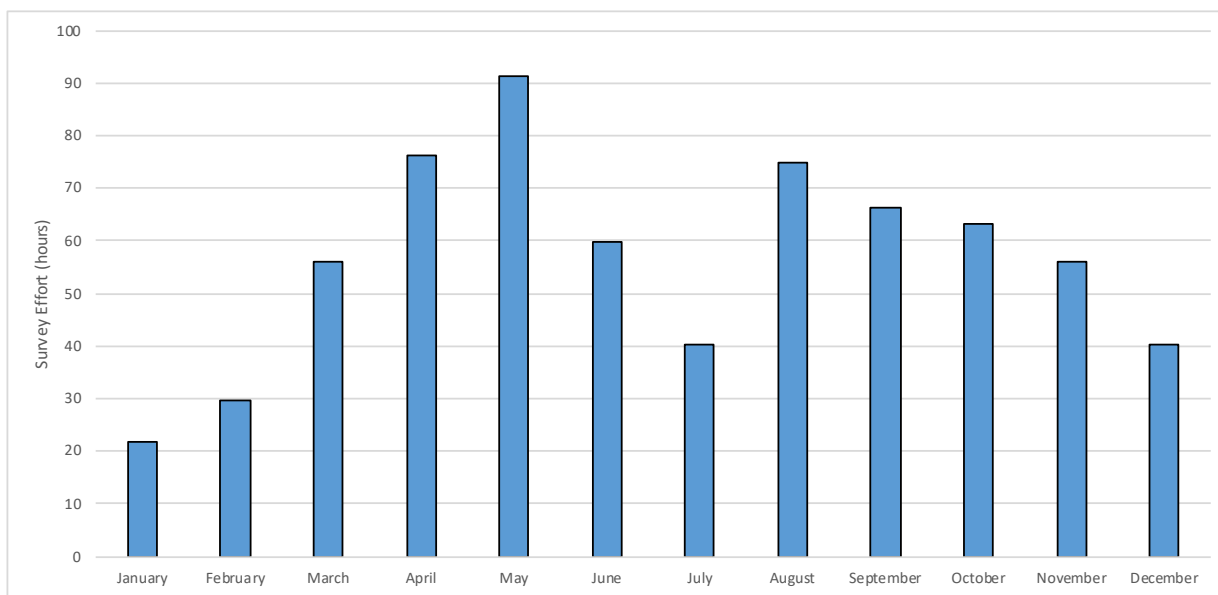


Figure 9. Monthly avian area search survey effort (hours) completed on the Rio Blanco Lake State Wildlife Area, 2017 – 2021.

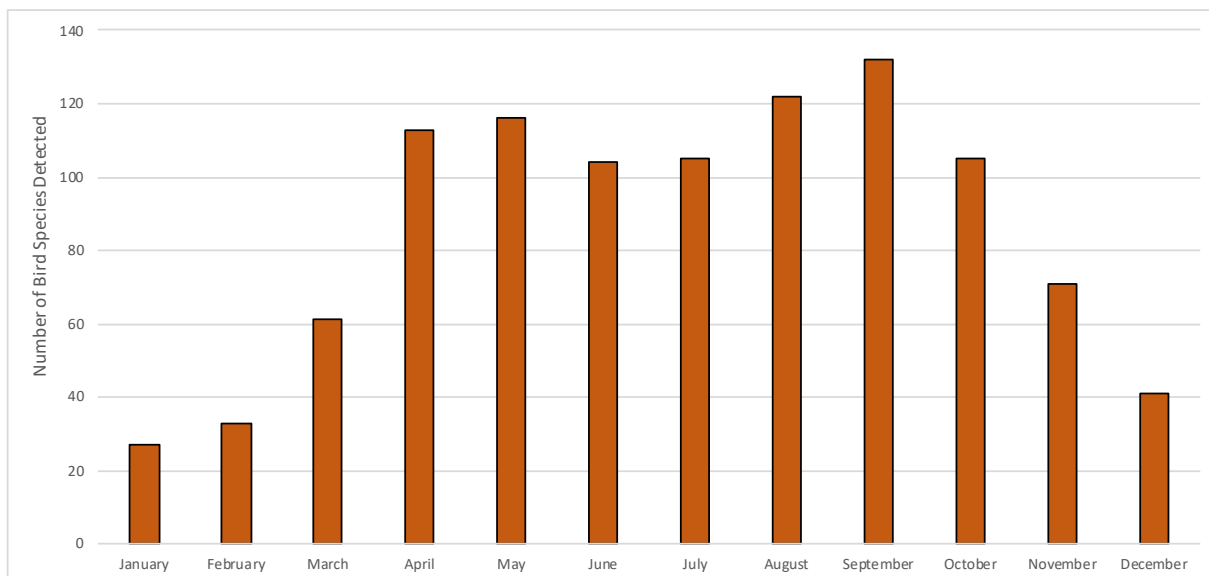


Figure 10. Number of bird species detected by month on the Rio Blanco Lake State Wildlife Area, 2017 – 2021.

RBL-SWA throughout the year. The one area where we could have increased our effort during this survey to potentially detect a small number of additional species was with nighttime surveys. Nearly all our survey effort was during the day, although we did make numerous visits that included sunrise and sunset time periods. Few survey occasions included extensive nighttime searches. However, we did make opportunistic observations of several nocturnal bird species while conducting other work, principally bat mist net surveys. In total, we documented only one species, the common poorwill, as an opportunistic nighttime observation that was not otherwise documented during area searches.

Discussion

The RBL-SWA supports a diverse avifauna given its small size. We documented 38% of all wild bird species currently recorded for Colorado on the property during this study (Colorado Bird Records Committee 2022). Much of this diversity is driven by a diverse suite of shorebirds, wading birds, and waterfowl that make use of the open water, shoreline, and mudflat habitats of Rio Blanco Lake, primarily during spring and fall migration periods. Of all the bird species documented on the property during this study, 34% (67 of 195) were shorebirds, wading birds, or waterfowl. The RBL-SWA also provides habitat for a number of species of conservation concern, including three Tier I and 19 Tier II Species of Greatest Conservation Need (SGCN) from Colorado’s 2015 State Wildlife Action Plan. Appendix II includes

maps with observation locations and notes on breeding evidence for some of these 22 SGCN.

Three bird species we documented on the RBL-SWA are listed as Tier I SGCN – greater sage-grouse, sandhill crane, and golden eagle. We recorded greater sage-grouse on the property on only one occasion during this study. That observation was north of Highway 64 on the Roselund Unit in a mixed stand of sagebrush and greasewood. There is one greater sage-grouse lek located within 1.5 km of the RBL-SWA (Appendix II), but the extent of suitable sage-grouse habitat on the property is limited. Sandhill cranes were commonly observed on the property, primarily during spring migration in March and April. In 2021, we also confirmed sandhill cranes breeding on the property. That observation was the first breeding record of cranes on the property and extended the known breeding distribution of cranes in Rio Blanco County west by nearly 20 km. Golden eagles were documented in small numbers (1 to 3 individuals) on the property every month of the year. They likely use the property as foraging habitat and were often documented perched on rock outcrops on the Roselund Unit just north of Highway 64. There is a golden eagle nest within 1 km of the property on BLM-managed land north of the Roselund Unit that was active in 2021 (Appendix II).

Four of the Tier II SGCN we documented during this study were confirmed breeding on the property. These include the bald eagle, northern harrier, prairie

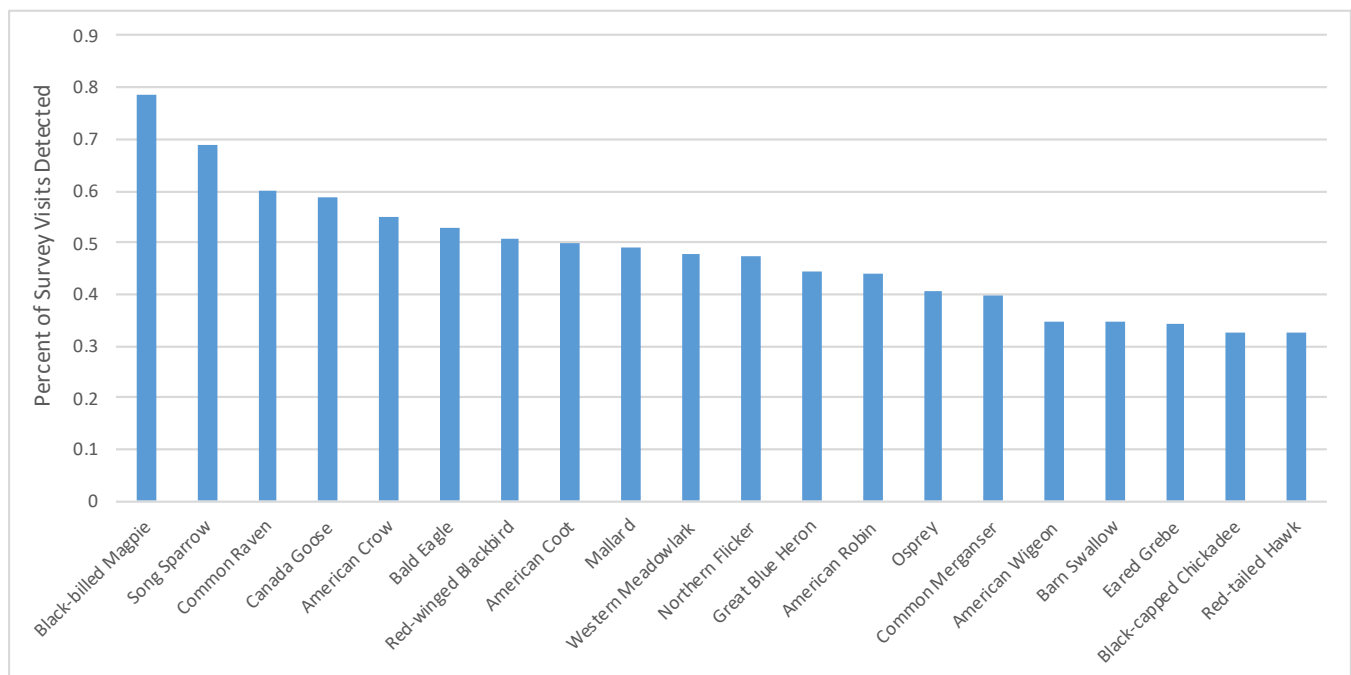


Figure 11. Bird species most commonly detected on the Rio Blanco Lake State Wildlife Area, 2017 – 2021. Each bar represents the proportion of all survey sessions (n=211) during which a species was detected.

falcon, and lazuli bunting. Bald eagles were documented throughout the year and used three different nest sites on the property during the course of this study. The northern harrier was recorded on the property year-round and confirmed breeding on the property through observation of nest building activity. A prairie falcon eyrie was active on the property boundary in 2018 and was likely active in subsequent years, although we did not specifically monitor that location. The lazuli bunting was only documented during a short breeding season (May through July) and was confirmed breeding through observation of recently fledged young and adults carrying food items to nestlings or fledglings.

We recorded a high diversity of waterbirds on the RBL-SWA, 67 species in total. Both the diversity and numbers of waterbirds observed on the property peaked during spring and fall migration cycles. While the number of shorebirds and wading birds observed during any visit was always generally small (usually <20 individuals of any species), waterfowl numbers could be quite high, particularly during fall migration. The peak in waterfowl numbers occurred during fall migration and the highest number documented during any visit was estimated at 800 to 1,000 individuals. In general, the most abundant waterfowl on the property in order of highest abundance included: 1) American coot, 2) Canada goose, 3) American wigeon, 4) gadwall, and 5) green-winged teal. However, only three waterfowl species were confirmed breeding on the property – Canada goose, mallard, and common merganser. Several waterbirds we observed on the property appear to be rare migrants and were only documented on a single sampling occasion over the five-year study. These include the snowy egret, black-crowned night heron,

cackling goose, tundra swan, snowy plover, long-billed curlew, dunlin, Caspian tern, and common tern.

