Kittlitz's Murrelet Cooperative Study in Icy Bay, Alaska

Michelle L. Kissling, Principal Investigator
Juneau Fish and Wildlife Service Office

PROJECT SUMMARY

In 2005, we launched a study of the nesting and foraging ecology, demography, and population dynamics of the Kittlitz's Murrelet (*Brachyramphus brevirostris*; KIMU) in Icy Bay, Alaska. Since the project's inception, we have developed formal partnerships with nine government agencies, universities, private businesses, and non-profit organizations, and been awarded over $500,000 in competitive grants. To date, this cooperative study represents the single largest, most comprehensive field effort dedicated to KIMU.

BACKGROUND INFORMATION

- Small seabird (~220g) endemic to coastal Alaska and eastern Russia; 90% breeds, molts, and winters in Alaska
- Listed as candidate species (LPN 2) to Endangered Species Act in 2004; trend is geographically variable, but declining across range
- Speculated causes for decline include oil pollution, glacial recession/climate change (and cascading effects thereof), gill-net mortality, and reduced availability of preferred forage fish
- Solitary breeder, lay one egg on ground, typically in recently deglaciated areas and often at high altitudes on rock scree slopes
- K-selected species: large-scale nonbreeding common, low reproductive rates, long lifespan (15-20 years)
- Often associates with tidewater glaciers, glaciated fjords, and glacially-influenced waters; referred to as "Glacier Murrelet"

PARTNERSHIPS

Scott Gende – National Park Service
Stephen Lewis, Sarah Schoen – US Fish and Wildlife Service
Paul Lukacs – Colorado Division of Wildlife
Nick Hatch (SCEP student), Dan Roby – Oregon State University
Robert Day – ABR, Inc.
Tony Williams – Simon Fraser University
Steve Zack – Wildlife Conservation Society
Michael Tobias – Dancing Star Foundation
John Piatt, Mayumi Arimitsu, Erica Madison – US Geological Survey
Chris DeSorbo, Dave Evers – Biodiversity Research Institute
Many, many volunteers!

OBJECTIVES

- Estimate population growth rate by generating empirical estimates of adult survival, reproductive measures, and population abundance
- Determine stages in the life history when population growth is bottlenecked and identify factors that are limiting growth
- Characterize foraging and nesting habitat at multiple spatial scales

VITAL RATES

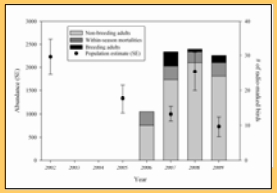

Figure 1. KIMU abundance estimates derived from at-sea surveys and reproduction and mortality rates of radio-marked KIMU, Icy Bay, 2002-2009.

- Annual variability in abundance results from movements, not reproduction or survival (demographically impossible)
- High % females with elevated yolk-precursor hormones, but reproductive effort is low
- Abundance alone is not reliable measure of population growth

- Within-season mortality exceeds reproduction
- KIMU mortality from Bald Eagles and Peregrine Falcons
- Initiating study of raptor behavior, movements, and diet in 2010
- Located 8 active nests in Icy Bay; 7 located on glacier or nunatak (insular mountain surrounded by ice sheet)

SEASONAL MOVEMENTS

- Virtually nothing known about the ecology, movements, or locations of KIMU in the non-breeding season (September-April)
- Attached 2 prototype, solar-powered satellite transmitters (~6g; Microwave Telemetry) as part of larger USGS effort in August 2009
- Encouraging, but limited results; both KIMU marked in Icy Bay flew to Lower Cook Inlet area, roughly 400 km, in less than 2 days

Figure 2. Large-scale movements of two KIMU equipped with satellite transmitters in Icy Bay, August 3-4, 2009 (map by E. Madison, USGS).

- Refined design and characteristics of transmitters; plan to deploy 6 satellite transmitters from May-August 2010 in Icy Bay

PLUMAGE VARIATION

- Investigating ability to sex, age, and determine breeding status of KIMU in field; age and sex ratio important for demographic modeling
- Wing chord longer in males (>135 mm) than females
- Underwing pattern can be used to distinguish between hatch-year (HY), second-year (SY), and after-second-year (ASY) KIMU

DIET COMPOSITION

- Neritic zone pursuit diver, feeding mostly on small planktivorous forage fish and macrozooplankton
- Stable isotope comparison with feathers from museum specimens is underway
- Developing energetic model to identify potential bottlenecks related to diet composition and nutrition
- Study conducted by Master's student at Oregon State University

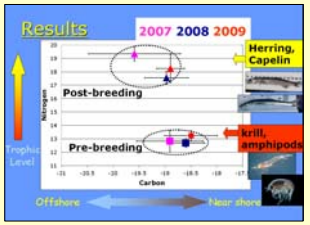

Figure 3. KIMU feed high on the trophic scale during the post-breeding period (September-October) and low on the trophic scale during the pre-breeding period (March-April; graphic prepared by N. Hatch, OSU).

CONTAMINANTS

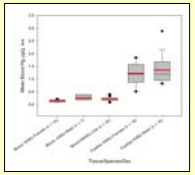

Figure 4. Preliminary results of mean mercury levels of KIMU from Icy Bay (from D. Evers and C. DeSanto, BRI)

- Deposition of atmospherically derived mercury is favored in glacial landscapes due to the cold condensation process
- Top-level consumers, like KIMU, that forage in glacial-influenced waters may be disproportionately susceptible to mercury pollution
- Full contaminant screening completed for tissue and egg samples collected opportunistically

KIMU AND CLIMATE

- KIMU evolved unique nesting and foraging habits in glaciated landscapes where rapid change is now occurring;
- Therefore, KIMU are disproportionately affected by changes in climate, such as encroaching vegetation, predator expansion, and prey availability, and their long-term persistence is questionable