



# Now You See Them, Now You Don't: Clark's Nutcracker Migratory Behavior

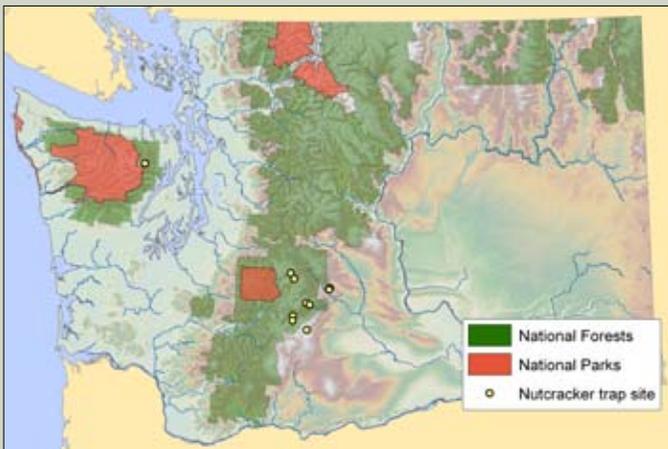
**CAPABLE OF** stunning “vanishing acts,” huge flocks of migrant Clark’s nutcrackers can be there one minute, and gone the next. But when these houdinis disappear to distant locations, they don’t take their whitebark pine seeds with them. Can this be good for whitebark pine?

## BACKGROUND

We investigated habitat use, caching behavior, and migratory patterns in Clark’s nutcrackers in the Pacific Northwest using radio telemetry. Over 4 years (2006–2009), we captured 54 adult nutcrackers at 10 sites in the Cascade and Olympic Mountains in Washington State. We fitted nutcrackers with a back-pack style harness. The battery life on the radio tags was 450 days, and we tracked nutcrackers year-round, on foot (to obtain behavior observations) and via aircraft (to obtain point locations). We obtained more than 6,000 telemetry point locations on radio-tagged nutcrackers, and we observed more than 1,000 seed-harvest events and 655 seed-caching events.

Of nutcrackers captured in this study, we classified 20 nutcrackers as residents and 21 as emigrants wintering on our study area. Among residents, 11 had home ranges in whitebark pine stands and 9 had home ranges in ponderosa pine stands.

The future of whitebark pine is of serious concern because of the species’ vulnerability to white pine blister rust, mountain pine beetle infestation, wildfires, and climate change. The Clark’s nutcracker is the primary means of whitebark pine seed dispersal.



**THE STUDY'S** Clark's nutcracker trap sites.

## The nature of nutcracker migration

In autumn, whitebark pine stands come alive with hundreds to thousands of Clark’s nutcrackers harvesting, caching, and eating whitebark pine seeds; calling and preening; chasing each other; and mobbing hawks. Yet during other parts of the year, these stands may be nearly devoid of nutcrackers except, perhaps, for a couple of stray individuals or family groups. And, every so often, flocks of thousands of nutcrackers may descend upon a cone crop, only to vanish within weeks and not return for years, despite fairly consistent cone production.

Why are nutcrackers so erratic in their migratory behavior? Where do these hundreds or thousands of birds go for the remainder of the year? Ornithologists classify nutcrackers as “facultative partial migrants,” meaning that they migrate only when necessary because of food shortage and only as far as necessary until sufficient food is located. Overall, nutcracker migration is largely unpredictable—at least until we learn a way to estimate cone production in all large-seeded conifer species throughout western North America.

