



### **Program Objectives**

1. Monitor landbirds during their breeding season to detect trends in their density throughout accessible areas of five North Coast and Cascades Network parks.
2. Track changes in the breeding season distribution of landbird species throughout accessible areas of the North Coast and Cascade Network's three large wilderness parks.

Clark's Nutcracker, *Nucifraga columbiana* Photo: NPS/Pringle

## *Landbirds*

TWO RESEARCHERS STAND BACK-TO-BACK IN THE WILDERNESS, enveloped by the faint rustling of trees and echoes of birdsong. They begin to walk in opposite directions like participants in a duel, moving in as straight a path as they can through dense underbrush, stopping at points approximately 650 feet (200 m) apart, listening intently to different bird sounds and marking the species they hear on data sheets. These observations, combined with those from other parks in the North Coast and Cascades Network (NCCN), build a base of knowledge to understand changes in bird populations throughout the park network and the Pacific Northwest region.

Every May, Pacific Northwest forests come alive as dozens of bird species burst into song after the silence of winter. “Landbirds” include birds that perch and sing—more than half of all bird species. They are of great interest to the public and are perhaps the most visible (and audible) faunal component of park ecosystems. Birds are also very sensitive to changes in their environment, making them excellent indicators of ecosystem health.

The National Park Service (NPS) has selected landbirds as a Vital Sign for its Inventory and Monitoring program. Landbird monitoring takes place in five of the eight NCCN parks: Olympic National Park (Olympic), Mount Rainier National Park (Mount Rainier), North Cascades National Park Complex (North Cascades), San Juan Island National Historical Park (San Juan), and Lewis and Clark National Historical Park (Lewis and Clark). The protocol focuses on monitoring landbirds during their breeding season from late-May through July to track changes in population density and distribution.

**By: Emily Linroth**

### *The Role of National Parks in Landbird Monitoring*

Interest in birds has increased with reported declines and geographic shifts in bird populations that breed in North America. Data from numerous surveys indicate that landbird populations across the world are declining. Resident and migratory birds can be affected by changes in food and habitat availability along their journey: where they breed, make temporary stopovers, and spend their winters. Birds breeding in coniferous forests of the Pacific Northwest face destruction and fragmentation of their habitats due to anthropogenic impacts such as logging, residential and agricultural development, and forest management practices that discourage forests from reaching later stages of succession. The amount of old-growth forest in the United States has decreased by more than half since World War II, and many landscapes that were managed to produce timber are still in early- and mid-successional states. National Parks are some of the few areas that protect the old-growth forests we have left. Visitor impacts, shifts in natural fire regimes, and climate changes can also greatly affect birds that breed in alpine and subalpine zones.

These threats have spurred multi-agency and citizen monitoring efforts around the world to take stock of bird populations and hopefully provide clues about what impacts are affecting population trends.

National Parks provide protected, relatively undisturbed land compared to surrounding areas. They serve as both sanctuaries for bird species that depend on them, and as reference sites to compare the effects of land-use changes on bird populations throughout the Pacific Northwest. Monitoring points within National Parks are areas where bird population trends are affected by large-scale impacts such as climate change, but relatively unaffected by local changes in land use.

“We can act as control sites,” said wildlife biologist Robert Kuntz, National Park Service lead project manager for the landbird monitoring protocol. “We can act as that example of, ‘if you didn’t manipulate that habitat, how would populations change?’”

### *Monitoring Strategy*

The NCCN’s three large parks—Olympic, North Cascades, and Mount Rainier—are dominated by late-successional coniferous forests and extensive alpine and subalpine plant communities. These parks are hundreds of thousands of acres in size and range in elevation from sea level to the lofty snow-covered 14,400 feet (4,400 m) summit of Mount Rainier. The enormous size of these parks leads to great variation in bird community composition, breeding cycles, and the average date of accessibility by monitoring teams. Higher areas are virtually inaccessible to ground crews in spring and early summer due to safety concerns about high water and steep slopes. Deep snow also affects

when areas can be monitored. For these reasons, the timing of monitoring is structured around the most remote survey points.

