

# INITIAL ASSESSMENT OF RARE SPECIES, BIODIVERSITY, AND CONSERVATION ISSUES FOR THE ARAPAHO RANCH

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*29 June 2021*

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This report is an initial assessment of the biological diversity of the Arapaho Ranch, based on data on file at the Wyoming Natural Diversity Database (“WYNDD”; <http://www.uwyo.edu/wyndd/>). WYNDD is a Research and Service unit of the University of Wyoming dedicated to the collection and distribution of comprehensive information on the biological diversity of Wyoming.

WYNDD maintains a large database of information on the biological elements of Wyoming, managed by professional data specialists, zoologists, botanists, and ecologists. WYNDD scientists have extensive experience documenting and researching Wyoming biota in the field, including at sites near the Arapaho Ranch, but no experience doing so directly on the Ranch itself. Therefore, the information presented here would benefit from refinement by people with on-site experience. WYNDD looks forward to such refinements, and to discussing, clarifying, or elaborating anything in this report, as needed.

**Rare species expected to occur on Arapaho Ranch:** The attached species list was generated by querying the central WYNDD information system for rare species documented or predicted to occur in the HUC10 watersheds that generally encompass the Ranch. Please note that this list includes only species considered rare or of conservation concern in Wyoming - it does not include common species such as Mule Deer, Horned Lark, Mountain Big Sagebrush, etc., that are widespread and well-known residents of the area.

A species is considered an occupant of a target watershed if WYNDD has (a) a documented record of the species being observed in that watershed (columns D & E), (b) predicted habitat for the species in that watershed (column F), and/ or (c) mapped an overlap between the species’ range and that watershed (column G).

The attached list shows 163 species considered rare or of conservation concern in the area. Of that total, 105 (64%) are considered “Species of Greatest Conservation Need” by the Wyoming Game and Fish Department; 42 (26%) are designated “Sensitive” by the USDA Forest Service; 30 (18%) are designated “Sensitive” by the USDI Bureau of Land Management; and 6 (4%) have some current nexus with the U.S. Endangered Species Act (ESA). More details are available upon request.

**Vertebrate wildlife comments:** This area is something of a “donut hole” of occurrence data for many rare vertebrates – i.e., although there are good occurrence data on file for many species in the surrounding region, there is a paucity of field data available for the Ranch itself.

Bats are a major group of concern for the area. The Bighorn Basin as a whole is a “hotspot” of bat diversity in the region, supporting many species at relatively high densities. There is strong potential for large roosts and hibernacula on or near the Ranch, and such features are of significant conservation value. A novel fungal disease known as “white-nose syndrome”, which is most damaging to bats in large hibernation gatherings, threatens almost all bats in the region.

Several rare and important bird species likely occupy the Ranch. The area could be a significant breeding center for cliff-nesting raptors such as Golden Eagle and Peregrine Falcon. Juniper-specialist songbirds – e.g., Ash-throated Flycatcher, Black-throated Gray Warbler, Virginia’s Warbler, Pinyon Jay, Blue-gray Gnatcatcher – may be a similarly important group, depending on the extent and quality of Juniper-dominated habitats on the Ranch.

The area may support a relatively high diversity and density of reptiles, based on data from nearby sites. Also, the Ranch may support population segments of important amphibians like Western Toad, a species known to occur in nearby portions of the Owl Creek Mountains.

**Invertebrate wildlife comments:** The diversity and distributions of almost all Rocky Mountain invertebrates – including both rare and common species – are poorly understood. All areas within Wyoming have the potential to support rare and endemic invertebrate species (i.e., species that occur nowhere else in the world), and the north slope of the Owl Creek Mountains is no exception.

Most Wyoming mountain ranges support high densities of insect pollinators, with native bees and butterflies being especially important. There is a strong likelihood that the Ranch supports populations of Western Bumblebee and Suckley’s Cuckoo Bumblebee – both species are currently being considered for listing under ESA. Monarch Butterfly is an official Candidate for ESA listing, and is another likely occupant of the site.

The attached species list indicates several important aquatic invertebrates, including some rare snails and freshwater mussels, occurring in the general area, and potentially occupying the Ranch itself.

**Plant species comments:** Similar to the situation with vertebrate wildlife, this area is something of a “donut hole” of occurrence data for rare plants. The distributions and abundances of even common plants are not well known here, compared to the relatively abundant floristic data from adjacent areas.

Owl Creek Cryptantha, aka “Owl Creek Miners Candle”, is endemic to the Owl Creek and Bridger Mountains. It is possible that population segments occur on the Ranch. There are other plant species endemic to adjacent portions of the Bighorn Basin (e.g., Absaroka Beardtongue on the southern Absaroka Range) that may also extend onto the Ranch.

Depending on the extent of alpine and subalpine habitat on the Ranch, there is some potential for occurrence of a suite of alpine plant species that reach the southern limits of their continental ranges in northwestern Wyoming.

Stands of Whitebark Pine and Limber Pine provide important wildlife habitat and ecosystem services, and each species is currently subject to a range of threats. It is assumed that the Ranch supports Limber Pine broadly, and perhaps also Whitebark Pine at higher elevations. This is an issue perhaps better discussed under “Important habitat comments”, below, but Whitebark Pine is currently proposed for listing as Threatened under the ESA, making it something of a species-level priority as well.