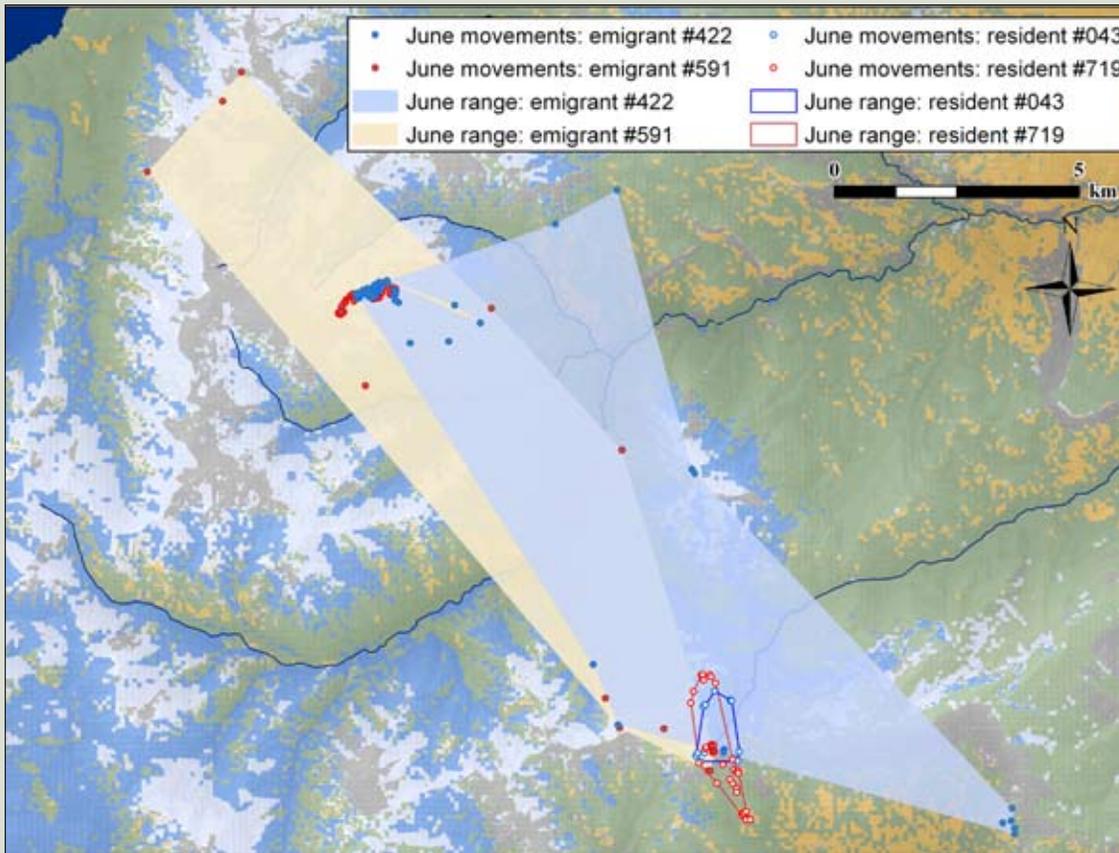
One thing we know is that nutcrackers commonly travel in large flocks when

migrating, because flocks afford a measure of protection from predation for birds traveling in unfamiliar terrain. Thus, large flocks of nutcrackers can appear in a cone-producing pine stand and vanish just as quickly.

## Homebody or traveler? Flip a cone!

Clark’s nutcrackers are very plastic in their migratory behavior, and they readily adopt a resident or emigrant lifestyle depending on autumn cone crops. If there are sufficient cones, then nutcrackers remain as residents within one region year-round; they harvest seeds from sources within approximately 30 km of their year-round home ranges, and store seeds within the home range for winter and spring subsistence. If there are not sufficient cones, then nutcrackers migrate from their home range in August and move throughout western North America searching for cones. When cone-producing stands are located, migrants may settle in a temporary home range and begin storing seeds. Migrants may remain over the winter in these areas, breed and raise young, and return to their native areas only in mid-summer.

Regions with extensive stands of large-seeded conifers (of various kinds, not just whitebark pine) are probably



**SUMMER RANGES** of migrant nutcrackers in our study dwarfed the ranges of residents. This map depicts June ranges for 2 migrants and 2 residents of comparable weight. The migrant ranges are larger than those of residents by a factor of 27.