The two smaller NCCN parks monitored for landbirds include San Juan Island and Lewis and Clark. Nestled in the rainshadow of the Olympic Mountains, San Juan features small tracts of coastal prairie and Garry Oak woodlands—plant communities that are relatively rare for Western Washington and that support distinct bird populations. Lewis and Clark traces coastlines of Washington and Oregon along the mouth of the Columbia River and contains lowland wetlands and coastal and upland forests, extending the reach of the program's area of inference southward. Landbird monitoring does not take place at Fort Vancouver and Ebey's Landing because the small amount of land in NPS ownership at each park makes the methods scientists use ineffective.

Because many species can be monitored simultaneously using the same protocol, monitoring landbirds can help scientists detect trends in community statistics for multiple regions. However, this does not make monitoring easy. The statistics used to analyze many species across multiple samples and different areas are complicated—it's a case of teasing a result from a jumble of experimental "noise." Moreover, crews must venture to remote areas and spend hours hiking through dense forests, concentrating intently on the faintest sounds of birds. Although most trips last two to three days, some trips at the end of the season can be as long as nine days because the points are so far into the wilderness, said landbird monitoring field lead Mandy Holmgren, a contracted wildlife biologist with the nonprofit research organization The Institute for Bird Populations (IBP). Day after day, researchers must rise early in order to begin monitoring just after sunrise.

"You could gain 2,000 feet [in elevation] in a morning, but it's still not as hard as getting out of your sleeping bag," Holmgren said.

Crews monitor landbirds during their breeding season, because this is when they are most vocal and territorial and therefore more likely to be noticed, Holmgren said. Methods for monitoring landbirds and estimating their population densities are well-developed and already used by other regional and national agencies, allowing for comparison of data between organizations. Much is known about landbird community structure and habitat relationships in the Pacific Northwest, as well as specific information about the current status of landbirds in the NCCN. This knowledge, along with multiple field tests of survey techniques, aided development of the current monitoring protocol.



Steller's Jay, *Cyanocitta stelleri*. NPS/Pringle

### *Data Collection*

Crews begin monitoring landbirds in late May to ensure that they detect low-elevation breeders. Year-round residents begin nesting and singing as early as February and March. Many birds return from migration in April, but don't begin singing right away. Field crews begin training in May and are from diverse backgrounds. Some were competent amateur birders, while others studied birds in school or came to birds from other areas of biology. During training, field crews initially focus on visually and audibly identifying common birds very well. They then hone their skills by learning the songs, calls, and appearances of less-common species. Each team member must know the sound and appearance of more than 100 different bird species, and cannot collect survey data until passing a training test. The best way to learn the sounds is by tracking the birds down in the field, said Dr. Jerry Freilich, research coordinator at Olympic.

“That hard work of finding the bird is what burns the sound into your brain so you don't forget it,” Freilich said. “Everything you're doing out there is done by sound. You've got to know them cold.”

Shared methodology for monitoring across the five parks ensures consistency and allows for comparisons between their data. However, because each of the parks has different constraints on safety, travel, and logistics, the NCCN uses two separate sampling schemes. Monitoring at all of the parks consists of point counts at various places along a straight transect line, where crew members stop for seven-minute periods of time to count all the birds they can see and hear.

Just after dawn, pairs of observers find their transect start point. Each member of the pair takes half the transect and walks it in the opposite direction,

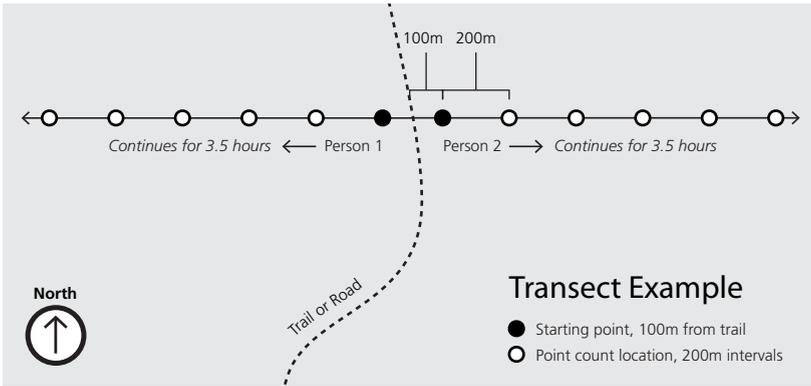
stopping at each of their individual survey points along the transect. Forests are so dense that team members can lose sight of each other after roughly 650 feet (200 meters), Holmgren said. By the end of their sampling session, crew members could be 1 or more miles (1.6 or more kilometers) apart.