Riparian habitats located within arid and semi-arid landscapes have long been understood to host high levels of biodiversity, particularly for avian species, compared to surrounding uplands (Knopf et al. 1988; Montgomery 1996). Andrews and Righter (1992) identified lowland riparian forests and reservoirs as the two habitat types in Colorado with the richest avifauna. Our data for the RBL-SWA support and reinforce that conclusion. The diverse and productive riparian vegetation communities found on the RBL-SWA, including largely intact forested riparian areas often with a multi-layered canopy of deciduous shrubs and trees, represent highly important bird habitats for numerous species. Coupled with the presence of Rio Blanco Lake itself, which provides open water, shoreline, and mudflat habitats, it becomes clear why we were able to document so many bird species utilizing the property. A review of data currently available from eBird (2022) confirms that our tally of species documented on the RBL-SWA (we documented 195 bird species) represents the highest recorded avian diversity of any site in northwest Colorado north of the Colorado River Valley. The Colorado Natural Heritage Program prepared a survey report (Culver et al. 2008) of unique biological resources in Rio Blanco County and identified the White River at Rio Blanco Lake as one of seven “very high biodiversity significance sites” in the county. While that assessment was largely based on the relatively unique and intact riparian and wetland vegetation communities found at the site, the recognition is befitting of the associated high avian diversity that we highlighted during this study.

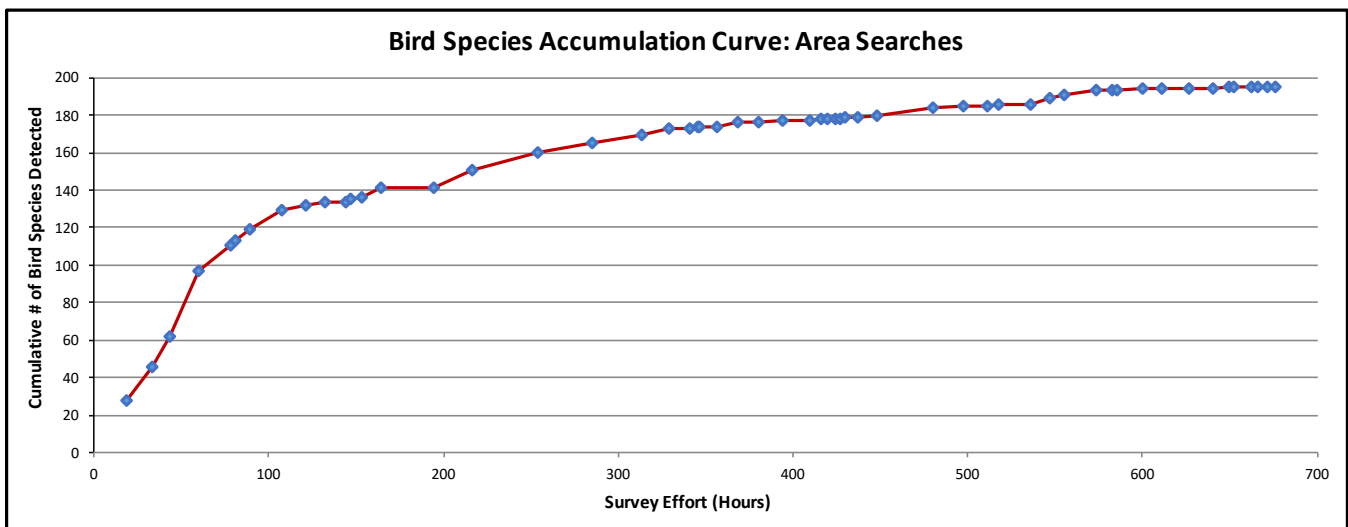


Figure 12. Species accumulation curve for avian area searches on the Rio Blanco Lake State Wildlife Area, 2017 – 2021. Each data point represents a month’s worth of survey effort, beginning in February 2017 and ending in December 2021.

CHAPTER 4. MAMMALS

Previous Work

Prior to this study, most data on the presence, distribution, and abundance of mammal species on the RBL-SWA was for big game, specifically mule deer and elk. Both species are known to occur on the property and it is a popular location for archery hunting during big game hunting seasons. There are numerous mammal records from central Rio Blanco County published in Armstrong (1972), Armstrong et al. (1994), and Siemers and Schorr (2006). Of those sources, only Armstrong et al. (1994) had records attributed specifically to the Rio Blanco Lake area. Those records include three bats – the little brown myotis (*Myotis lucifugus*), Yuma myotis (*Myotis yumanensis*), and canyon bat (*Parastrellus hesperus*). Two other studies (O'Meara et al. 1981, Gallo et al. 2016) collected mammal data in pinyon-juniper woodland communities at multiple locations throughout the Piceance Basin just south of the RBL-SWA. Data from those two studies are suggestive of species which might occur within the relatively limited amount of pinyon-juniper habitat found on the property. Freeman (1984) conducted intensive work on bats in mixed sagebrush and pinyon-juniper habitats near Elk Spring in Moffat County approximately 35 km northwest of the RBL-SWA. Lastly, CPW conducted a pilot study on small mammals in sagebrush habitats throughout north-west Colorado in 2010 and 2011 (CPW, *unpublished data*). This work included two sampling sites in shrub-steppe habitats similar to those found on the RBL-SWA <20 km south of the property in the Piceance Basin.

Methods

We surveyed mammals on the RBL-SWA using multiple standard field techniques targeted at specific groups of taxa: 1) live trapping targeted at detecting small and medium-sized mammals, 2) camera trapping targeted at detecting medium-sized and large mammals, 3) mist netting for bats, and 4) acoustic detectors for bats (Wilson et al. 1996; Kays and Slauson 2008; Figure 13). We also recorded the date and location of all incidental mammal observations. Except for camera traps, survey sites for mammal inventory were distributed non-randomly. The RBL-SWA is a relatively small property with a complex juxtaposition and distribution of vegetation communities (Figure 3). Small mammal live-trapping transects were located to ensure we sampled different vegetation communities and to ensure that transects up to 500m in length fell within the property boundary. Bat sampling locations, both mist netting and acoustic detectors, were chosen non-randomly to maximize detection of bats and mostly involved sites with standing water where western Colorado bat species typically

concentrate at foraging/drinking locations. Camera trap stations were distributed both randomly and non-randomly throughout the RBL-SWA. Non-random sites were included to augment the overall effort represented by random sites and in order to sample locations of particular interest that were not represented in our random sample.

Live Trapping: We trapped small mammals using non-randomly placed transects of 25 to 50 Sherman live traps (folding aluminum, 3 x 3.5 x 9"; H.B. Sherman, Inc., Tallahassee, FL) placed 10 meters apart in a curvilinear pattern to follow geographic features such as wetland/riparian edges in the river bottom area or accessible terrain in the steeper pinyon-juniper habitats. At three sites in 2018 we also deployed Tomahawk live traps (rigid steel single-door, 6 x 6 x 20"; Tomahawk Live Trap, Hazelhurst, WI) at the beginning, middle, and end point of each transect. We baited traps with a commercially available "sweet feed" mixture of corn/oats/barley with molasses and ran each transect for four consecutive nights. Three consecutive nights has been suggested as the minimum effort required to produce stable species richness estimates for small mammals (Conrad et al. 2008). We checked traps each morning, closed them during the day to prevent animals from overheating, and then reopened them in the evening. For each capture we recorded species, sex, age class, and weight. We also gave each captured animal a temporary batch mark by clipping a small amount of fur off the rump area to distinguish newly captured individuals from recaptures. All trapping was conducted during the summer months of June through August.

Camera Trapping: We deployed passive infrared-triggered cameras (model# HC500 or PC800, Reconyx Inc., Holmen, WI) at both random and non-random locations to detect medium and large mammals. We placed cameras randomly throughout the RBL-SWA with no regard to vegetation community and supplemented this effort with additional camera locations placed non-randomly in an effort to detect the greatest number of species possible with an emphasis on unique habitat features such as ponds, riverbank, and backwater areas. Each camera site consisted of a single camera mounted on a steel U-channel post ~0.75 m high. At the random point the observer chose a direction to face the camera which maximized field of view. For all random and most non-random cameras we placed a scent bait in front of the camera to increase detections. The bait consisted of a mixture of: 1) peanut butter and 2) commercial skunk essence (Pete Rickard's Trapping Products, Cobleskill, NY) mixed with petroleum jelly to form a viscous skunk-scented lure. We placed approx-

imately five grams of each bait in a small PVC tube capped at each end with multiple small (~0.3 cm) holes drilled in it to protect the bait from weather and animals while also allowing the scent to disperse from the tube. We mounted this PVC bait tube to a short piece of steel reinforcing bar with a hose clamp to raise the bait ~0.3 m high. Random sites were run for 10 consecutive days, rebaited, and then run for 10 additional days for a total of 20 camera-days at each random site. In some cases, it took more than 10 days from deployment to rebait a random site or more than 10 days from rebaiting to collect a camera from a random point. Cameras at non-random sites were deployed for a variable amount of time, generally from 20 to 40 consecutive days. We ran random camera sites during summer and fall seasons (June through October) while non-random sites were run at various times throughout the year. We programmed cameras to take a pulse of three consecutive photos (at one second intervals) when triggered with no delay between triggers in order to collect as much information as possible to maximize species identification. We identified animals in each photograph to species, when possible. Because we often received a large number of photographs of the same individual or group of individuals in a short span of time, we tallied photographs for a species as unique detections only when they were separated by more than one hour.

Mist Netting: We selected six sites with surface water to deploy mist nets in order to capture bats foraging or drinking. The sites included: 1) three small ponds on the Roselund Unit just north of State Highway 64 surrounded by pinyon-juniper woodland, sagebrush, and rock outcrops, 2) a seasonal pond on the Black Mountain Unit surrounded by sagebrush and pinyon-juniper woodland, 3) a side channel backwater slough adjacent to shrub and forested riparian communities, and 4) a site spanning the White River adjacent to an old metal bridge surrounded by riparian communities. We deployed a variable number of polyester mist nets designed for bats (38 mm mesh size, 4 shelves; Avinet, Inc., Portland, ME) in several lengths (6 m, 9 m, 12 m, or 18 m) at each site depending on the size and configuration of open water (Kunz et al. 2009). Either two or three nets were deployed at each site directly over the water. We opened nets at sunset and ran them for 2.5 to 4 hours. We identified each captured bat to species and recorded sex, age, weight, and forearm length.

Acoustic Detectors: We deployed acoustic detectors at eight sites on the RBL-SWA between July and early September 2020 in an effort to detect additional bat species which we might not have captured during mist netting. We used SM4BAT ultrasonic recorders (Wildlife

Acoustics, Inc., Maynard, MA) with an external microphone (model# SMM-U2; Wildlife Acoustics, Inc.) mounted approximately two meters above the ground and programmed to continuously record bat calls for 10 consecutive days at each site from 30 minutes before sunset to 30 minutes after sunrise. Detector settings followed the Colorado NABat deployment protocol for stationary sites (version 6/2020). Acoustic files were stored on Secure Digital High Capacity (SDHC) memory cards during the sampling period and subsequently downloaded to a laptop computer for analysis. We attributed call recordings with sufficient quality to the species level using the Batch Attributer function in SonoBat v4.3 analysis software. We set acceptable call quality and decision threshold values high (0.90 and 0.95, respectively) to reduce uncertainty in species identifications and manually vetted sonograms for all species documented via acoustic detector that we did not capture on the property. With this approach our objective was to significantly reduce the possibility of false positive records or species misidentification.

Analysis

For live-trapping we simply tallied the total number of captures and total number of individuals captured for each species. Trap-night effort was calculated as the number of trap nights (# of traps x # nights open) minus $\frac{1}{2}$ the number of empty tripped traps (Beauvais and Buskirk 1999). For camera traps we report the proportion of random sites (n=40) at which we detected each species as an estimate of summer season relative abundance and distribution. These estimates are equivalent to naïve site occupancy. We did not model site occupancy due to the highly varied nature of vegetation communities in which we sampled. For mist netting, we tallied the number of each bat species captured at each location and for acoustic detectors we just included species documented by acoustic means in our overall species list (Appendix I). We considered a bat species documented by acoustic means only if the likelihood of presence estimate generated by Sonobat exceeded 95% for at least one sampling site.

Results

We detected 38 species of mammal on the RBL-SWA during this study. This includes 36 species captured or photographed on the property and two additional bat species detected by acoustic analysis only. We also detected domestic (pet) dogs (*Canis familiaris*) and domestic cattle (*Bos taurus*) via camera traps on the property, but we excluded these from species totals and subsequent analyses. We documented seven species via live trapping, 15 species via camera traps, 11 bat species using a combi-

nation of mist netting and acoustic detection methods, and 14 species as incidental observations. Four species were detected only by incidental observation – the Wyoming ground squirrel (*Urocitellus elegans*), yellow-bellied marmot (*Marmota flaviventris*), pine squirrel (*Tamiasciurus hudsonicus*), and American mink (*Neovison vison*).