Nicholas Errist



**MIGRANT NUTCRACKER #591** was captured in a ponderosa pine stand and moved 150 km (~110 miles) north of our study area in summer 2007. It cached whitebark pine seeds over an area encompassing 274 km<sup>2</sup> in the North Cascades.

**MIGRANTS SUCH** as nutcracker #591 (left) tended to cache seeds close to harvest trees—thus, they appeared to be more effective seed dispersers for whitebark pine compared to residents.

occupied by resident nutcrackers in nearly all years, whereas regions that are sparsely populated with only one or two seed sources probably have no residents and are visited only by migrants.

### How do migrants differ from residents?

We found migrants to differ from residents in three interrelated ways:

- Migrants have no fidelity to a home range as they travel.
- Migrants range over large areas in winter, spring, and summer; and they forage opportunistically.
- Because they move through large areas of unfamiliar terrain,

migrants typically associate with larger flocks than residents do.

Consequently, migrants differ from residents in their autumn seed storage and winter-summer seed retrieval behavior. Migrants may be less likely than residents to transport seeds long distances between harvest trees and cache sites; they are more likely to cache seeds within the seed harvest stands and on communal caching grounds. This behavior possibly makes migrants more effective than residents as seed dispersers for whitebark pine—migrants are unlikely to retrieve many seed stores; they cache seeds locally within stands but then commonly leave the area and move to a new region.

### CASE STUDY: Autumn Seed Caching by Migrant Nutcrackers #505b and #591

Nutcrackers #505b<sup>1</sup> and #591 were captured in May 2007 in a whitebark and ponderosa pine stand, respectively. They foraged within the southern Washington Cascades in spring and migrated northward in July. In August 2007, both migrants were located on aerial telemetry surveys. After moving in on foot, we found that both were harvesting whitebark pine seeds.

Unlike resident nutcrackers, migrants showed no fidelity to a home range when caching; instead, they cached seeds right where they found them, within seed harvest stands and nearby communal caching grounds. On average, seeds were transported less than 500 m, and the maximum seed transport distance that we recorded was 1.7 km.

Although migrant nutcrackers did not transport seeds long distances, they themselves traveled over large expanses as they moved among seed harvest stands. Nutcracker #591 ranged over 274 km<sup>2</sup> in August alone while harvesting and caching seeds; nutcracker #505b ranged over 175 km<sup>2</sup>. In September, and after a month of wandering, #505b settled on an autumn-winter home range, where it remained until June 2008, when its radio battery failed; beginning in mid-September, #505b transported all harvested whitebark and ponderosa pine seeds to this newly established home range. Nutcracker #591 did not settle within Washington, as far as we know. After tracking it during August 2007, we lost its signal and never relocated it.

<sup>1</sup>#505 originally designated a nutcracker that was tagged in 2006 and, ultimately, shot later that year. We were able to retrieve the radio tag, which was undamaged, replace its battery, and use the tag to mark a new bird in spring 2007. To avoid confusion, we have designated the newly tagged nutcracker “#505b.”

