Clark's Nutcracker

Nucifraga columbiana

REGULATORY STATUS

USFWS: Migratory Bird
USFS R2: No special status
UWFS R4: No special status
Wyoming BLM: No special status
State of Wyoming: Protected Bird

CONSERVATION RANKS

USFWS: No special status
WGFD: NSS4 (Bc), Tier II
WYNDD: G5, S3S4
Wyoming contribution: LOW
IUCN: Least Concern
PIF Continental Concern Score: 10

STATUS AND RANK COMMENTS

The Wyoming Natural Diversity Database has assigned Clark's Nutcracker (*Nucifraga columbiana*) a range of state conservation ranks due to uncertainties in actual abundance within the state and the severity of extrinsic stressors.

NATURAL HISTORY

Taxonomy:

Clark's Nutcracker is the only North American bird in the genus *Nucifraga*. The Spotted Nutcracker (*N. caryocatactes*) is the only other species in the genus, but is completely restricted to Eurasia [1]. No subspecies of Clark's Nutcracker are recognized. Recent work has confirmed that populations are not highly differentiated across their range, likely a result of gene flow from periodic mass irruptions that swamp local adaptation except in peripheral populations [2].

Description:

Clark's Nutcracker is a jay-sized corvid associated with conifer forests. It has crow-like features (e.g., rounded head and short tail) and flight characteristics [1]. Sexes are similar in appearance, with males slightly larger than females. Plumage is primarily light to medium gray; wings are black with large white patches on the secondary flight feathers. Center of the tail is black, outlined by white outer feathers. Contrast between the white and black feathers on the wings and tail is striking in flight. The bill is long, pointed, and black with short nasal bristles; legs and feet are also black. The species has a unique sublingual pouch located below the tongue for carrying seeds. The distinctive guttural calls can be heard at great distance. Clark's Nutcracker is distinctive in appearance and not easily confused with other species. Gray Jay (*Perisoreus canadensis*) is most similar in appearance and habitat, but can be easily distinguished by its dark gray wings, lack of white on the wings and tail, and much shorter bill. Juvenile Clark's

Nutcracker is buffy gray and fluffy, often with dull black or brown wings. First-year birds are indistinguishable from adults by July.

Distribution & Range:
Clark's Nutcracker is widespread in Wyoming, with confirmed or circumstantial evidence of breeding in all but 4 latitude/longitude degree blocks [3]. It is found in conifer forests in all major mountain ranges in the state, but wanders widely during winter, even into urban areas where it frequents bird feeders (S. Patla, pers. obs.) [4]. Clark's Nutcracker breeds below the subalpine zone, but moves to higher elevations post-nesting when its preferred food of Whitebark Pine (*Pinus albicaulis)* seeds are abundant [5]. The species' continental range extends from central British Columbia and southwestern Alberta south through the Rocky Mountains to central Arizona and New Mexico, and as far west as California and Washington. An isolated, stable population exists in Nuevo Leon, Mexico. Large irruptions occur in some years in response to simultaneous cone crop failures of major seed sources with many birds moving to new areas both within and beyond the expected range [1, 6].

Habitat:
Clark's Nutcracker breeds in a variety of forest habitats from the lower montane to the subalpine zone, including pinon-juniper woodlands (*P. edulis, P. monophylla,* and *Juniperus* spp.), Ponderosa Pine (*P. ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), Jeffrey Pine (*P. jeffreyi*), and mixed coniferous subalpine communities which include Whitebark or Limber Pine (*P. flexilis*) [1]. The bird is an important seed disperser for many conifer species, especially Whitebark Pine, which is an obligate mutualist and depends entirely on the nutcracker for regeneration [7, 8]. Nutcrackers store excess conifer seeds when available in fall in thousands of individual seed caches to be retrieved later in the year. Cached seeds are important for both winter survival and spring breeding [7, 9]. Preferred habitat varies geographically, and size of home ranges varies by season, available seed crops, and breeding status [1, 5, 10]. Both altitudinal and latitudinal migrations occur in response to fluctuating conifer seed crops [1, 6, 10]. In western Wyoming, breeding and nonbreeding Clark's Nutcrackers strongly selected for Douglas fir habitat with home range size averaging 101 ha ± 23 ha for breeders compared to 202 ha ± 53 ha for nonbreeders [5]. In the Cascade Range of Washington, resident birds used mixed conifer (Ponderosa Pine, Douglas-fir) and Whitebark Pine habitat through the summer and then extended their ranges to forage in lower elevation areas after mid-September [10]. Summer habitat used in the subalpine zone throughout the western U.S. includes open to semi-open stands of shrubby Whitebark or Limber Pine often mixed with fir, spruce, or other pines growing on steep, rocky hillsides or on ridges interspersed with moist meadows, small lakes, and creeks with birds migrating to lower elevation areas in winter and spring [1]. In winter Clark's Nutcracker uses generally similar habitats but often increases use of lower elevations to avoid deep mountain snow [1].