From 2018 to 2021 we completed nine live-trapping transects totaling 1,646 Sherman trap-nights and 36 Tomahawk trap-nights. We captured a total of 107 individuals representing seven species. The seven species of small mammals captured included six rodents and one shrew (Table 1). The deer mouse (*Peromyscus maniculatus*) was by far the most commonly captured species, occurring at all sites where we trapped.

From 2018 to 2021 we completed 40 random camera deployments totaling 1,041 trap-days and 16 non-random camera deployments totaling 554 trap-days for a total combined effort of 1,595 trap-days. We detected 15 different mammal species with camera traps – 13 species at random sites and nine species at non-random sites. We

recorded a total of 407 unique species detections across all camera sites. Mule deer and elk were the two species most commonly detected by camera traps, representing 56% and 15% of all unique detections, respectively. Mule deer and elk were also the two species detected at the highest proportion of random camera sites (Figure 14). We detected two species at non-random sites placed directly adjacent to water that were not detected at random sites – beaver (*Castor canadensis*) and common muskrat (*Ondatra zibethicus*).

From 2018 to 2021 we completed 15 total mist netting sessions across six sites, sampling each site between one and five occasions. We captured nine bat species via mist netting (Table 2). The Yuma myotis was the most common species captured, accounting for 26% of all captures. Three other species of *Myotis* (long-eared myotis, western small-footed myotis, and little brown myotis) were captured in nearly equal proportions with each representing approximately 20% of all captures. The long-eared myotis (*M. evotis*) was the most widely distributed bat we

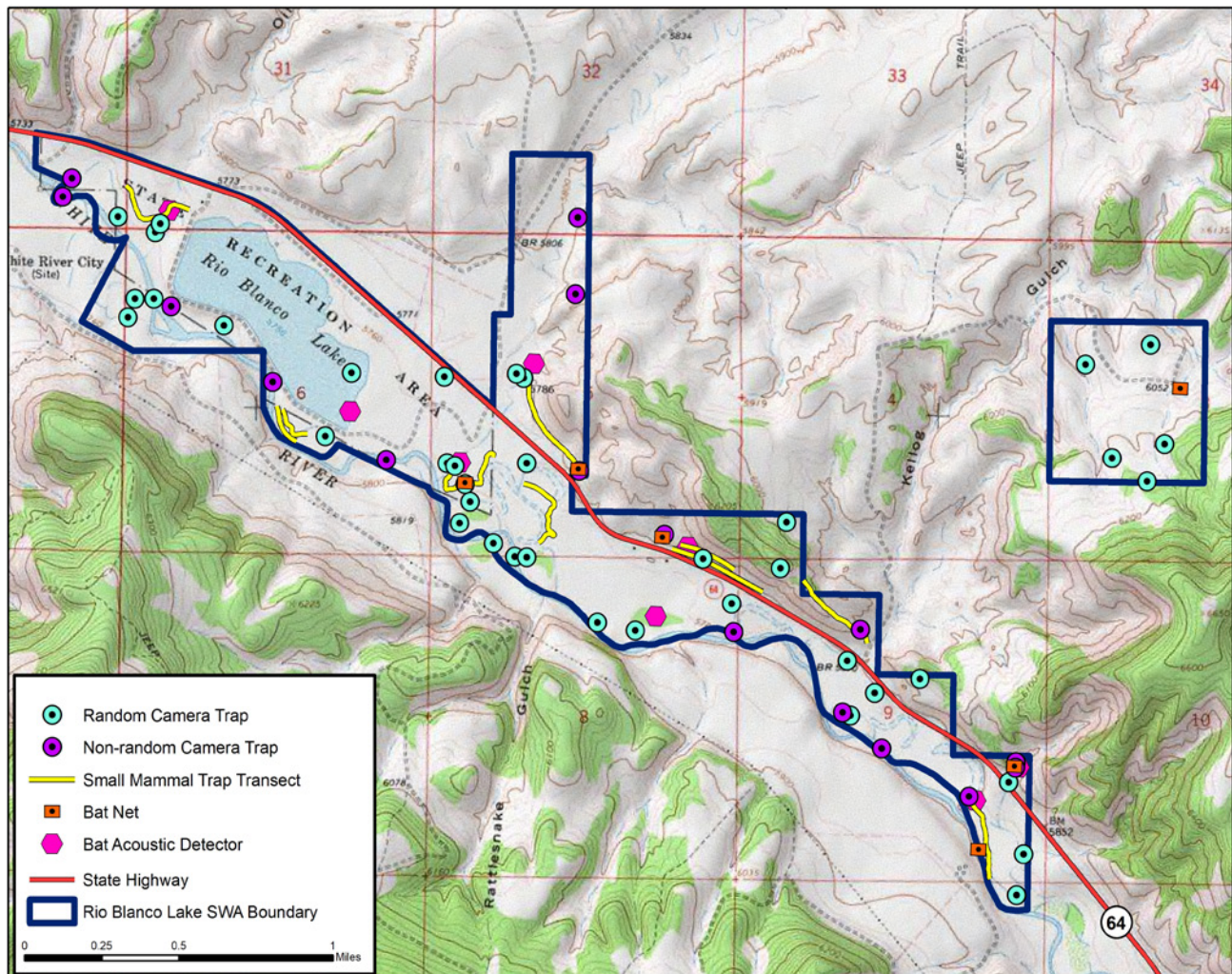


Figure 13. Mammal inventory site locations on the Rio Blanco Lake State Wildlife Area, 2018 – 2021.

captured. It was detected during seven of the 15 netting sessions and at five of the six sites sampled. We also recorded the long-eared myotis at all of the eight acoustic detector deployments. In addition to the nine species captured on the property, we also detected two additional species via acoustic detectors – the silver-haired bat (*Lasiorycteris noctivagans*) and the canyon bat. For both of these species there were a sufficient number and quality of calls that the likelihood of presence at one or more sampling sites was >95%.

Inventory Completeness

We constructed simple survey method-specific species accumulation curves for our camera trapping and bat mist netting inventory methods to visually assess inventory completeness (Figures 15, 16). For camera trapping the curve reached an asymptote at approximately 75% of total effort (~1,200 camera trap days) before increasing by one species during the last deployment of this study. This suggests that additional effort using camera traps would likely result in the detection of few additional species. For mist netting, the curve reached an asymptote at approximately 55% of total effort (eight net sessions) before also increasing by one species later in the effort. This also suggests that most bat species expected to be captured in mist nets were detected by this method. However, at least two additional bat species that we did not capture were confirmed by acoustic monitoring. We did not construct a species accumulation curve for live trapping due to the small number of discrete sampling occasions.

Several species of mammal that are known to occur nearby in similar habitats were not detected on the RBL-SWA during this study. Both Gallo et al. (2016) and O’Meara et al. (1981) found the bushy-tailed woodrat (*Neotoma cinerea*) to be fairly common in pinyon-juniper woodland habitat just south of the RBL-SWA in the Piceance Basin. In addition, Gallo et al. (2016) detected two mesocarnivores – the American badger (*Taxidea taxus*) and western spotted skunk (*Spilogale gracilis*) – using camera traps in pinyon-juniper habitat in the nearby Piceance Basin with fairly high frequency. Camera trapping is a suitable method for detection of all three of these species, and additional effort could potentially lead to their detection. In addition, the northern pocket gopher (*Thomomys talpoides*) is known to occur in similar habitats nearby, but our study did not include a survey method designed to target fossorial species (Jones et al. 1996). Lastly, the reach of the White River through the RBL-SWA appears to provide suitable habitat for river otter (*Lontra canadensis*), but we did not detect this species. CPW maintains an active database of river otter sightings throughout Colorado and the nearest confirmed sightings are on the lower White River near Taylor Draw Dam approximately 45 km downstream from this property.

Discussion

The 38 species of mammals we documented on the RBL-SWA as part of this study represent 30% of all wild mammal species currently known to occur in Colorado (Armstrong et al. 2011). This is a diverse mammalian

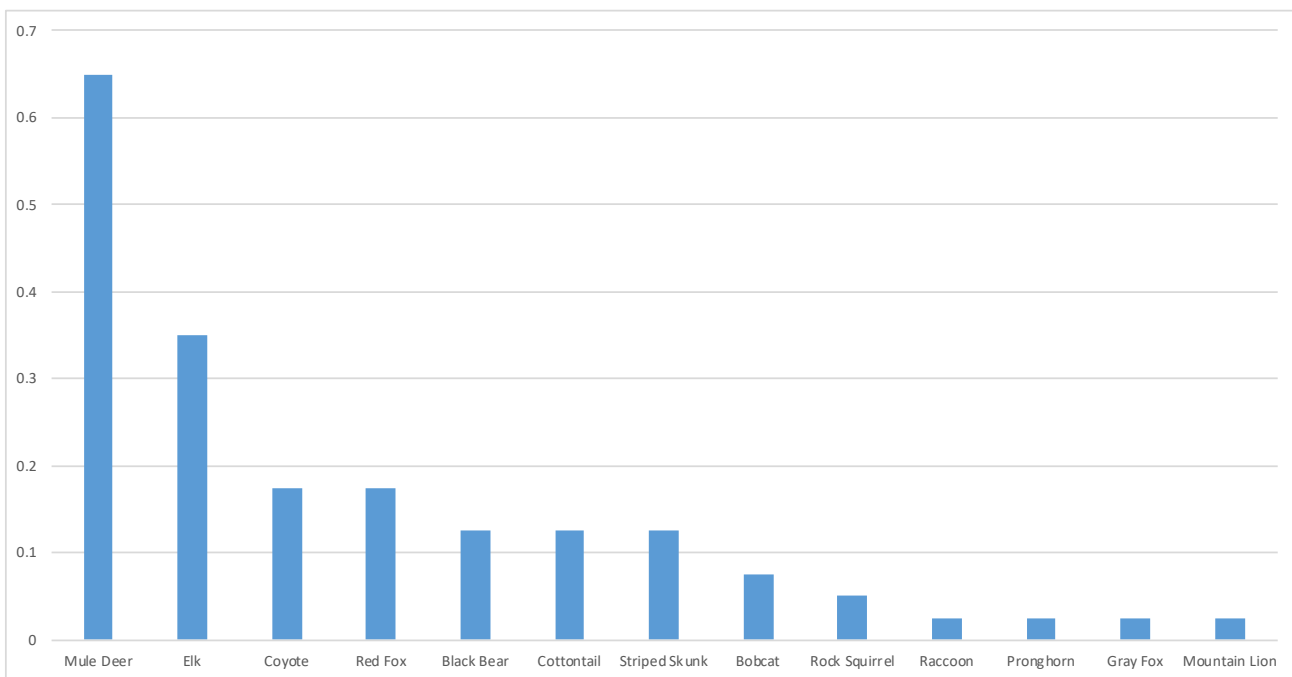


Figure 14. Mammals detected by randomly placed camera traps (n=40) on the Rio Blanco Lake State Wildlife Area, 2018 – 2021. Bars represent the percent of all random sites at which a species was detected. No correction has been made for species detection probability.

fauna given the property's small size. The two big game species that commonly occur on the RBL-SWA (mule deer, elk) were previously well-documented on the property and represent species of significant economic

and recreational importance in northwest Colorado. Mule deer are common on the RBL-SWA throughout the year, although numbers appear to peak during spring and fall migration when large numbers of deer

Table 1. Small mammals captured on the Rio Blanco Lake State Wildlife Area, 2018 – 2021.

Species	Scientific Name	Total Captures	Total Individuals
Deer Mouse	<i>Peromyscus maniculatus</i>	150	80
Pinyon Mouse	<i>Peromyscus truei</i>	37	17
Least Chipmunk	<i>Tamias minimus</i>	3	3
Western Jumping Mouse	<i>Zapus princeps</i>	3	3
Dusky Shrew	<i>Sorex monticolus</i>	2	2
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	1	1
Montane Vole	<i>Microtus montanus</i>	1	1
Grand Total		197	107

Table 2. Bat species captured by site on the Rio Blanco Lake State Wildlife Area, 2018 – 2021.

