

Nucifraga columbiana

This species is complete.

October 6, 2009 by Michael Case

Author(s) Expertise:

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Sensitivity Factor	Sensitivity 1 - 7 (one being least sensitive, seven being most sensitive)	Confidence 1 - 5 (one being least sensitive, five being most sensitive)
Generalist/Specialist	6 High	4 Good
Physiology	1 Low	4 Good
Life History	6 High	4 Good
Habitat	7 Extremely High	5 Very Good
Dispersal Ability	1 Low	3 Fair
Disturbance Regimes	5 High	3 Fair
Ecology	3 Medium	3 Fair
Non-Climatic	6 High	3 Fair
Other (weight)		

Sensitivity Score : 60 High

Sensitivity Score

$100 * [(0.5 * (\text{Dispersal Distance} + \text{Dispersal Barriers}) + \text{Disturbance Regimes} + (0.5 * \text{Generalist/Specialist}) + \text{Physiology} + (0.5 * \text{Life History}) + \text{Sensitive Habitats} + \text{Ecology} + \text{Non-Climatic Stressors} + (\text{Other} * \text{Weight}) / 49 + (7 * \text{Weight})]$

Note: if Sensitive Habitats are identified, this factor automatically gets a value of seven, otherwise it remains zero.

Confidence Score : 3 Fair

Confidence Score

The Confidence Score is an average of the Confidence column above.

Overall User Ranking: 6 High

Common Name:

Clark's nutcracker

Is this Species completed:

Yes

Taxonomy

This is a description of the whole group

Scientific Name:

Nucifraga columbiana

Geography:

Olympics

Realm:

Terrestrial

Kingdom:

Animal

Phylum:

Craniata

Class:

Aves

Order:

Passeriformes

Family:

Corvidae

Genus:

Nucifraga

Global Rank:

G5 (1996)

Rounded Global Rank:

G5 - Secure

IUCN:

Least Concern ver 3.1 - 2009

US Endangered Species Act Code:

Not Listed

Species Element Code:

ABPAV08010

Generalist/Specialist

Broadly, where does this species fall on the spectrum of generalist to specialist? :

6

Confidence in your assessment of the degree to which the species is a generalist or specialist:

4 Good

Please specify which factors, if any, make the species more of a specialist:

seed dispersal dependency

host plant dependency (symbiont/mutualist/parasite)

Please further describe the relationships that make the species more of a specialist:

Clark's nutcrackers are obligate mutualists of whitebark pine (*Pinus albicaulis*) because nutcrackers are the only means by which seeds are effectively dispersed from the parent tree (Hutchins and Lanner 1982; for a review see Lorenz et al. 2008). Nutcrackers therefore enable population-wide regeneration in this species. Nutcrackers also disperse seeds for other common and widespread conifer species, including but not limited to Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), and single-leaf and Colorado pinyon pines (*Pinus monophylla* and *Pinus edulis*) (Vander Wall and Balda 1977, Lanner and Vander Wall 1980, Vander Wall et al. 1981, Vander Wall 1988, Lorenz and Sullivan 2009).

Comments:

Nutcrackers appear to be habitat generalists in spring for breeding and in summer (Lorenz, unpublished data). However their survival and reproductive success from autumn through early spring depend mostly on the availability of conifer seed (Giuntoli and Mewaldt 1978). Consequently, even though they only harvest seeds in autumn, they are habitat specialists that require large expanses of large-seeded conifer for survival.

Citations:

Guintoli, M, and L.R. Mewaldt. 1978. Stomach contents of Clark's nutcrackers collected in western Montana. *Auk* 95: 595-598. Hutchins, H.E., and R.M. Lanner. 1982. The central role of Clark's nutcracker in the dispersal and establishment of whitebark pine. *Oecologia* 55:192-201. Lanner, R.M., and S.B. Vander Wall. 1980. Dispersal of limber pine seed by Clark's nutcracker. *Journal of Forestry* 78:637-639. Lorenz, T.J., C. Aubry, and R. Shoal. 2008. A review of the literature on seed fate in whitebark pine and the life history traits of Clark's nutcracker and pine squirrels. General Technical Report PNW-GTR-742. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 62 p. Lorenz, T.J., and K.A. Sullivan. 2009. Seasonal differences in space use by Clark's nutcrackers in the Cascade Range. *Condor* 111:326-340. Vander Wall, S.B. 1988. Foraging of Clark's nutcrackers on rapidly changing pine seed resources. *Condor* 90:621-631. Vander Wall, S.B., and R.P. Balda. 1977. Coadaptations of the Clark's nutcracker and the pinyon pine for efficient seed harvest and dispersal. *Ecological Monographs* 47:89-111. Vander Wall, S.B., S.W. Hoffman, and W.K. Potts. 1981. Emigration behavior of Clark's nutcracker. *Condor* 83:162-170.