Phenology:
Breeding begins in the second winter, and pairs remain together year-round [9]. Clark's Nutcracker breeds exceptionally early, with courtship beginning in January and nest building starting in early March [1, 5, 9]. Eggs are laid in March and April; clutches range from 2–5 eggs. Both males and females develop incubation patches, but females spend more time on the nest. Incubation lasts 18–22 days. Nestlings remain in the nest for 20 days, and fledge in April and May. Young remain dependent on parents through mid-August. Birds that nest at lower elevations will travel to subalpine elevations in late summer to collect and cache seeds, sometimes traveling > 30 km [11]. Within the same population some birds may migrate altitudinally while others remain year-

round on stable home ranges [10]. Severe cone crop failures cause many birds to wander widely in search of food and new ranges, resulting in Clark's Nutcracker appearing in unusual habitats well outside of its normal distribution [1]. In years with low Whitebark Pine cone production and high snow pack, a population of Clark's Nutcrackers was found to forgo reproduction completely but remained in the same breeding area in western Wyoming [12].

Diet:

Clark's Nutcracker is a conifer seed specialist, and its diet year-round consists mainly of fresh and stored pine seeds [1]. Nestlings and fledglings are also fed stored seeds. Seed sources vary geographically and seasonally. In the Northern Rocky Mountains, Whitebark, Limber, and Ponderosa Pines and Douglas-fir are the most commonly used species, with the latter species possibly being especially important in areas where large-seeded pines are declining [1, 5]. Birds collect seeds directly from cones and transport uneaten seeds in the sublingual pouch to multiple cache sites in litter, soil, logs, stumps and similar structures [1]. Clark's Nutcracker also opportunistically feeds on insects, small mammals, and carrion throughout the year [13, 14]. Main insect orders eaten include Coleoptera (beetles), Hymenoptera (bees and ants), Orthoptera (grasshoppers and crickets), Lepidoptera (moths and butterflies), Diptera (flies), Plecoptera (stone flies), and Homoptera (leafhoppers) [13]. Invertebrates may comprise a more important part of the breeding season diet than previously documented [5].

CONSERVATION CONCERNS

Abundance:

Continental: WIDESPREAD

Wyoming: UNCOMMON

Using North American Breeding Bird Survey (BBS) data, the Partners in Flight (PIF) Science Committee estimated the global population of Clark's Nutcracker to be 230,000 birds [15]. Extrapolation suggests approximately 14.5% of the global population, or around 30,000 birds, could breed in Wyoming [16], but this estimate should be viewed with caution. The species' habit of concentrating in areas of high food availability makes precise abundance estimation especially difficult. The statewide rank of UNCOMMON is based on the limited area of the state known to be occupied in any given season, and the relatively small coverage of suitable habitat within that area. However, within suitable habitat in the occupied area, Clark's Nutcracker appears to be common and is usually encountered during surveys that could be expected to indicate its presence [3]. Clark's Nutcracker density (number of birds per square km) and population size estimates for Wyoming are available from the Integrated Monitoring in Bird Conservation Regions (IMBCR) program for the years 2009–2015 [17].

Population Trends:

Historic: UNKNOWN

Recent: MODERATE DECLINE

There are no reliable data from which to infer historic population trends for Clark's Nutcracker. The species' habits of concentrating in areas of high food availability and variable reproductive output depending on food availability makes trend estimation especially difficult. Data from the IMBCR effort suggest a possible population decline over the past seven years, but may not yet be complete enough to use for robust trend estimation. Data from the BBS suggest a statistically insignificant moderate decline of 0.83 annually (N = 46 routes, 95% CI: -3.36–1.15) from 1968–

2013 [18]. Population declines in Glacier National Park and the Cascade Mountains of Washington have been reported [18].