Site	Date	COTO	EPFU	LACI	MYCI	MYEV	MYLU	MYTH	MYVO	MYYU	MYsp	Total Captures
Roselund Pond #1	7/8/2018					2					1	3
Roselund Pond #1	7/12/2018				1	2			1			4
Roselund Pond #1	8/12/2018				2							2
Roselund Pond #2	7/30/2018					1						1
Roselund Pond #2	8/14/2018	1									1	2
White River Backwater	7/23/2018		1									1
Black Mountain Pond	7/10/2019				7	2						9
Cottonwood Pond	6/25/2019				1					1		2
Roselund Pond #1	6/26/2019				2	3	2	1			1	9
Roselund Pond #1	8/12/2019									1		1
Roselund Pond #2	7/6/2019									1		1
Roselund Bridge	8/6/2020			1		1	9			10		21
Roselund Pond #1	7/23/2020											0
Roselund Bridge	7/27/2021								1	3		4
White River Backwater	9/2/2021					1						1
Total By Species		1	1	1	13	12	11	1	2	16	3	61

COTO – Townsend's Big-eared Bat (*Corynorhinus townsendii*) **MYLU** – Little Brown Myotis (*Myotis lucifugus*)

EPFU – Big Brown Bat (*Eptesicus fuscus*)

MYTH – Fringed Myotis (*Myotis thysanodes*)

LACI – Hoary Bat (*Lasiurus cinereus*)

MYVO – Long-legged Myotis (*Myotis Volans*)

MYCI – Western Small-footed Myotis (*Myotis ciliolabrum*)

MYYU – Yuma Myotis (*Myotis yumanensis*)

MYEV – Long-eared Myotis (*Myotis evotis*)

MYsp – Unknown Myotis Species (*Myotis* sp.)

use the property's hay fields. Mule deer that use the RBL-SWA include animals from the White River Herd, the second largest mule deer herd in Colorado. Elk use the RBL-SWA sporadically throughout the year, but summer drought conditions can push larger numbers onto the property seeking water and green forage. Elk that use the property are part of the White River Herd, the largest elk herd in Colorado. Aside from mule deer and elk, prior to this study essentially nothing was known about the remainder of the mammalian fauna that occurs on the property.

Of the 38 mammal species found on the RBL-SWA, four are considered SGCN in Colorado's 2015 State Wildlife Action Plan, all of which were bats. Appendix IV includes a map with observation locations for these SGCN. Because they are nocturnal and difficult to identify unless captured or using specialized recording equipment, bats are generally difficult to monitor and much less is known about their overall distribution and population status than for most other mammal species. The State Wildlife Action Plan identifies improving understanding of the habitat, distribution and population parameters as high priority actions for all four of these bats. Our study addresses some of these factors by documenting presence and distribution on the RBL-SWA. While the little brown myotis appears to be relatively common and widespread on the property, the two other Tier I SGCN bats we documented – fringed myotis (*M. thysanodes*) and Townsend's big-eared bat (*Corynorhinus townsendii*) – appear to be much less common based on the combination of mist netting and acoustic detector monitoring we completed. It is likely that

the diverse and abundant water resources as well as the (presumably) abundant insect community found on the RBL-SWA represent highly attractive foraging resources for bats over a broader area. In addition, the property is surrounded by abundant pinyon-juniper woodland habitat with numerous exposed rock outcrops, representing high quality roosting habitat. In fact, pinyon-juniper woodlands are known to harbor some of the highest bat diversity of any ecosystem in the Rocky Mountain west (Adams 2003; Neubaum and Aagaard 2022). This combination of diverse wetland and water resources in close proximity to extensive pinyon-juniper woodland habitat interspersed with numerous rock outcrops likely explains the high bat diversity documented on the property. While we documented 11 different bat species on the property, we still know little about their ecology or the location of important habitat features where conservation actions could potentially be directed such as maternity sites, roost sites, or hibernacula. Like O'Farrell and Gannon (1999), we found that the combination of physical capture via mist netting and detection via acoustic monitoring led to a more complete inventory than either method alone.

All the mammal species we documented on the RBL-SWA have relatively widespread distributions in suitable habitat throughout western Colorado. However, two species that we documented are likely near the edge of their geographic range and ecological tolerance on the property based on previous distribution data and literature descriptions. We documented the pine squirrel and the western jumping mouse (*Zapus princeps*) on the property, both species more typically associated with higher elevation montane

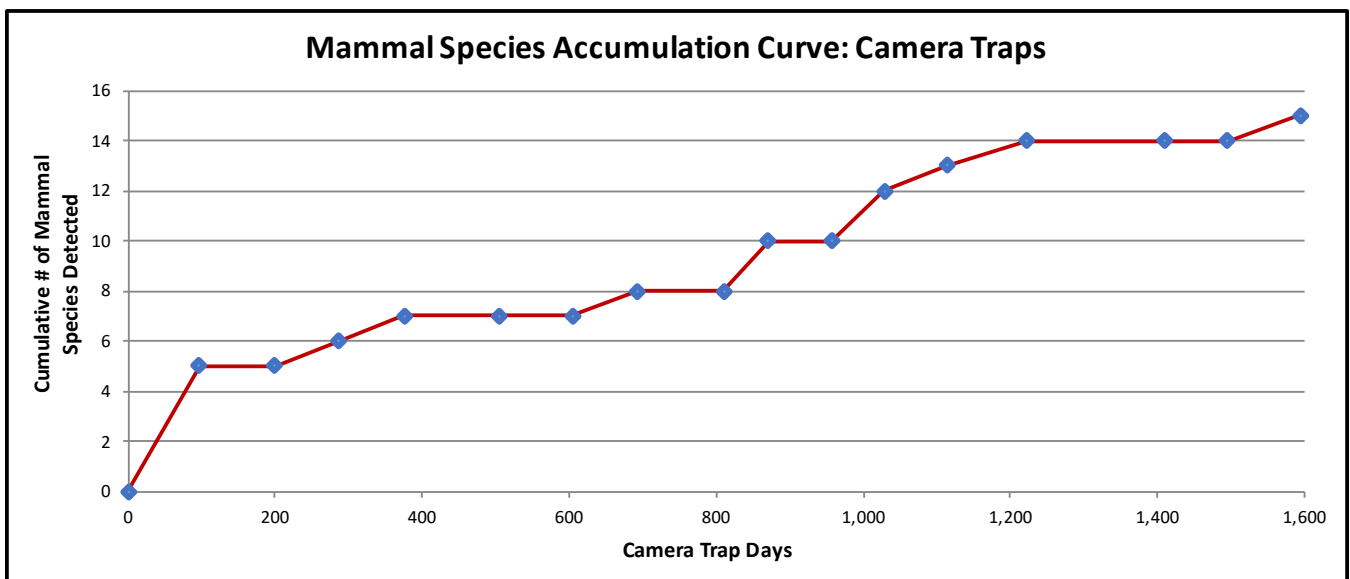


Figure 15. Species accumulation curve for mammals detected by camera trapping on the Rio Blanco Lake State Wildlife Area, 2018 – 2021.

habitats in Colorado. Armstrong et al. (2011) report the lower elevational limit for both of these species to be 1,830 m (6,000 ft) in the state. We documented one pine squirrel as an opportunistic observation in a narrowleaf cottonwood tree within a patch of forested riparian habitat at an elevation of 1,760 m (5,780 ft) on the RBL-SWA in December 2017. The nearest other records of the pine squirrel that we are aware of are from stands of Douglas-fir (*Pseudotsuga menziesii*) located on steep, north-facing slopes in the Timber Gulch drainage in the Piceance Basin at an elevation of 2,250 m (7,400 ft) approximately 20 km southeast of the property. We captured the western jumping mouse at two locations on the RBL-SWA in riparian habitats at 1,755 m (5,760 ft) and 1,775 m (5,820 ft). For this species, the White River and its associated riparian habitats form a narrow corridor of suitable habitat that extends westward from more typical mid- and high elevation mesic habitats of the Flattops mountain range. Our observations of the pine squirrel and western jumping mouse below 1,770 m (5,800 ft) elevation on the RBL-SWA may represent low elevation records for both species in Colorado.

One species that historically occurred in the vicinity of the RBL-SWA but which was extirpated from Colorado by the 1940's is the gray wolf (*Canis lupus*). Armstrong (1972) references several wolf records from the Piceance Basin and White River southwest of Meeker, placing them within close proximity to the current RBL-SWA property. In addition, Cary (1911) reports there were "considerable numbers in the White River country, particularly in the valley of the Piceance" in 1905. Recently (within the past 10 years) a small number of wolves have been observed in northwest Colorado, confirmed dispersing from estab-

lished packs in Wyoming. One individual with a tracking collar was documented for a brief period of time in Rio Blanco County during an apparent dispersal movement.

We documented 38 species of mammal on the RBL-SWA during this study. That represents approximately 30% of all wild mammal species known to currently occur in Colorado. This represents extremely high diversity for a SWA that encompasses only 486 ha (1,200 ac). For comparison, Holmes and Kircher (2020) documented 33 species of mammal on the Bitterbrush State Wildlife Area, a property approximately seven times larger. The high diversity found on the RBL-SWA provides robust support for claims made by numerous sources (e.g. CPW 2011) that riparian and wetland areas host species diversity that is disproportionately high relative to their extent on the landscape. This seems to be especially true of riparian/wetland systems found along large, valley-bottom river systems. Alarming-ly, these are also the systems most at risk of degradation (Marshall and Lemly 2020), particularly in arid western states like Colorado. Approximately 47% of the RBL-SWA consists of riparian, wetland, irrigated hay field, or open water habitat types. Continued protection and sound management of the diverse and highly productive habitats found on the RBL-SWA should ensure that the property remains a reservoir of high mammalian diversity into the future.

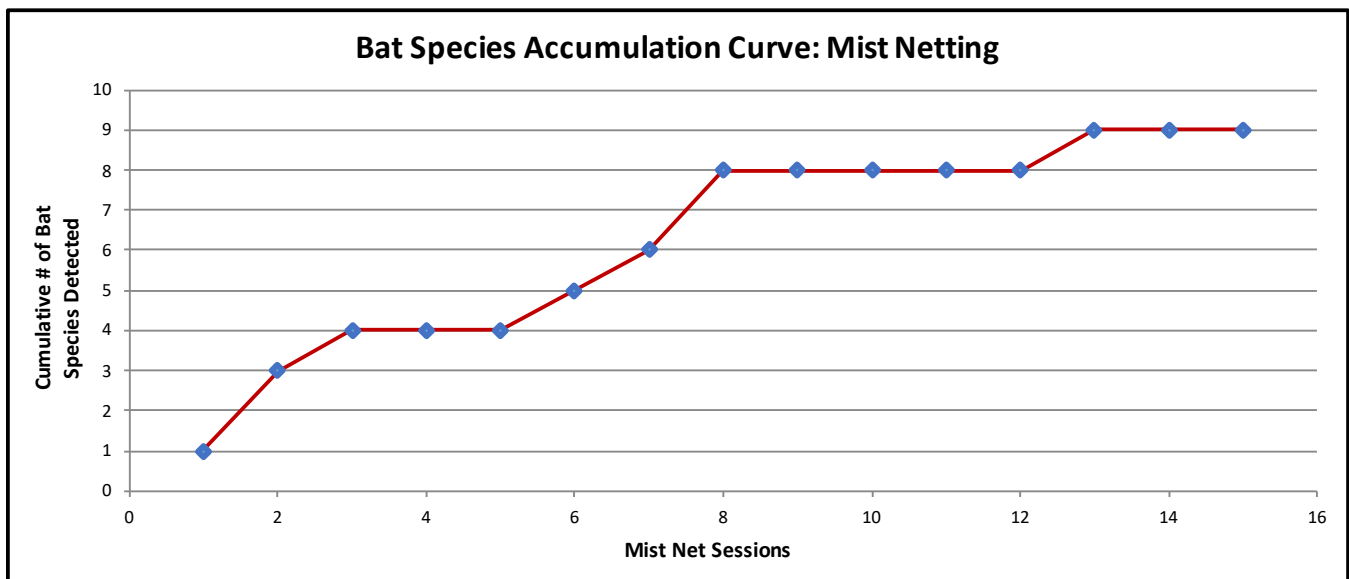


Figure 16. Species accumulation curve for bats detected by mist netting on the Rio Blanco Lake State Wildlife Area, 2018 – 2021.

