The Southwest Alaska Network Inventory & Monitoring Program Newsletter
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Diverse Landscapes within SWAN Parks Provide Important Landbird Habitat

Compared to many regions of Alaska, bird species in Katmai NPP (KATM) and Lake Clark NPP (LACL), are relatively well described. However, much of this information was derived from coastal surveys and other accessible aquatic habitats. Both of these large remote parks are incredibly rugged and largely free of roads. Consequently, our understanding of the presence and distribution of birds away from coastal areas is very limited.

Previous inventories point to the importance of montane areas as nesting habitat for particular assemblages of birds. However, the breeding distribution of alpine-nesting shorebird species such as Pacific Golden-Plover, Surfbird, and Wandering Tattler, is poorly understood. For one little-studied seabird, the Kittlitz's Murrelet, nearly one-quarter of the ≈30 nests found in the North American portion of its range were located on the steep rocky slopes of the Alaska Peninsula.

What habitats are used for nest sites and which bird species use montane areas for nesting? Are different bird assemblages found in KATM and LACL? Biologists from the U.S. Geologic Survey set out to answer these questions by conducting bird inventories in montane habitats in KATM and LACL. Surveys were conducted during the early breeding season from mid-May to early-June during 2004 - 2006. This period coincided with peak courtship activity. Biologists recorded their observations from 54 plots distributed among low (100-350 m), mid (351 – 600 m) and high (601-1620 m) elevations sites. Biologists recorded 92 species in KATM and 104 species in LACL, totaling 116 unique species. Approximately 70% of all species observed were found in both parks. The 13 most numerous species were all songbirds, which dominated the counts in both parks, comprising over two-thirds of all birds observed. Golden-crowned Sparrow, a species most-commonly detected at middle elevation sites, was detected at 1.5 times the rate of any other species. Other commonly detected songbirds included Fox Sparrow, American Pipit, and redpoll species.

A male Rock Ptarmigan, *Lagopus mutus*, surveys its surroundings, (KATM). This species molts into cryptic plumage to better match its snow-free summer haunts. Photo by D. Ruthrauff, USGS.

Birds were more abundant at low and mid elevations sites, where complex plant communities provide abundant and varied habitat. Golden-crowned Sparrow, Fox Sparrow, Yellow-rumped Warbler, and Wilson's Warbler, species inhabiting low and mid-elevation sites, were twice as abundant as alpine species in high elevation sites. Biologists recorded 40 species of conservation concern, as defined by Audubon Alaska, Partners in Flight, U.S. Fish and Wildlife Service, Alaska Shorebird Group, and/or Boreal Partners in Flight. Species of concern are those with threatened, declining or small populations.

Differences in species occurrence revealed aspects unique to each park. More Ruby-crowned Kinglets, Varied Thrushes, Yellow-rumped Warblers, and Dark-eyed Juncos were observed in LACL, whereas Hermit Thrushes, Wilson's Warblers, and Fox Sparrows were more frequently observed in KATM. Many boreal forest species were only observed in Lake Clark (e.g., Trumpeter Swan, Solitary Sandpiper, Lesser Yellowlegs, and Olive-sided Flycatcher). Of species detected only in KATM, three were typical of dwarf shrub tundra regions in western and northern Alaska (Gyrfalcon, Black-bellied Plover, and Pacific Golden-Plover).

USGS biologist Caroline Van Hemert surveys for montane-breeding birds at a site overlooking Kinak Bay (KATM). Photo by P. Farrell, USGS.

Previously verified bird observations suggest that many species unique to KATM are coastal/pelagic seabirds (e.g., Fork-tailed Storm-Petrel and Thick-billed Murre); KATM's long, rocky coastline simply provides more of this habitat. In contrast, birds unique to LACL are uncommon species at the edge of their ranges (e.g., Franklin's Gull and Rufous Hummingbird). Other species unique to LACL include migrant shorebirds using the extensive mudflats along the coast (e.g., Red Knot, Sanderling and Long-billed Dowitcher).

Upon completing their analysis, biologists identified an Area of Special Importance in each park: the Kukaklek Lake region in KATM and the Twin/Turquoise/Telaquana Lake highlands in LACL. These areas support diverse bird assemblages of both regional and national importance that include many species of conservation concern. Both regions are characterized by extensive highlands consisting of moraines that form rolling terrain with numerous kettle ponds. These geological diverse landscapes create extensive habitat for nesting and foraging sites unique to these parks. Park managers can benefit montane birds by making efforts to ensure the continued integrity of these sites.

For more information view the complete report at: http://science.nature.nps.gov/im/units/swan/index.cfm?theme=inventory_species#Birds

SWAN Welcomes New Staff

Michael Shephard took the helm as the Program Coordinator. He comes to us from the USDA Forest Service where he worked as a plant ecologist on Forest Health.

Jeff Shearer, Aquatic Ecologist, hails from the South Dakota State Parks system where he worked as an aquatic ecologist.

Chuck Lindsay filled a Physical Science Technician position. Prior to this assignment, he was a geologist with USGS, coordinating logistics and deploying automated geophysical equipment in Afghanistan.

Adrian Riddle joined the SWAN staff as a part time administrative assistant. She brings extensive knowledge from her seasonal work at Katmai NPP.

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SWAN Southwest Alaska Network

Integrating science, education, and resource protection through monitoring.