Researchers wait one minute for any birds disturbed by their approach to resume normal activities, and then begin their seven-minute count. The count is divided into one interval of three minutes and two successive intervals of two minutes. Birds observed in the first three minutes are recorded separately to allow for comparison with data from the North American Breeding Bird Survey (BBS), a collaborative surveying program created in 1966 and managed jointly by the United States Geological Survey (USGS) and the Canadian Wildlife Service, which also uses three-minute counts. Crew members record whether they see or hear birds (or both) and estimate the horizontal distance to each bird to the nearest meter the first time it is detected. Distance Sampling is a statistical method that uses these linear distances to calculate population size. After completing their fifth and final point, observers retrace their steps to their starting point, classifying broad vegetation types at each of the five survey points on their way back to include with their other data. Before leaving each point, observers record a site description, including information about habitat, the amount of noise interference from water or wind, and weather conditions.

Teams begin with lower elevation transects in late May and work their way upward throughout the breeding season. Some transects are impossible to sample during certain years because of snow cover resulting from bad weather and late snow melt. Even in early summer, there can still be five to 10 feet (1.5 to 3 m) of snow at 6,000 feet (roughly 1,830 m) above sea level, said field technician David Wolfson. Crews cannot sample in the rain or in wind exceeding 25 to 30 miles per hour (approximately 40 to 50 kph). Teams sample as many transects as possible per season, and only areas that are dangerous are eliminated from the potential monitoring sites.

In the two smaller parks (San Juan and Lewis & Clark), which do not have the substantial travel and logistics restrictions of the wilderness parks, biologists sample points throughout each entire park using a grid system that aligns with cardinal directions and begins with a random starting point. Each grid point is approximately 1,148 feet (350 m) apart, resulting in 54 points at San Juan and 91 points at Lewis and Clark.

“We just put a grid over it and go for it,” Kuntz said. “It’s much more straightforward. I wish we could put a grid over our big parks, but that’s totally impossible.” Crews sample one of the parks each year—San Juan every odd year, and Lewis & Clark every even year. The 2011 field season marks the third year of



sampling at San Juan. Since both of these parks are near sea level where birds breed earlier than at higher elevations, fewer surveys must occur between late-May and mid-June.

### *Current Trends*

The NPS began developing the landbird monitoring protocol in 2001, tested it in 2005 and 2006, finished writing, and published and implemented it in 2007. Data are published in reports released annually and every five years. Annual reports released so far show subtle fluctuations in different species from year to year, but these fluctuations do not necessarily indicate trends, Holmgren said. These reports are available on the NPS Inventory and Monitoring (I&M) program website (<http://science.nature.nps.gov/im/units/nccn/index.cfm>). Major analysis will come with the first five-year report, which is expected to be released in summer of 2012.

“Right now, trends from the actual work we’ve done so far are not available,” Kuntz said. “I think we all understand the need and the value of getting our results out there as quickly as we can, but I think we also understand the need for those results to be accurate.”

The landbird monitoring protocol has been successful in gathering baseline data for landbird distribution and density in NCCN parks since its implementation nearly four years ago. Trends indicated in the five-year report could help biologists understand how anthropogenic and natural changes impact bird populations within protected wilderness areas of national parks as well as the regions surrounding them. But researchers monitor landbirds for more than data points, Kuntz said.

“We monitor birds for birds’ sake because they have their own intrinsic value,” Kuntz said. “We like having them in parks, and we want to continue to have birds in parks.”



Red-breasted sapsucker, *Sphyrapicus ruber*. NPS/Liang

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