CHAPTER 5. AMPHIBIANS AND REPTILES

Previous Work

Prior to this study essentially no data existed for amphibian or reptile (collectively herpetofauna) presence or distribution on the RBL-SWA. Hammerson (1999) includes maps of specimen records that suggest a number of species are relatively common in central Rio Blanco County, but none of those records can be specifically tied to the RBL-SWA. The northern portion of the Colorado Plateau physiographic province (where the RBL-SWA is located), and the White River watershed in particular, has relatively low herpetofauna diversity compared to most other areas of western Colorado (Hammerson 1999). However, the fairly high diversity of landforms and associated habitat types found on the RBL-SWA suggests that a reasonable diversity of herpetofauna may be expected.

Methods

We did not specifically survey for amphibians or reptiles as part of this study due to limited time and competing work priorities. However, we did take advantage of significant time spent on the property to accumulate a list of herpetofauna encountered opportunistically during fieldwork for the other taxa.

Results

We detected eight species of herpetofauna (2 amphibians, 6 reptiles) on the RBL-SWA during this study. One species not native to western Colorado, the painted turtle (*Chrysemys picta*), was detected on the property. All other herpetofauna documented on the property are native to the area. Appendix V includes information on each detection record and Appendix VI includes a map depicting all herpetofauna records on/near the RBL-SWA during this study.

Discussion

Of the eight species of herpetofauna recorded on the RBL-SWA during this study, two are listed as Species of Greatest Conservation Need (SGCN) in Colorado's 2015 State Wildlife Action Plan. The northern leopard frog (*Rana pipiens*) is a Tier I SGCN and listed by CPW as State Special Concern. This species was commonly encountered and widespread across all suitable habitats on the RBL-SWA (Appendix VI) including emergent marshes, flooded hayfields, riparian areas, and Rio Blanco Lake itself. This is promising news for northern leopard frogs in central Rio Blanco County as there are reports of recent population declines and local extirpations across the

Rocky Mountain Region (Smith and Keinath 2007). We also documented the midget-faded rattlesnake (*Crotalus oreganus concolor*), a Tier II SGCN and State Special Concern species, on the property. The midget-faded rattlesnake is currently recognized as a subspecies of the western rattlesnake and has a distribution limited to the northern Colorado Plateau ecoregion of western Colorado, eastern Utah, and extreme southwestern Wyoming. We collected one midget-faded rattlesnake on the property as a roadkill on State Highway 64 at the base of a pinyon-juniper hillside in July 2020. Both the midget-faded rattlesnake and prairie rattlesnake (*C. viridis*) occur in central Rio Blanco County, but the midget-faded is generally restricted to areas with rock outcrops and they are largely associated with geology of the Green River Formation. This does appear to be an area of intergradation for the two rattlesnakes (Hammerson 1999) but expert inspection of our specimen reported traits consistent with *C. oreganus concolor* (S. Mackessy, personal communication, July 2020).

We documented painted turtles at two locations on the RBL-SWA on June 14, 2021 – in Rio Blanco Lake and in a small pond/wetland located between the lake and the White River. A total of four turtles were confirmed on the property that day. Painted turtles are native to eastern Colorado and a small area of extreme southwest Colorado in tributaries of the San Juan River (Hammerson 1999). There are also reports of introduced populations in Mesa and Delta counties, but to our knowledge this is the first report of the painted turtle in Rio Blanco County or the White River watershed. Painted turtles in northwest Colorado are considered introduced, non-native species. It is unclear how long turtles have been present on the property or if the turtles at RBL-SWA represent a breeding population.

Three amphibian species that we did not detect also potentially occur on the property based on the presence of suitable habitat and nearby records - the western tiger salamander (*Ambystoma mavoritum*), Woodhouse's toad (*Anaxyrus woodhousii*), and Great Basin spadefoot (*Spea intermontana*). In addition, lizards in the genus *Sceloporus* are common and widespread in central Rio Blanco County and are likely to occur on the property in upland habitats with pinyon-juniper woodland and rock outcrops.

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APPENDIX I.

List of all bird, mammal, amphibian, and reptile species detected on the Rio Blanco Lake State Wildlife area, 2017 – 2021. Common and scientific nomenclature adheres to Chesser et al. (2021), Armstrong et al. (2011), and Hammer-son (1999).

Birds			
Family	Common Name	Scientific Name	Status*
Anatidae	Snow Goose	<i>Anser caerulescens</i>	
	Cackling Goose	<i>Branta hutchinsii</i>	
	Canada Goose	<i>Branta canadensis</i>	
	Trumpeter Swan	<i>Cygnus buccinator</i>	
	Tundra Swan	<i>Cygnus columbianus</i>	
	Wood Duck	<i>Aix sponsa</i>	
	Blue-winged Teal	<i>Spatula discors</i>	
	Cinnamon Teal	<i>Spatula cyanoptera</i>	
	Northern Shoveler	<i>Spatula clypeata</i>	
	Gadwall	<i>Mareca strepera</i>	
	American Wigeon	<i>Mareca americana</i>	
	Mallard	<i>Anas platyrhynchos</i>	
	Northern Pintail	<i>Anas acuta</i>	
	Green-winged Teal	<i>Anas crecca</i>	
	Canvasback	<i>Aythya valisineria</i>	
	Redhead	<i>Aythya americana</i>	
	Ring-necked Duck	<i>Aythya collaris</i>	
	Lesser Scaup	<i>Aythya affinis</i>	
	Bufflehead	<i>Bucephala albeola</i>	
	Common Goldeneye	<i>Bucephala clangula</i>	
Hooded Merganser	<i>Lophodytes cucullatus</i>		
Common Merganser	<i>Mergus merganser</i>		
Red-breasted Merganser	<i>Mergus serrator</i>		
Ruddy Duck	<i>Oxyura jamaicensis</i>		
Phasianidae	Wild Turkey	<i>Meleagris gallopavo</i>	
	Greater Sage-grouse	<i>Centrocercus urophasianus</i>	Tier 1 SGCN, SC
	Ring-necked Pheasant	<i>Phasianus colchicus</i>	Non-native
	Chukar	<i>Alectoris chukar</i>	Non-native
Podicipedidae	Pied-billed Grebe	<i>Podilymbus podiceps</i>	
	Eared Grebe	<i>Podiceps nigricollis</i>	
	Western Grebe	<i>Aechmophorus occidentalis</i>	
Columbidae	Rock Pigeon	<i>Columba livia</i>	Non-native
	Eurasian Collared-dove	<i>Streptopelia decaocto</i>	Non-native
	Mourning Dove	<i>Zenaidura macroura</i>	
Caprimulgidae	Common Nighthawk	<i>Chordeiles minor</i>	
	Common Poorwill	<i>Phalaenoptilus nuttallii</i>	

Birds			
Family	Common Name	Scientific Name	Status*
Trochilidae	Black-chinned Hummingbird	<i>Archilochus alexandri</i>	
	Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	
	Rufous Hummingbird	<i>Selasphorus rufus</i>	Tier 2 SGCN
Rallidae	Virginia Rail	<i>Rallus limicola</i>	
	Sora	<i>Porzana carolina</i>	
	American Coot	<i>Fulica americana</i>	
Gruidae	Sandhill Crane	<i>Antigone canadensis</i>	Tier 1 SGCN, SC
Recurvirostridae	Black-necked Stilt	<i>Himantopus mexicanus</i>	
	American Avocet	<i>Recurvirostra americana</i>	
Charadriidae	Killdeer	<i>Charadrius vociferus</i>	
	Semipalmated Plover	<i>Charadrius semipalmatus</i>	
	Snowy Plover	<i>Charadrius nivosus</i>	Tier 2 SGCN, SC
Scolopacidae	Long-billed Curlew	<i>Numenius americanus</i>	Tier 2 SGCN, SC
	Marbled Godwit	<i>Limosa fedoa</i>	
	Sanderling	<i>Calidris alba</i>	
	Dunlin	<i>Calidris alpina</i>	
	Baird's Sandpiper	<i>Calidris bairdii</i>	
	Least Sandpiper	<i>Calidris minutilla</i>	
	Western Sandpiper	<i>Calidris mauri</i>	
	Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	
	Wilson's Snipe	<i>Gallinago delicata</i>	
	Spotted Sandpiper	<i>Actitis macularius</i>	
	Solitary Sandpiper	<i>Tringa solitaria</i>	
	Lesser Yellowlegs	<i>Tringa flavipes</i>	
	Willet	<i>Tringa semipalmata</i>	
	Greater Yellowlegs	<i>Tringa melanoleuca</i>	
	Wilson's Phalarope	<i>Phalaropus tricolor</i>	
Red-necked Phalarope	<i>Phalaropus lobatus</i>		
Laridae	Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	
	Franklin's Gull	<i>Leucophaeus pipixcan</i>	
	Ring-billed Gull	<i>Larus delawarensis</i>	
	California Gull	<i>Larus californicus</i>	
	Caspian Tern	<i>Hydroprogne caspia</i>	
	Black Tern	<i>Chlidonias niger</i>	Tier 2 SGCN
	Common Tern	<i>Sterna hirundo</i>	
	Forster's Tern	<i>Sterna forsteri</i>	
Gaviidae	Common Loon	<i>Gavia immer</i>	
Phalacrocoracidae	Double-crested Cormorant	<i>Phalacrocorax auritus</i>	

Birds			
Family	Common Name	Scientific Name	Status*
Pelecanidae	American White Pelican	<i>Pelecanus erythrorhynchos</i>	Tier 2 SGCN
Ardeidae	Great Blue Heron	<i>Ardea herodias</i>	
	Snowy Egret	<i>Egretta thula</i>	
	Black-Crowned Night-Heron	<i>Nycticorax nycticorax</i>	
Threskiornithidae	White-faced Ibis	<i>Plegadis chihi</i>	Tier 2 SGCN
Cathartidae	Turkey Vulture	<i>Cathartes aura</i>	
Pandionidae	Osprey	<i>Pandion haliaetus</i>	
Accipitridae	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Tier 2 SGCN, SC
	Northern Harrier	<i>Circus hudsonius</i>	Tier 2 SGCN
	Sharp-shinned Hawk	<i>Accipiter striatus</i>	
	Cooper's Hawk	<i>Accipiter cooperii</i>	
	Swainson's Hawk	<i>Buteo swainsoni</i>	Tier 2 SGCN
	Red-tailed Hawk	<i>Buteo jamaicensis</i>	
	Rough-legged Hawk	<i>Buteo lagopus</i>	
	Golden Eagle	<i>Aquila chrysaetos</i>	Tier 1 SGCN
Strigidae	Great Horned Owl	<i>Bubo virginianus</i>	
	Northern Pygmy-Owl	<i>Glaucidium gnoma</i>	
	Long-eared Owl	<i>Asio otus</i>	
Alcedinidae	Belted Kingfisher	<i>Megaceryle alcyon</i>	
Picidae	Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	
	American Three-toed Woodpecker	<i>Picoides dorsalis</i>	
	Downy Woodpecker	<i>Dryobates pubescens</i>	
	Hairy Woodpecker	<i>Dryobates villosus</i>	
	Northern Flicker	<i>Colaptes auratus</i>	
Falconidae	American Kestrel	<i>Falco sparverius</i>	
	Merlin	<i>Falco columbarius</i>	
	Peregrine Falcon	<i>Falco peregrinus</i>	Tier 2 SGCN, SC
	Prairie Falcon	<i>Falco mexicanus</i>	Tier 2 SGCN
Tyrannidae	Western Wood-Pewee	<i>Contopus sordidulus</i>	
	Willow Flycatcher	<i>Empidonax traillii</i>	
	Gray Flycatcher	<i>Empidonax wrightii</i>	
	Dusky Flycatcher	<i>Empidonax oberholseri</i>	
	Say's Phoebe	<i>Sayornis saya</i>	
	Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	
	Western Kingbird	<i>Tyrannus verticalis</i>	
	Eastern Kingbird	<i>Tyrannus tyrannus</i>	
Laniidae	Loggerhead Shrike	<i>Lanius ludovicianus</i>	Tier 2 SGCN
	Northern Shrike	<i>Lanius borealis</i>	