Intrinsic Vulnerability:

MODERATE VULNERABILITY

Clark's Nutcracker uses all available conifer habitats in Wyoming, especially at higher elevations, but breeding success appears to depend upon the availability of seeds from preferred conifers [1, 12]. Clark's Nutcracker's relies on Whitebark Pine as a primary food source for feeding young in early spring with seeds that had been cached the previous autumn [1]. It is assumed that Limber Pine, Ponderosa Pine, and Douglas Fir perform this role in portions of Clark's Nutcracker range where Whitebark Pine does not occur (e.g., southern Wyoming). Nutcrackers remember cache sites for 7 to 9 months, and remaining seeds are subject to spoilage, germination, or robbery by other species; thus, caches from years with high cone crops cannot supplement the diet during low cone years [19]. In two low cone production years out of a five year study in the Greater Yellowstone Ecosystem (GYE), Clark's Nutcracker failed to breed [12].

Extrinsic Stressors:

MODERATELY STRESSED

Although Clark's Nutcracker is capable of dispersing widely, the ecosystems, and particularly the conifer species, upon which the bird depends are currently under threat. Widespread mortality of Whitebark Pine and Limber Pine as a result of White Pine Blister Rust (*Cronartium ribicola*) and Mountain Pine Beetle (*Dendroctonus ponderosae*) outbreaks are likely to reduce breeding populations of nutcrackers in Wyoming and the region for many decades. Global climate change may be exacerbating these effects – Whitebark Pine is only weakly adapted to resist bark beetles, and increasing minimum winter temperatures at high elevations have allowed beetle outbreaks to extend upwards into Whitebark Pine forests resulting in heavy tree mortality and, presumably, significant reductions in habitat quality for Clark's Nutcracker [20, 21]. Advanced forest succession at high elevations as a result of decades of fire suppression may have also depressed populations of preferred pines [1, 12]. Long-term BBS data suggest that some populations are declining even in relatively protected and pristine areas such as Glacier National Park [12, 18]. Clark's Nutcracker is a major disperser of Whitebark Pine seeds, enabling rapid migration of seeds and genes across landscapes [11, 22]. Declines in nutcracker populations may thus have long-term, significant ecosystem-wide effects on conifer communities in the Rocky Mountain west [12, 23].

KEY ACTIVITIES IN WYOMING

Clark's Nutcracker is classified as a Species of Greatest Conservation Need (SGCN) by the Wyoming Game and Fish Department, and a Wyoming PIF Level III Priority Species due to restricted habitat distribution and the need for long-term viability of Whitebark and Limber Pine forests [24]. Recent work includes a Cornell University Ph.D. dissertation on Clark's Nutcracker in the GYE in 2015 and 2016 [5, 12]. Eight Clark's Nutcrackers were marked with satellite transmitters in fall 2014; work continues on tracking their long distance movements and collecting additional data on habitat trends and occupancy in the Greater Yellowstone study area (T. Schaming, pers. comm.) [5, 12]. Working with numerous partners, the U.S. Forest Service (USFS) has developed a long-term, region-wide strategy for restoring Whitebark Pine, which is currently a candidate for listing under the federal Endangered Species Act [25].

ECOLOGICAL INFORMATION NEEDS

Standardized, long-term monitoring and occupancy data for different habitat types and areas of the state are needed for Clark's Nutcracker. Long-term demographic data are needed on annual survivorship of different age classes, annual reproductive success, and how changes in food availability and climate affect these variables. Additional studies on nutcracker/ pine mutualism would be beneficial. Clark's Nutcracker concentrates in areas where food is abundant, making accurate censusing a challenge [1]. In general, research that provides clear and effective management recommendations for protecting and enhancing the population viability of Whitebark and Limber Pine will enhance the ability of resource managers to benefit Clark's Nutcracker.