**Important habitat comments:** The biological diversity of arid Rocky Mountain landscapes, such as the north slope of the Owl Creek Mountains, is strongly driven by the extent and quality of water-influenced habitats. Surface streams and associated riparian communities are the most obvious of such habitats, but springs, seeps, and fens (collectively referred to as “groundwater dependent ecosystems”) can strongly affect biological diversity as well as surface hydrology (especially late-season flows) of down-

basin stream segments. Also, active Beaver colonies are increasingly recognized as providing important ecosystem services in Rocky Mountain landscapes, including water and sediment storage and increased productivity of riparian vegetation.

Upland habitats with large influences on the biological diversity of the Ranch likely include foothills shrub communities, especially to the extent that they support berry-bearing species, and large stands of Aspen.

Invasive plants affect all habitats in the region, and it is important to understand the diversity, extent, trends, and effects of invasive plants broadly. Invasive species with particularly profound effects, such as Cheatgrass, are especially important to understand and address.

**Future information development:** A series of field and mapping efforts would generate actionable information for Ranch managers interested in maintaining and promoting biological diversity and conservation values.

--- *Multi-species bat surveys* --- Many different bat species can be surveyed simultaneously, over large areas, by combining audio detectors with mist-net capturing. The latter technique is critical to gaining information on the presence and extent of white-nose syndrome in local bat assemblages. This work would inform managers of priority bat species and habitats on the Ranch, and suggest management actions necessary to promote local bat populations and maximally contribute to regional bat diversity.

--- *Multi-species breeding bird surveys* --- Similarly, many different breeding bird species can be surveyed simultaneously using well-developed audio and visual detection methods. A better understanding of the bird assemblage, with attention to priority groups such as Juniper-specialists, would similarly inform managers of specific actions needed to enhance populations and best contribute to regional bird diversity.

--- *Floristic documentation, supplemented with targeted rare plant surveys* --- General floristics surveys that document the common flora, using the Rocky Mountain Herbarium (<http://www.uwyo.edu/botany/rocky-mountain-herbarium/>) as a specimen repository, can be paired efficiently with surveys that deliberately target particular rare plant species. Clearly documenting invasive plants at all survey sites would be an important component of this work. Careful mapping of rare plant “hotspots”, and overlaying such hotspots with invasive plant concentrations, would help managers better plan weed control actions that avoid impacts to important native plants.

Also, because general floristics collection would occur at sites spaced widely across the Ranch, there would be substantial efficiency in appending herpetological and invertebrate specialists to the floristics field crew to perform a general assay of reptiles, amphibians, and insect pollinators on the property. This would minimize travel costs, and help maximize information gathered per unit time in the field.

--- *Stream quality assessments* --- Structured collection of aquatic invertebrates, followed by careful analysis of the data (in particular, calculating precise ratios of mayflies : stoneflies : caddisflies) is a reliable way to assess the quality of Rocky Mountain streams. Such an assessment of Ranch streams would identify segments that could benefit from management attention, eventually promoting overall biological diversity and productivity.

--- *Assessment of groundwater dependent ecosystems (“GDE’s”)* --- Developing a Ranch-wide map of GDE’s, and assessing the condition of those GDE’s using methods recently developed by the Springs Stewardship Institute (<https://springstewardshipinstitute.org/>) and promoted by the USDA Forest Service, would provide managers a more complete picture of Ranch hydrology and the management actions needed to maintain it.

--- *Mapping extant, and potential, Beaver colonies and Beaver-affected stream segments* --- Mapping methods recently developed by Utah State University (<https://brat.riverscapes.xyz/assessment>) can be applied in conjunction with field surveys to map existing and potential future Beaver colonies on the Ranch, including identifying areas of potential conflict between Beaver activities and necessary human infrastructure such as roads and irrigation facilities. Managers can apply this information for long-term enhancement of water and sediment storage – and enhancement of biological diversity - through strategic management of Beaver populations.

--- *Condition assessments of Whitebark Pine, Limber Pine, Foothills Shrub, and Aspen communities* --- Careful measurement of plant composition, age structure of overstory dominant species, prevalence of invasive plants, and presence of special threat vectors in priority habitats will inform managers of the condition and likely persistence of those habitats, and suggest management actions to enhance and promote habitat quality.

WYNDD has successfully performed the field research and mapping efforts described above in many areas of Wyoming (copies of completed reports are available on request), and currently has personnel on staff with significant expertise in all of the appropriate thematic arenas.

We would welcome the chance to discuss performing this work on Arapaho Ranch, with a near-term goal of developing precise cost estimates and identifying possible funding sources.

Our fieldwork routinely involves students as paid field technicians and assistants, and we would like to explore employing tribal youth in any work we are privileged to conduct on the Ranch. We can also engage colleagues at University of Wyoming (<http://www.wyomingbiodiversity.org/>) who specialize in arranging community science/ citizen science events as well, if there is interest in involving more community members in on-ground work.