Birds			
Family	Common Name	Scientific Name	Status*
Vireonidae	Plumbeous Vireo	<i>Vireo plumbeus</i>	
	Warbling Vireo	<i>Vireo gilvus</i>	
Corvidae	Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	Tier 2 SGCN
	Woodhouse's Scrub Jay	<i>Aphelocoma woodhouseii</i>	
	Clark's Nutcracker	<i>Nucifraga columbiana</i>	
	Black-billed Magpie	<i>Pica hudsonia</i>	
	American Crow	<i>Corvus brachyrhynchos</i>	
	Common Raven	<i>Corvus corax</i>	
Alaudidae	Horned Lark	<i>Eremophila alpestris</i>	
Hirundinidae	Bank Swallow	<i>Riparia riparia</i>	
	Tree Swallow	<i>Tachycineta bicolor</i>	
	Violet-green Swallow	<i>Tachycineta thalassina</i>	
	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	
	Barn Swallow	<i>Hirundo rustica</i>	
	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	
Paridae	Black-capped Chickadee	<i>Poecile atricapillus</i>	
	Mountain Chickadee	<i>Poecile gambeli</i>	
	Juniper Titmouse	<i>Baeolophus ridgwayi</i>	Tier 2 SGCN
Aegithalidae	Bushtit	<i>Psaltriparus minimus</i>	
Sittidae	Red-breasted Nuthatch	<i>Sitta canadensis</i>	
	White-breasted Nuthatch	<i>Sitta carolinensis</i>	
Troglodytidae	Rock Wren	<i>Salpinctes obsoletus</i>	
	Canyon Wren	<i>Catherpes mexicanus</i>	
	House Wren	<i>Troglodytes aedon</i>	
	Marsh Wren	<i>Cistothorus palustris</i>	
	Bewick's Wren	<i>Thryomanes bewickii</i>	
Poliophtilidae	Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	
Regulidae	Ruby-crowned Kinglet	<i>Corthylio calendula</i>	
Turdidae	Mountain Bluebird	<i>Sialia currucoides</i>	
	Townsend's Solitaire	<i>Myadestes townsendi</i>	
	Hermit Thrush	<i>Catharus guttatus</i>	
	American Robin	<i>Turdus migratorius</i>	
Mimidae	Gray Catbird	<i>Dumetella carolinensis</i>	
	Sage Thrasher	<i>Oreoscoptes montanus</i>	
	Northern Mockingbird	<i>Mimus polyglottos</i>	
Sturnidae	European Starling	<i>Sturnus vulgaris</i>	Non-native
Bombycillidae	Cedar Waxwing	<i>Bombycilla cedrorum</i>	

Birds			
Family	Common Name	Scientific Name	Status*
Motacillidae	American Pipit	<i>Anthus rubescens</i>	
Fringillidae	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	
	Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>	
	House Finch	<i>Haemorhous mexicanus</i>	
	Cassin's Finch	<i>Haemorhous cassinii</i>	
	Pine Siskin	<i>Spinus pinus</i>	
	Lesser Goldfinch	<i>Spinus psaltria</i>	
	American Goldfinch	<i>Spinus tristis</i>	
Passerellidae	Lark Sparrow	<i>Chondestes grammacus</i>	
	Lark Bunting	<i>Calamospiza melanocorys</i>	Tier 2 SGCN
	Chipping Sparrow	<i>Spizella passerina</i>	
	Brewer's Sparrow	<i>Spizella breweri</i>	Tier 2 SGCN
	American Tree Sparrow	<i>Spizelloides arborea</i>	
	Dark-eyed Junco	<i>Junco hyemalis</i>	
	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	
	Harris's Sparrow	<i>Zonotrichia querula</i>	
	White-throated Sparrow	<i>Zonotrichia albicollis</i>	
	Savannah Sparrow	<i>Passerculus sandwichensis</i>	
	Vesper Sparrow	<i>Poocetes gramineus</i>	
	Sagebrush Sparrow	<i>Artemisiospiza nevadensis</i>	Tier 2 SGCN
	Song Sparrow	<i>Melospiza melodia</i>	
	Lincoln's Sparrow	<i>Melospiza lincolnii</i>	
	Green-tailed Towhee	<i>Pipilo chlorurus</i>	
Spotted Towhee	<i>Pipilo maculatus</i>		
Icteriidae	Yellow-breasted Chat	<i>Icteria virens</i>	
	Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	
	Western Meadowlark	<i>Sturnella neglecta</i>	
	Bullock's Oriole	<i>Icterus bullockii</i>	
	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	
	Brown-headed Cowbird	<i>Molothrus ater</i>	
	Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	
	Common Grackle	<i>Quiscalus quiscula</i>	

Birds			
Family	Common Name	Scientific Name	Status*
Parulidae	Northern Waterthrush	<i>Parkesia noveboracensis</i>	
	Orange-crowned Warbler	<i>Leiothlypis celata</i>	
	Nashville Warbler	<i>Leiothlypis ruficapilla</i>	
	Virginia's Warbler	<i>Leiothlypis virginiae</i>	Tier 2 SGCN
	MacGillivray's Warbler	<i>Geothlypis tolmiei</i>	
	Common Yellowthroat	<i>Geothlypis trichas</i>	
	Yellow Warbler	<i>Setophaga petechia</i>	
	Yellow-rumped Warbler	<i>Setophaga coronata</i>	
	Black-throated Gray Warbler	<i>Setophaga nigrescens</i>	
Wilson's Warbler	<i>Cardellina pusilla</i>		
Cardinalidae	Western Tanager	<i>Piranga ludoviciana</i>	
	Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	
	Blue Grosbeak	<i>Passerina caerulea</i>	
	Lazuli Bunting	<i>Passerina amoena</i>	Tier 2 SGCN

*Status: SGCN = Species of Greatest Conservation Need (from Colorado's 2015 State Wildlife Action Plan), SC = State Species of Concern

Mammals			
Family	Common Name	Scientific Name	Status*

Soricidae	Dusky Shrew	<i>Sorex monticolus</i>	
Vespertilionidae	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	
	Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	
	Long-eared Myotis	<i>Myotis evotis</i>	
	Little Brown Myotis	<i>Myotis lucifugus</i>	Tier 1 SGCN
	Long-legged Myotis	<i>Myotis volans</i>	
	Yuma Myotis	<i>Myotis yumanensis</i>	
	Fringed Myotis	<i>Myotis thysanodes</i>	Tier 1 SGCN
	Canyon Bat	<i>Parastrellus hesperus</i>	
	Hoary Bat	<i>Lasiurus cinereus</i>	Tier 2 SGCN
Sciuridae	Big Brown Bat	<i>Eptesicus fuscus</i>	
	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Tier 1 SGCN, SC
	Least Chipmunk	<i>Neotamias minimus</i>	
	Yellow-bellied Marmot	<i>Marmota flaviventris</i>	
	Rock Squirrel	<i>Otospermophilus variegatus</i>	
	Golden-mantled Ground Squirrel	<i>Callospermophilus lateralis</i>	
Castoridae	Wyoming Ground Squirrel	<i>Urocitellus elegans</i>	
	Pine Squirrel	<i>Tamiasciurus hudsonicus</i>	
Castoridae	American Beaver	<i>Castor canadensis</i>	
Dipodidae	Western Jumping Mouse	<i>Zapus princeps</i>	
Cricetidae	Montane Vole	<i>Microtus montanus</i>	
	Common Muskrat	<i>Ondatra zibethicus</i>	
	Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	
	Deer Mouse	<i>Peromyscus maniculatus</i>	
	Pinyon Mouse	<i>Peromyscus truei</i>	
Leporidae	Desert Cottontail	<i>Sylvilagus audubonii</i>	
Felidae	Mountain Lion	<i>Puma concolor</i>	
	Bobcat	<i>Lynx rufus</i>	
Canidae	Coyote	<i>Canis latrans</i>	
	Gray Fox	<i>Urocyon cinereoargenteus</i>	
	Red Fox	<i>Vulpes vulpes</i>	
Ursidae	Black Bear	<i>Ursus americanus</i>	
Mustelidae	American Mink	<i>Neovison vison</i>	
Mephitidae	Striped Skunk	<i>Mephitis mephitis</i>	
Procyonidae	Northern Raccoon	<i>Procyon lotor</i>	
Cervidae	American Elk	<i>Cervus canadensis</i>	
	Mule Deer	<i>Odocoileus hemionus</i>	
Antilocapridae	Pronghorn	<i>Antilocapra americana</i>	

*Status: SGCN = Species of Greatest Conservation Need (from Colorado's 2015 State Wildlife Action Plan), SC = State Species of Concern

Amphibians

Family	Common Name	Scientific Name	Status*
Hylidae	Boreal Chorus Frog**	<i>Pseudacris maculata</i>	
Ranidae	Northern Leopard Frog	<i>Rana pipiens</i>	Tier 1 SGCN, SC

*Status: SGCN = Species of Greatest Conservation Need (from Colorado's 2015 State Wildlife Action Plan), SC = State Species of Concern

**Hammerson (1999) reported this species as the western chorus frog (*Pseudacris triseriata*) but the taxonomic status of chorus frogs in North America has been debated in recent decades and more recent sources (e.g. Lemmon et al. 2007) consider frogs from Colorado to be *P. maculata*.

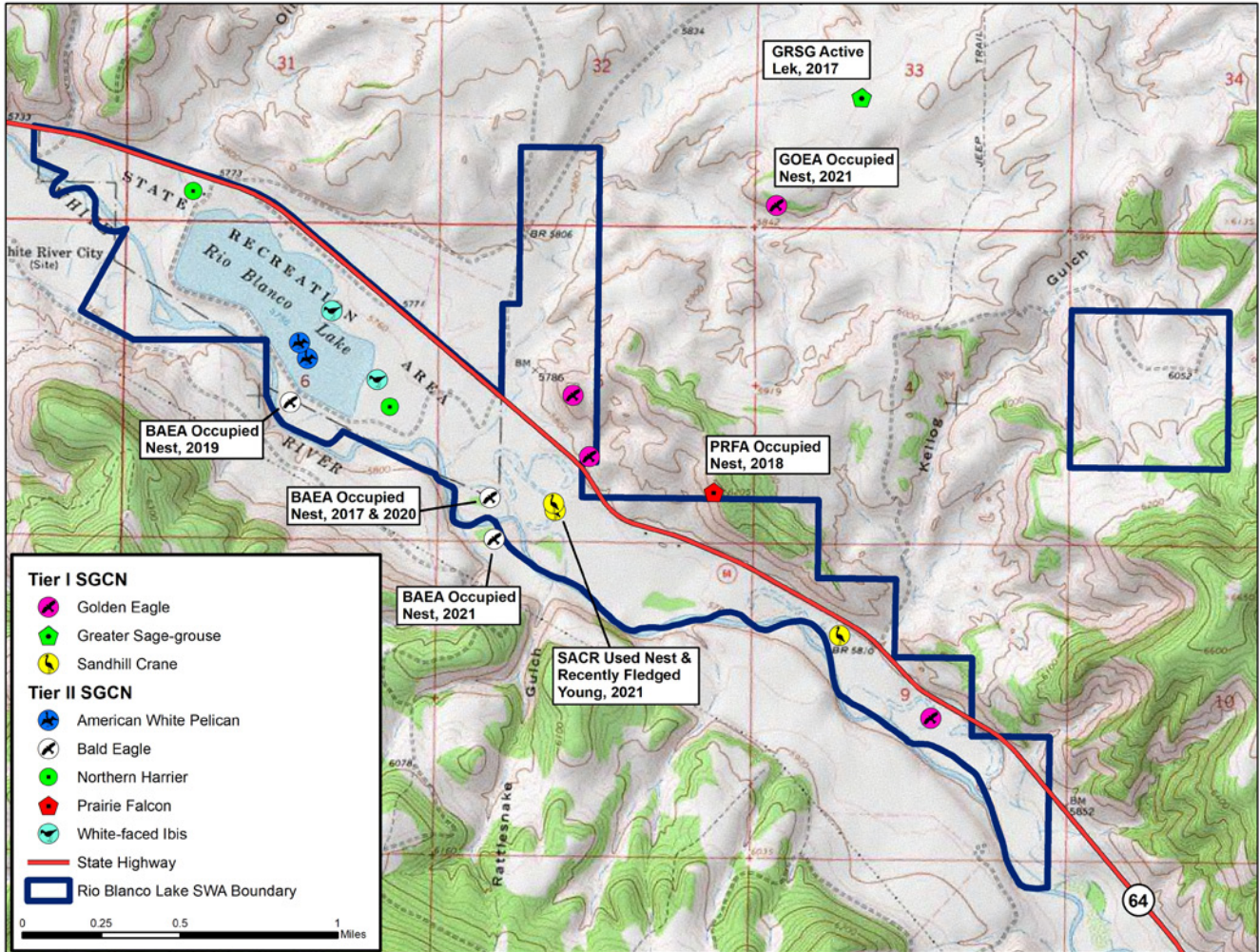
Reptiles

Family	Common Name	Scientific Name	Status*
Emydidae	Painted Turtle	<i>Chrysemys picta</i>	Non-native
Colubridae	Yellow-bellied Racer	<i>Coluber constrictor</i>	
	Western Terrestrial Garter	<i>Thamnophis elegans</i>	
	Bullsnake	<i>Pituophis catenifer</i>	
Viperidae	Midget Faded Rattlesnake	<i>Crotalus oreganus concolor</i>	Tier 2 SGCN, SC
	Prairie Rattlesnake	<i>Crotalus viridis</i>	

*Status: SGCN = Species of Greatest Conservation Need (from Colorado's 2015 State Wildlife Action Plan), SC = State Species of Concern

APPENDIX II.