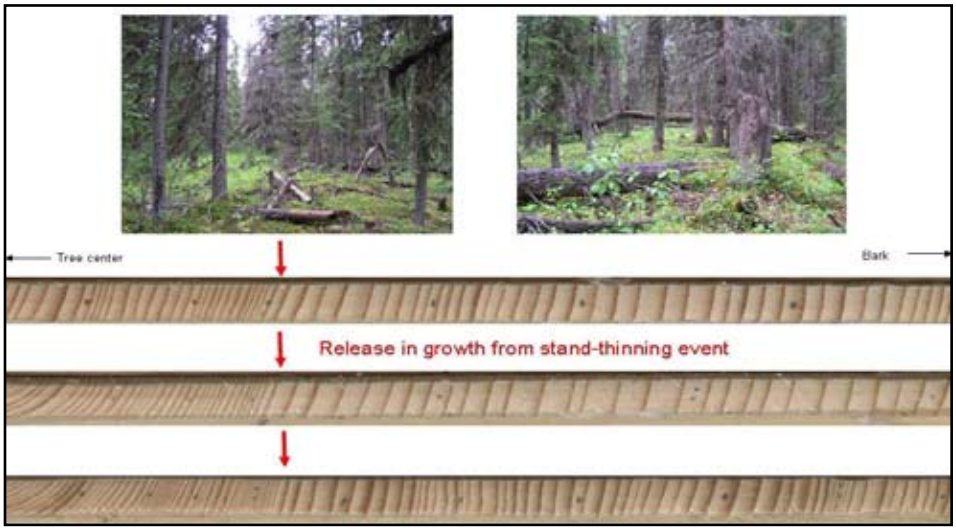
Tree-ring Analysis Provides Insight into Past Forest Disturbance

Tree-ring studies have been used to understand past disturbance (insect outbreaks, fire) and long-term climate variability in temperate and high-latitude forests. In south-central and southwest Alaska, gradual warming since the 1970s is thought to be partly responsible for the recent spruce bark beetle outbreaks that have killed over 3 million acres of spruce forest. In Lake Clark National Park and Preserve (LACL), forest stands started to show signs of heavy beetle activity in the 1990s.

The current spruce bark beetle outbreak has resulted in extensive forest mortality on the western Kenai Peninsula and the west side of Cook Inlet. Tree-ring reconstructions indicate that most areas of the Kenai experienced regional episodes of forest thinning during the last two centuries. Katmai National Park and Preserve (KATM) is currently experiencing some of the most severe infestations observed in the state. Approximately 70,000 acres are currently under attack at the west end of Naknek Lake. In response to concerns over recent spruce beetle infestations in south-central Alaska, the SWAN has initiated a multi-year study to examine the history of spruce beetle outbreaks in LACL and KATM using tree-ring analysis.

What is the history of previous spruce bark beetle outbreaks in LACL and KATM? Are the outbreaks localized or synchronized across the landscape? Is there a relationship between climate and insect disturbance? These are a few of the questions that the SWAN and research ecologists hope to answer in the next few years. Tree-ring data are being used to reconstruct spruce bark beetle outbreaks in both the LACL and KATM regions over the past 200-300 years. Variation in tree-ring widths indicate growth pulses caused by thinning of the forest by beetle kill. This method is based on the assumption that spruce bark beetles kill the larger trees, leaving behind the smaller pole-sized trees. When the smaller trees are released from competition (referred to as a "release"), they grow rapidly for decades until the canopy closes again and competition for light slows their growth.

In 2005, 814 tree cores were collected from live and dead trees from seven sites in LACL, and from two sites on Native land adjacent to Lake Iliamna. Results of the LACL regional tree-ring data reveal one or more growth release periods at all sites during the last 200+ years. On average, significant growth release was observed every 51 years, which matches closely the average return interval of 52 years for the Kenai Peninsula.



Upper: Spruce bark beetles attack mature trees thinning the forest stand. During this period of optimal growing conditions, young trees experience growth release, which is recorded in their tree rings.
Lower: Examples of growth release observed on tree-ring cores collected from the Tlikakila River, LACL. The cores represent a release in the 1910s which is evident in 6 of our sites.

Researchers compared their results to known climate records and additional tree-ring data collected at treeline to examine possible links to climate extremes. These trees are less susceptible to bark beetle outbreaks because the trees are slow growing and often stunted, unlike the larger diameter trees that beetles generally prefer. The treeline sites do not show the growth releases observed in the study sites, providing additional support that the releases are the result of spruce bark beetle infestations.

Researchers exam tree-ring core after removing it from a tree with an increment borer.

That's not to say that climate doesn't play a role. Preliminary beetle-climate results suggest that the decades in which regional bark beetle outbreaks started, low moisture conditions with warm winter-spring and dry late summer conditions were observed. Low moisture years are known to produce stress in white spruce, which greatly increases the probability of successful bark beetle attack and reproduction.

Regional stand-thinning events in the 1810s, 1830s, 1870s, 1910s, and 1970s attributed to spruce beetle activity in LACL match the regional outbreak dates on the Kenai Peninsula. The close association between outbreaks in LACL and the Kenai suggests a history of synchronized regional spruce bark beetle outbreaks across south-central Alaska that ranged from moderate- to high-severity (i.e., higher tree mortality). The current data suggest that the present outbreak appears to be a high-severity event with high tree mortality.

Analyses are currently underway on the 570 tree core samples that were collected in KATM in 2007. The KATM results will be compared to LACL to determine if the synchronized outbreaks observed in the LACL region and the Kenai Peninsula extend southward into KATM. In addition, the disturbance chronologies from both parks will be analyzed with a variety of climate data to gain a better understanding of the role of climate in controlling beetle outbreaks. The results of this study will provide baseline information on current forest conditions and will help to define the range of natural variability in insect outbreaks. This work will also provide insight into how future environmental changes may influence forest productivity in this region, and will provide a context for forest trends observed during NPS vital signs monitoring.

Overview of spruce beetle outbreak, Bay of Islands, KATM.