MANAGEMENT IN WYOMING

This section authored solely by WGFD; Susan M. Patla. Clark's Nutcracker is classified as a SGCN in Wyoming due to drought, disease and climate change that affect its preferred habitat. Two separate but compatible survey programs are in place to monitor populations of many avian species that breed in Wyoming. The first is the long-term BBS started in Wyoming in 1968 with 108 established routes [18]. The IMBCR program was established in 2009 in Wyoming with many state, federal, and nongovernmental organization partners that contribute funding, field personnel, technical assistance, or in-kind services. Data analyses produce density, occupancy, and population estimates at various scales; present habitat associations; and provide decision support tools for managers [17]. Best management practices to benefit Clark's Nutcracker include maintaining and restoring mature Whitebark and Limber Pine forests, and using forest management techniques that favor mature stands of these species to ensure abundant food [24]. The USFS has developed a restoration strategy for Whitebark Pine that can provide guidance for future work on Forest Service lands [25]. Whitebark Pine Ecosystem Foundation, a nonprofit focused on Whitebark Pine conservation and restoration, publishes a biannual newsletter "Nutcracker Notes", with updates on news, projects, and ongoing research related to Whitebark Pine: http://whitebarkfound.org/?page_id=408. Recent work has highlighted the importance of Douglas-fir as an alternative seed source and of providing year-round habitat for Clark's Nutcracker, especially in areas where Whitebark Pine has declined significantly in western Wyoming [12]. Landscape level management of Whitebark Pine restoration should be optimized by focusing restoration efforts on locations adjacent to a mosaic of habitats which specifically include Douglas-fir [12].

CONTRIBUTORS

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Figure 1: Adult Clark's Nutcracker in Albany County, Wyoming. (Photo courtesy of Pete Arnold)

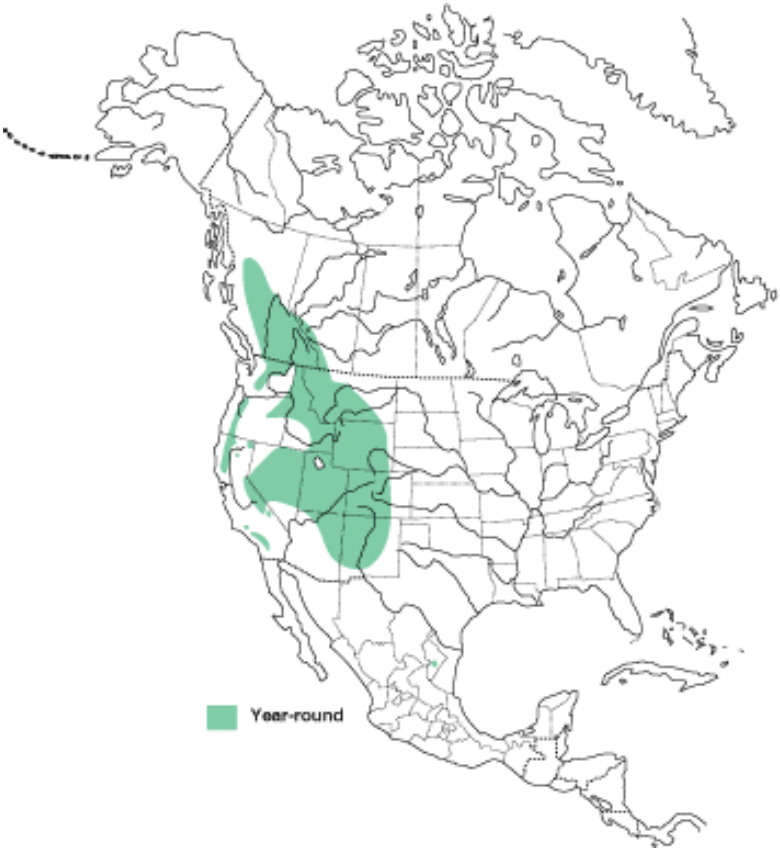

Figure 2: North American range of *Nucifraga columbiana*. (Map courtesy of Birds of North America, http://bna.birds.cornell.edu/bna, maintained by the Cornell Lab of Ornithology)