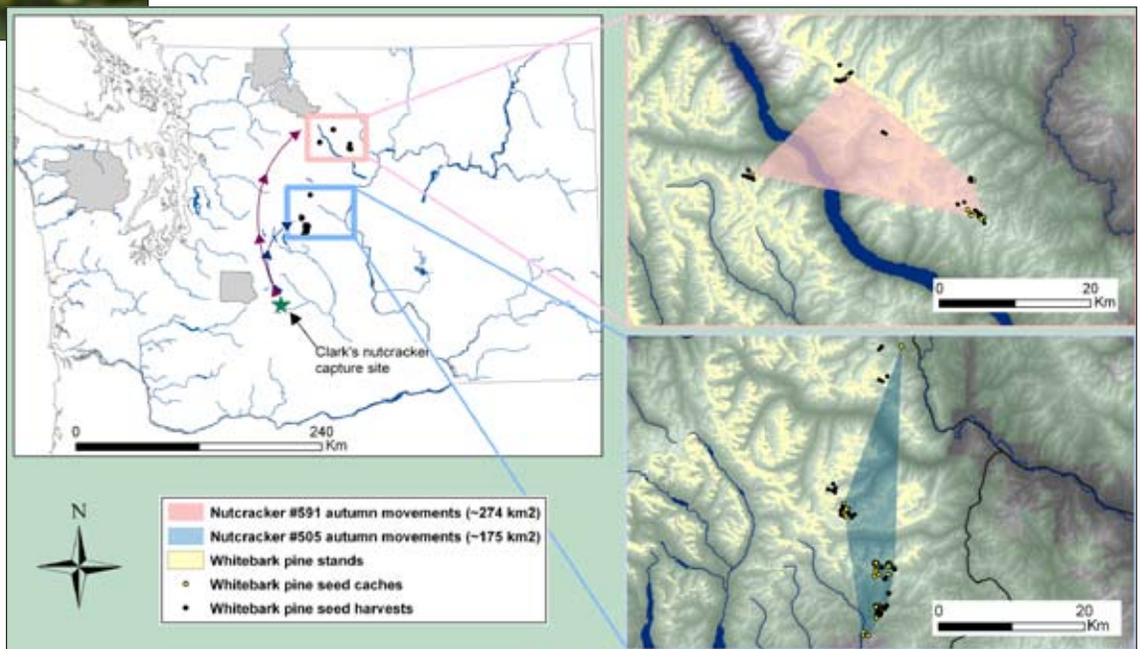


**MIGRANT NUTCRACKERS** were more mobile than residents and ranged over large areas, making them difficult to reliably track.



Nicholas Errst

**NUTCRACKER #505b** moved 90 km north of our study area in summer 2007 and cached seeds over an area encompassing 175 km<sup>2</sup>.



## THE BOTTOM LINE: MANAGER'S PERSPECTIVE

### How can we persuade nutcrackers to keep dispersing seeds in heavily diseased stands?

Many whitebark pine have had high mortality rates from white pine blister rust infection, mountain pine beetle attacks, or both, and resource managers are concerned that nutcrackers will stop visiting such unprofitable areas. If that happens, seed dispersal and regeneration cannot occur. Managers can better assess which stands are in most need of on-the-ground restoration by considering the juxtaposition of other large-seeded conifers within the larger landscape. For example:

- Stressed whitebark pine stands that occur within a landscape of ponderosa pine are likely to contain fairly stable, resident populations of nutcrackers, so most whitebark pine seeds are likely to be harvested and dispersed. On the other hand, residents might transport whitebark pine seeds to cache sites within the ponderosa pine zone, where whitebark will not grow.
- Stressed whitebark pine stands located in a landscape without alternate seed sources (such as ponderosa

pine, limber pine, or Douglas-fir) will probably be visited mostly by migratory nutcrackers, which are more likely to stash the seeds right there in the whitebark pine zone. However, in years when cone production is high range-wide, there might be few emigrant nutcrackers, and such stands might not be visited.

Managers should consider the availability of low-elevation seed sources for nutcrackers when determining management approaches. For example, whitebark pine stands that are considered “isolated” by managers might not appear isolated to Clark’s nutcrackers if they occur within a landscape of ponderosa pine. In our study area, although whitebark pine stands occurred several thousand feet in elevation above ponderosa pine, the two ecosystems were irrevocably linked through a common dispersal mechanism, the Clark’s nutcracker.

### FURTHER READING

**Lorenz, T.J.; Sullivan, K.A. 2009.** Seasonal differences in space use by Clark’s nutcrackers in the Cascade Range. *Condor*. 111: 326–340.

**Vander Wall, S.B.; Hoffman, S.W.; Potts, W.K. 1981.** Emigration behavior of Clark’s nutcracker. *Condor*. 83: 162–170.



**NUTCRACKERS ARE** “facultative partial migrants.” This means that migration is dependent on food availability and is largely unpredictable. Flocks of migrants may move over large areas in autumn and winter, attempting to locate the most productive pine stands.

### FOR FURTHER INFORMATION

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