Map of Colorado Species of Greatest Conservation Need (SGCN) bird observations on/near the Rio Blanco Lake State Wildlife Area, 2017 – 2021. Some SGCN detected during area searches are not represented on this map because precise location data was not recorded. Notes on this map indicate observations with probable or confirmed breeding evidence.



APPENDIX III.

Breeding status for bird species detected on the Rio Blanco Lake State Wildlife Area, 2017 – 2021.

Species	Breeding Status	Breeding Evidence
Snow Goose	N/A	---
Cackling Goose	N/A	---
Canada Goose	Confirmed	#, P, V, FL
Trumpeter Swan	N/A	---
Tundra Swan	N/A	---
Wood Duck	N/A	---
Blue-winged Teal	N/A	---
Cinnamon Teal	N/A	---
Northern Shoveler	N/A	---
Gadwall	Possible	#
American Wigeon	N/A	---
Mallard	Confirmed	#, P, NE
Northern Pintail	N/A	---
Green-winged Teal	Possible	#
Canvasback	N/A	---
Redhead	N/A	---
Ring-necked Duck	Possible	#
Lesser Scaup	N/A	---
Bufflehead	N/A	---
Common Goldeneye	N/A	---
Hooded Merganser	N/A	---
Common Merganser	Confirmed	#, FL
Red-breasted Merganser	N/A	---
Ruddy Duck	N/A	---
Wild Turkey	Confirmed	#, FL
Greater Sage-grouse	N/A	---
Ring-necked Pheasant	N/A	---
Chukar	N/A	---
Pied-billed Grebe	N/A	---
Eared Grebe	N/A	---
Western Grebe	N/A	---
Rock Pigeon	N/A	---
Eurasian Collared-dove	Possible	#
Mourning Dove	Probable	#, P
Common Nighthawk	Possible	#
Common Poorwill	Possible	#
Black-chinned Hummingbird	Probable	#, T, C
Broad-tailed Hummingbird	Possible	#
Rufous Hummingbird	N/A	---
Virginia Rail	N/A	---
Sora	Possible	#, X

Species	Breeding Status	Breeding Evidence
American Coot	Possible	#
Sandhill Crane	Confirmed	#, P, UN, FL
Black-necked Stilt	N/A	---
American Avocet	N/A	---
Killdeer	Confirmed	#, P, A, DD, FL
Semipalmated Plover	N/A	---
Snowy Plover	N/A	---
Long-billed Curlew	N/A	---
Marbled Godwit	N/A	---
Sanderling	N/A	---
Dunlin	N/A	---
Baird's Sandpiper	N/A	---
Least Sandpiper	N/A	---
Western Sandpiper	N/A	---
Long-billed Dowitcher	N/A	---
Wilson's Snipe	Possible	#
Spotted Sandpiper	Possible	#
Solitary Sandpiper	N/A	---
Lesser Yellowlegs	N/A	---
Willet	N/A	---
Greater Yellowlegs	N/A	---
Wilson's Phalarope	N/A	---
Red-necked Phalarope	N/A	---
Bonaparte's Gull	N/A	---
Franklin's Gull	N/A	---
Ring-billed Gull	N/A	---
California Gull	N/A	---
Caspian Tern	N/A	---
Black Tern	N/A	---
Common Tern	N/A	---
Forster's Tern	N/A	---
Common Loon	N/A	---
Double-crested Cormorant	N/A	---
American White Pelican	N/A	---
Great Blue Heron	Confirmed	#, P, V, NB, UN, FL, ON
Snowy Egret	N/A	---
Black-Crowned Night-Heron	N/A	---
White-faced Ibis	N/A	---
Turkey Vulture	N/A	---
Osprey	Confirmed	#, P, T, V, NB, UN, FL, ON, CF, FF
Bald Eagle	Confirmed	#, P, V, A, FL, ON
Northern Harrier	Confirmed	#, P, NB
Sharp-shinned Hawk	N/A	---

Species	Breeding Status	Breeding Evidence
Cooper's Hawk	<i>Confirmed</i>	#, P, T, ON
Swainson's Hawk	N/A	---
Red-tailed Hawk	Possible	#
Rough-legged Hawk	N/A	---
Golden Eagle	Probable	#, P, C
Great Horned Owl	Possible	#
Northern Pygmy-Owl	N/A	---
Long-eared Owl	Possible	X
Belted Kingfisher	Possible	#
Red-naped Sapsucker	N/A	---
American Three-toed Woodpecker	N/A	---
Downy Woodpecker	Probable	#, P
Hairy Woodpecker	Probable	#, V, A
Northern Flicker	<i>Confirmed</i>	#, V, ON
American Kestrel	<i>Confirmed</i>	#, P, V, A, FL
Merlin	N/A	---
Peregrine Falcon	N/A	---
Prairie Falcon	<i>Confirmed</i>	#, P, T, V, A, FL
Western Wood-Pewee	Possible	#, X
Willow Flycatcher	Possible	#
Gray Flycatcher	Possible	#, X
Dusky Flycatcher	Possible	#
Say's Phoebe	Possible	#
Ash-throated Flycatcher	Possible	#, X
Western Kingbird	Probable	#, X, P, T
Eastern Kingbird	<i>Confirmed</i>	#, X, T, V, A, FL, CF
Loggerhead Shrike	N/A	---
Northern Shrike	N/A	---
Plumbeous Vireo	Possible	#, X
Warbling Vireo	N/A	---
Pinyon Jay	N/A	---
Woodhouse's Scrub Jay	Possible	#
Clark's Nutcracker	Possible	#
Black-billed Magpie	<i>Confirmed</i>	#, P, NB, UN
American Crow	Possible	#
Common Raven	Possible	#
Horned Lark	Possible	#, X
Bank Swallow	<i>Confirmed</i>	#, V, ON
Tree Swallow	<i>Confirmed</i>	#, V, NB, CF
Violet-green Swallow	<i>Confirmed</i>	#, FL
Northern Rough-winged Swallow	Possible	#
Barn Swallow	<i>Confirmed</i>	#, T, V, A, NB, FL, ON, NY
Cliff Swallow	<i>Confirmed</i>	#, V, NB, ON, CF

Species	Breeding Status	Breeding Evidence
Black-capped Chickadee	Probable	#, X, P
Mountain Chickadee	Probable	#, X, P
Juniper Titmouse	Possible	#
Bushtit	Possible	#
Red-breasted Nuthatch	N/A	---
White-breasted Nuthatch	Possible	#, X
Rock Wren	Confirmed	#, X, M
Canyon Wren	Possible	#
House Wren	Confirmed	#, X, M, P, V, FL
Marsh Wren	Confirmed	#, X, M, P, T, V, A, ON, NY
Bewick's Wren	Possible	#
Blue-gray Gnatcatcher	Probable	#, X, M, P
Ruby-crowned Kinglet	N/A	---
Mountain Bluebird	Confirmed	#, X, M, FL
Townsend's Solitaire	N/A	---
Hermit Thrush	N/A	---
American Robin	Confirmed	#, X, M, P, T, V, A, NB, FL, CF
Gray Catbird	Probable	#, X, P
Sage Thrasher	Confirmed	#, FL
Northern Mockingbird	N/A	---
European Starling	Probable	#, X, V
Cedar Waxwing	Confirmed	#, FF
American Pipit	N/A	---
Evening Grosbeak	N/A	---
Gray-crowned Rosy-Finch	N/A	---
House Finch	N/A	---
Cassin's Finch	Confirmed	#, X, C, FL
Pine Siskin	N/A	---
Lesser Goldfinch	Possible	#
American Goldfinch	Probable	#, X, P
Lark Sparrow	Confirmed	#, C, CF
Lark Bunting	N/A	---
Chipping Sparrow	Confirmed	#, X, M, C, CF
Brewer's Sparrow	Possible	#, X
American Tree Sparrow	N/A	---
Dark-eyed Junco	N/A	---
White-crowned Sparrow	N/A	---
Harris's Sparrow	N/A	---
White-throated Sparrow	N/A	---
Savannah Sparrow	N/A	---
Vesper Sparrow	Probable	#, X, M
Sagebrush Sparrow	N/A	---
Song Sparrow	Probable	#, X, M, P, T, A

Species	Breeding Status	Breeding Evidence
Lincoln's Sparrow	N/A	---
Green-tailed Towhee	Possible	#
Spotted Towhee	Confirmed	#, X, M, FL
Yellow-breasted Chat	Possible	#
Yellow-headed Blackbird	Confirmed	#, X, FL
Western Meadowlark	Confirmed	#, X, M, P, T, V, FL
Bullock's Oriole	Confirmed	#, X, UN
Red-winged Blackbird	Confirmed	#, X, M, P, T, A, NB, FL, CF
Brown-headed Cowbird	Confirmed	#, X, M, P, C, FL, CF
Brewer's Blackbird	Confirmed	#, X, M, P, T, A, CF, NE
Common Grackle	N/A	---
Northern Waterthrush	N/A	---
Orange-crowned Warbler	Possible	#
Nashville Warbler	N/A	---
Virginia's Warbler	N/A	---
MacGillivray's Warbler	N/A	---
Common Yellowthroat	Probable	#, X, P
Yellow Warbler	Confirmed	#, X, M, P, V, A, NB
Yellow-rumped Warbler	N/A	---
Black-throated Gray Warbler	Probable	#, X, M
Wilson's Warbler	Possible	#, X
Western Tanager	Confirmed	#, FL
Black-headed Grosbeak	Possible	#, X
Blue Grosbeak	Possible	#
Lazuli Bunting	Confirmed	#, X, P, T, FL, CF

Breeding Codes – Possible Breeding Evidence

= Species seen or calls heard in suitable nesting habitat during the species' breeding season

X = Singing male present in suitable nesting habitat during the species' breeding season

Breeding Codes – Probable Breeding Evidence

M = Multiple males (seven or more singing males heard on one day in suitable nesting habitat)

P = Pair present in suitable nesting habitat during the species' breeding season

T = Territorial behavior indicating a breeding territory

C = Courtship behavior or copulation

A = Agitated behavior or anxiety calls from an adult that indicate nearby nest site and/or young

Breeding Codes – Confirmed Breeding Evidence

NB = Nest building or adult carrying nest material

DD = Distraction display or injury feigning by adult

FL = Recently fledged young of altricial species, or downy young of precocial species