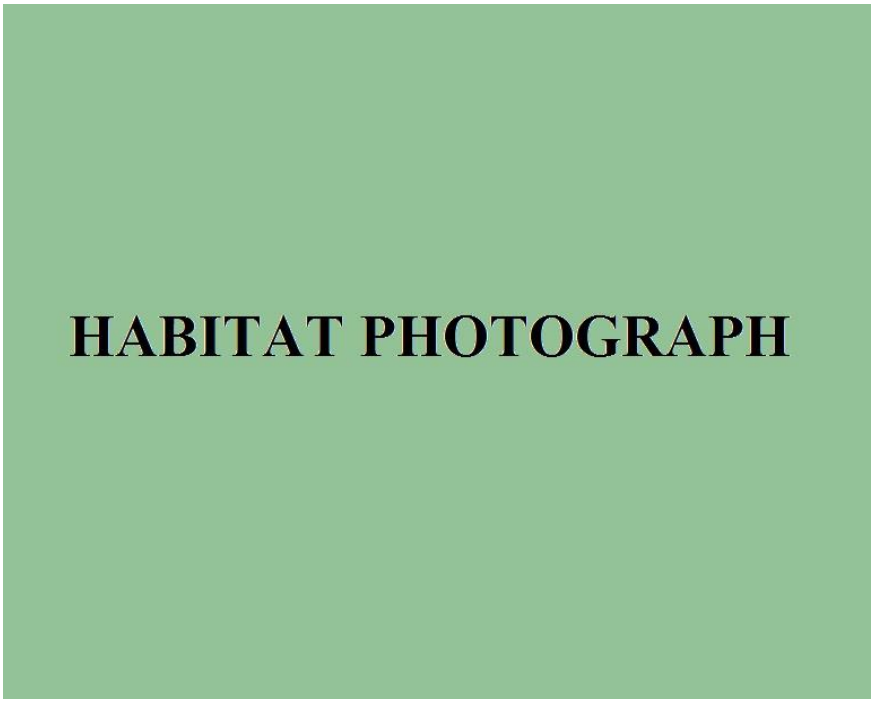

Figure 3: Photo not available.

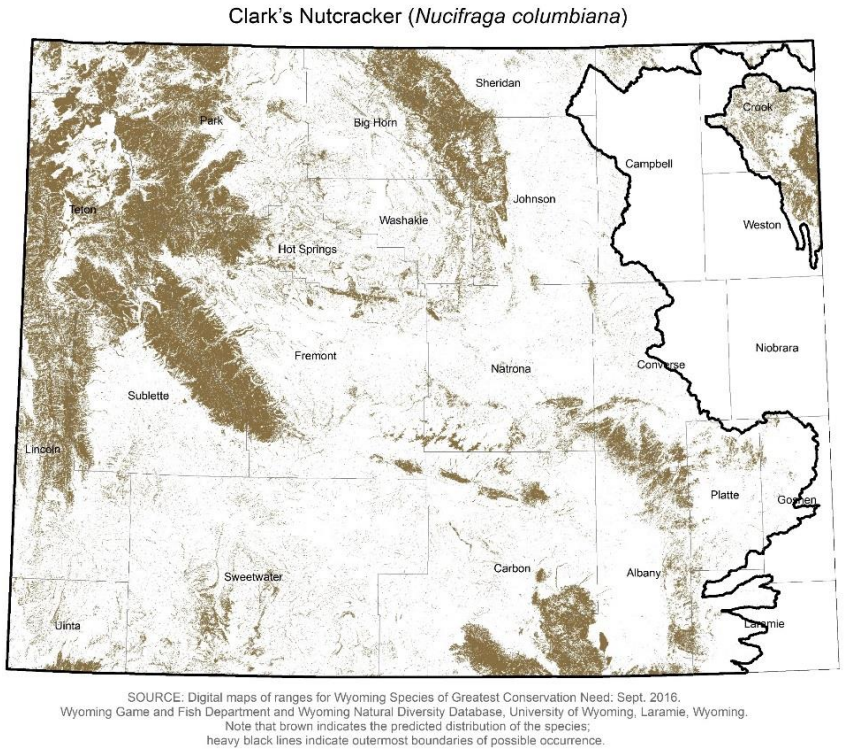

Figure 4: Range and predicted distribution of *Nucifraga columbiana* in Wyoming.