Physiology

Species' physiological sensitivity:

1 low sensitivity

Confidence in how physiologically sensitive the species is to climate change:

4 Good

Please specify whether or not this species is physiologically sensitive to one or more of the following:

temperature

Please describe any specific physiological sensitivities:

This species is a resident of western North America and tolerates a wide range of temperature and precipitation. For example, resident populations exist in temperate rainforests in the Olympic Mountains (Washington), high-deserts in the Great Basin (Arizona, New Mexico, Nevada), and at subalpine zones in the central Canadian Rockies (Alberta, British Columbia).

Life History

Species' reproductive strategy:

6

Confidence in your assessment of the species' reproductive strategy:

4 Good

Is the species polycyclic, iteroparous, or semelparous?:

Polycyclic (reproduces intermittently throughout a lifespan)

Average length of time to reproductive maturity:

700

How many surviving young can an individual produce during a single reproductive event under optimal conditions?:

typically two to four, although data are lacking for many parts of the range of this species

How many reproductive events can an individual undergo in a single year under optimal conditions?:

1

Sensitive Habitats

Depends on the following sensitive habitat types:

Grasslands/balds

Confidence in whether the species depends on the listed sensitive habitat types:

5 Very Good

Dispersal Ability

Maximum annual dispersal distance:

>100 km

Confidence in maximum annual dispersal distance:

3 Fair

Within the context of dispersal distance above, do barriers to dispersal exist?:

2

Confidence in barriers to dispersal exists:

3 Fair

Comments:

This species relies on abundant pine seed in autumn. It typically disperses in autumn when pine seed crops fail (Vander Wall et al. 1981, Lorenz and Sullivan 2009). Clark's nutcracker is capable of traveling great distances and is a strong flier (Vander Wall and Balda 1981). However, a decline in pine abundance or productivity might create barriers for this species because nutcrackers are unlikely to survive if forced to travel great distances (i.e. greater than 500 km) without pine seed (Vander Wall et al. 1981, Davis and Williams 1957, 1964).

Citations:

Davis, J., and L. Williams. 1957. Irruptions of the Clark nutcracker in California. *Condor* 59:297-307. Davis, J., and L. Williams. 1964. The 1961 irruption of Clark's nutcracker in California. *Wilson Bulletin* 76:10-18. Lorenz, T.J., and K.A. Sullivan. 2009. Seasonal differences in space use by Clark's nutcrackers in the Cascade Range. *Condor* 111:326-340. Vander Wall, S.B., and R.P. Balda. 1977. Coadaptations of the Clark's nutcracker and the pinyon pine for efficient seed harvest and dispersal. *Ecological Monographs* 47:89-111. Vander Wall, S.B., and R.P. Balda. 1981. Ecology and evolution of food storage behavior in conifer seed caching corvids. *Zeitschrift für Tierpsychologie* 56:217-242. Vander Wall, S.B., S.W. Hoffman, and W.K. Potts. 1981. Emigration behavior of Clark's nutcracker. *Condor* 83:162-170.

Disturbance Regimes

How sensitive is this species to one or more disturbance regimes:

5 more sensitive

Confidence in how sensitive is this species on one or more disturbance regimes:

3 Fair

Please check all disturbance regimes upon which the species is sensitive:

Fire

Comments:

This species is indirectly dependent on fire to create suitable habitat for forage in autumn, winter, and spring. Nutcrackers subsist on seeds of large-seeded conifers in autumn, winter, and spring (Giuntoli and Mewaldt 1978). Many species of large-seeded conifer (i.e. ponderosa pine (*Pinus ponderosa*), Jeffery pine (*Pinus jeffryi*), whitebark pine (*Pinus albicaulis*)) are moderately to highly dependent on frequent, low-intensity fire to cull competing species and to increase vigor and productivity (Krannitz and Duralia 2004).

Citations:

Giuntoli, M, and L.R. Mewaldt. 1978. Stomach contents of Clark's nutcrackers collected in western Montana. *Auk* 95: 595-598. Krannitz, P.G., and T.E. Duralia. 2004. Cone and seed production in *Pinus ponderosa*: a review. *Western North American Naturalist* 64:208-218.

Ecological Relationships

Please specify which of the following (if any) are sensitive to climate change for this species:

habitat

Confidence in how sensitive the species is to other effects of climate change on its ecology:

3 Fair

Which types of climate and climate-driven changes in the environment affect these aspects of the species' ecology?:

precipitation

How sensitive is this species? ecological relationships to the effects of climate change?:

3

Interacting non-climatic stressors

To what degree do other, non-climate-related threats, to the species make it more sensitive to climate change?:

6

Confidence in the degree to which non-climate-related threats affect the species' sensitivity to climate change:

3 Fair

Please check all of the stressors that make the species more sensitive to climate change:

habitat loss or degradation

Overall User Ranking

In your opinion, how would you rank the overall sensitivity of this species to climate change?:

6

Confidence in your overall assessment of the sensitivity of this species to climate change:

4 Good

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