ON = Occupied nest

CF = Adult carrying food for nestlings or fledglings

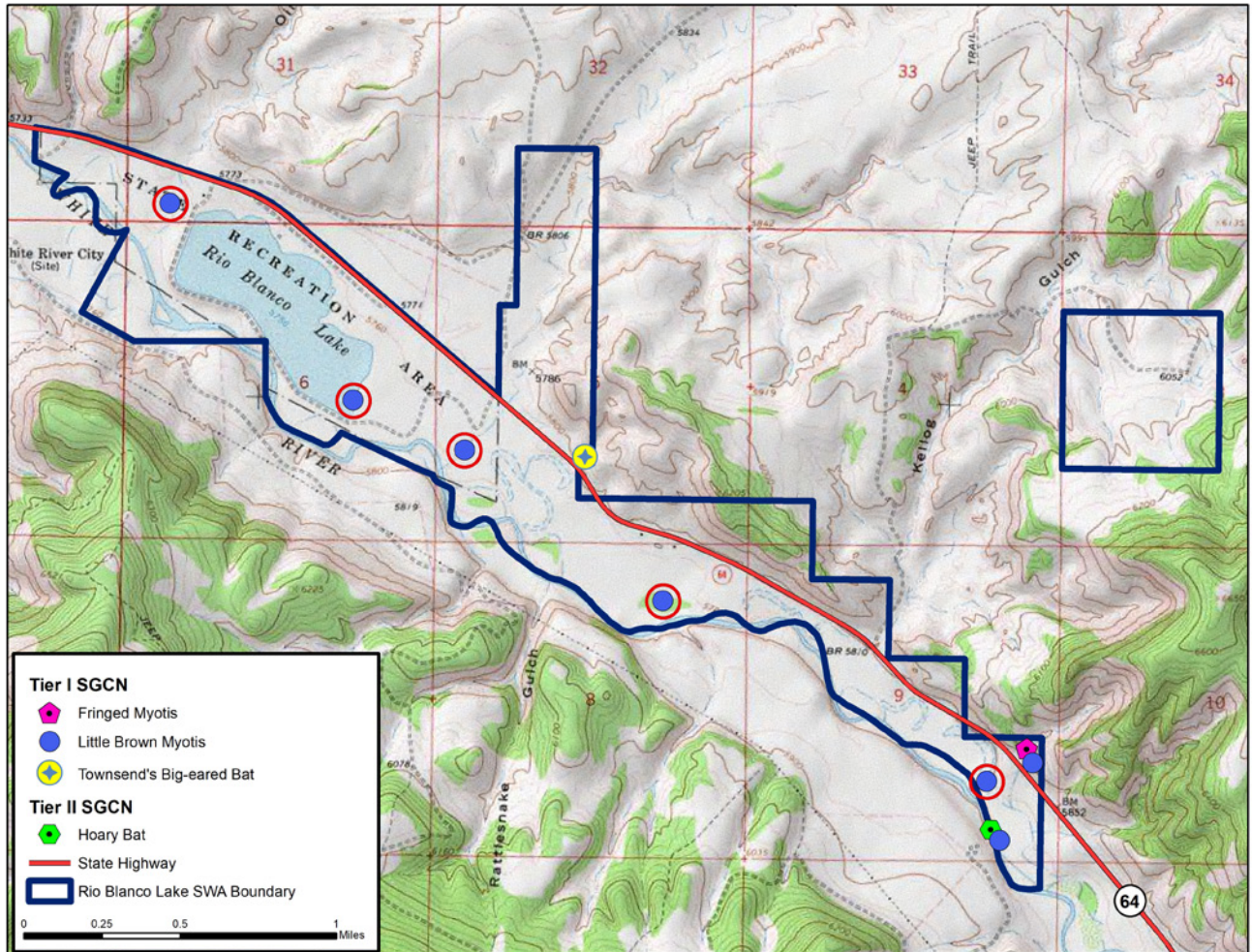
NE = Nest with eggs

NY = Nest with young seen or heard

N/A = Indicates that the species is not likely to breed on the RBL-SWA. Includes species detected during spring/fall migration or during winter only but not generally present throughout the breeding season.

APPENDIX IV.

Map of Colorado Species of Greatest Conservation Need mammal observations on the Rio Blanco Lake State Wildlife Area, 2017 – 2021. Bat locations encircled in red represent locations where the species was confirmed with acoustic detectors. All other locations are actual capture locations.



APPENDIX V.

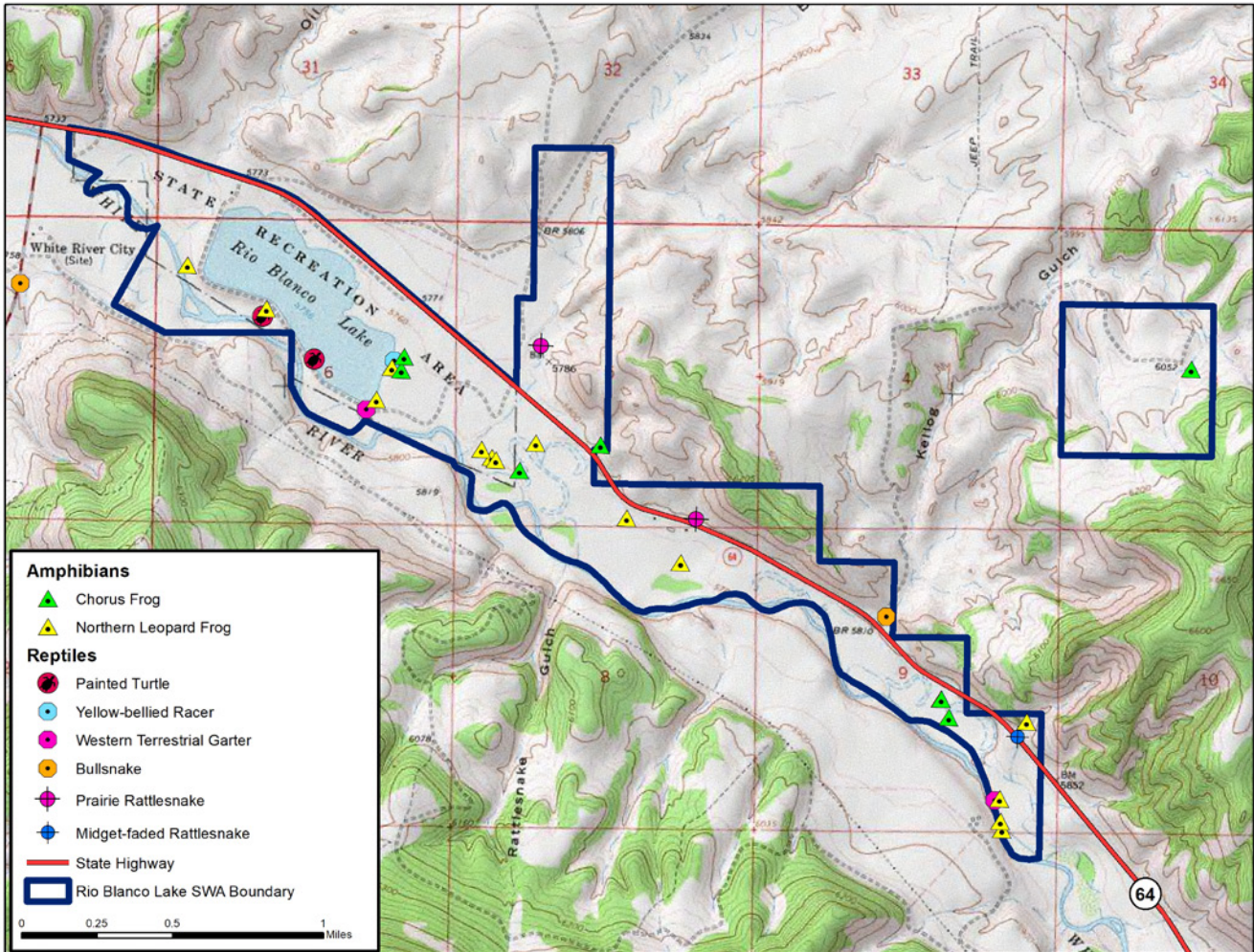
Amphibian and reptile records on/near the Rio Blanco Lake State Wildlife Area, 2018 – 2021.

Species	Latin Name	Individuals #	Date	Easting UTM (NAD83, Zone 12)	Northing	Comments
Amphibians						
Boreal Chorus Frog	<i>Pseudacris maculata</i>	1	4/11/2018	739235	4440336	
Boreal Chorus Frog	<i>Pseudacris maculata</i>	1	6/28/2018	741536	4439214	
Boreal Chorus Frog	<i>Pseudacris maculata</i>	0	7/31/2018	739661	4440491	
Boreal Chorus Frog	<i>Pseudacris maculata</i>	2	5/27/2019	741582	4439119	
Boreal Chorus Frog	<i>Pseudacris maculata</i>	5+	7/10/2019	742791	4441031	stock pond on Black Mountain Unit
Boreal Chorus Frog	<i>Pseudacris maculata</i>	1	9/14/2020	738583	4440843	
Boreal Chorus Frog	<i>Pseudacris maculata</i>	25+	5/5/2021	738594	4440917	
Northern Leopard Frog	<i>Rana pipiens</i>	1	6/27/2018	740115	4439882	
Northern Leopard Frog	<i>Rana pipiens</i>	1	6/28/2018	741535	4439215	
Northern Leopard Frog	<i>Rana pipiens</i>	1	7/23/2018	739029	4440440	
Northern Leopard Frog	<i>Rana pipiens</i>	~40	7/24/2018	739085	4440397	
Northern Leopard Frog	<i>Rana pipiens</i>	1	7/24/2018	739317	4440487	
Northern Leopard Frog	<i>Rana pipiens</i>	1	7/24/2018	739818	4440107	
Northern Leopard Frog	<i>Rana pipiens</i>	2	8/6/2018	737418	4441355	
Northern Leopard Frog	<i>Rana pipiens</i>	1	8/22/2018	741891	4438532	
Northern Leopard Frog	<i>Rana pipiens</i>	1	8/22/2018	741871	4438697	
Northern Leopard Frog	<i>Rana pipiens</i>	1	8/12/2019	741997	4439115	
Northern Leopard Frog	<i>Rana pipiens</i>	1	8/13/2019	741881	4438578	
Northern Leopard Frog	<i>Rana pipiens</i>	2+	6/16/2020	738532	4440855	
Northern Leopard Frog	<i>Rana pipiens</i>	10+	8/4/2020	738456	4440682	
Northern Leopard Frog	<i>Rana pipiens</i>	1	6/14/2021	737849	4441140	
Northern Leopard Frog	<i>Rana pipiens</i>	20+	9/2/2021	739107	4440386	

Species	Latin Name	Individuals #	Date	Easting UTM (NAD83, Zone 12)	Northing	Comments
Reptiles						
Painted Turtle	<i>Chrysemys picta</i>	2	6/14/2021	737830	4441099	unknown origin, species not native to western CO
Painted Turtle	<i>Chrysemys picta</i>	2	6/14/2021	738115	4440882	unknown origin, species not native to western CO
Yellow-bellied Racer	<i>Coluber constrictor</i>	1	5/6/2020	738542	4440868	found dead while working on wetland project
Western Terrestrial Garter	<i>Thamnophis elegans</i>	1	8/13/2019	741842	4438690	
Western Terrestrial Garter	<i>Thamnophis elegans</i>	1	6/16/2021	738402	4440628	
Bullsnake	<i>Pituophis catenifer</i>	1	5/29/2018	741221	4439644	
Bullsnake	<i>Pituophis catenifer</i>	1	9/14/2020	736528	4441220	roadkill on Rio Blanco County Road 5; off SWA
Midget-faded Rattlesnake	<i>Crotalus oreganus concolor</i>	1	7/23/2020	741949	4439031	roadkill on State Highway 64
Prairie Rattlesnake	<i>Crotalus viridis</i>	1	7/17/2020	739318	4441007	
Prairie Rattlesnake	<i>Crotalus viridis</i>	1	7/3/2019	740183	4440120	captured in small mammal trap

APPENDIX VI.

Map of all amphibian and reptile observations on/near the Rio Blanco Lake State Wildlife Area, 2018 – 2021.



APPENDIX VII.

Photographic vouchers of selected bird species documented on the Rio Blanco Lake State Wildlife Area, 2017 – 2021. [1] American White Pelicans (*Pelecanus erythrorhynchos*) during migration in April 2021; [2] Forster's Tern (*Sterna forsteri*) in non-breeding/late summer plumage (photo: Kathy Dunning); [3] White-faced Ibis (*Plegadis chihi*) on mudflat/shoreline habitat (photo: Dona Hilkey); [4] Cinnamon Teal (*Anas cyanoptera*) pair during migration on managed wetland (photo: Dona Hilkey); [5] Marsh Wren (*Cistothorus palustris*) in emergent marsh (photo: Erin Jones); [6] Eastern Kingbird (*Tyrannus tyrannus*) (photo: Erin Jones); [7] Song Sparrow (*Melospiza melodia*) (photo: Erin Jones).



APPENDIX VII.

Photographic vouchers of selected mammal species documented on the Rio Blanco Lake State Wildlife Area, 2017 – 2021. [1] Pronghorn (*Antilocapra americana*) on the Black Mountain Unit; [2] Mule Deer (*Odocoileus hemionus*) buck on the Roselund Unit; [3] Black Bear (*Ursus americanus*); [4] Bobcat (*Lynx rufus*) on the Black Mountain Unit; [5] Beaver (*Castor canadensis*); [6] Mountain Lion (*Puma concolor*).



