KITTLITZ'S MURRELET (*BRACHYRAMPHUS BREVIROSTRIS*) NESTING ECOLOGY ON KODIAK ISLAND, ALASKA

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Introduction

The Kittlitz's murrelet (*Brachyramphus brevirostris*) is a rare seabird that breeds in Alaska and eastern Russia. Observed at-sea population declines in the 1990s and 2000s led to concerns about the status of the species. The opportunistic discovery of a Kittlitz's murrelet nest in 2006 on Kodiak Island, Alaska prompted USFWS biologists to begin audio-visual surveys in potential nesting habitat. In 2008, Kodiak National Wildlife Refuge initiated a collaborative project to investigate Kittlitz's murrelet breeding ecology.

Objectives

1. Describe nest site characteristics.
2. Record and analyze incubation shifts and prey deliveries to chicks.
3. Monitor chick growth and development.
4. Quantify nest success and identify significant causes of nest failure.

Methods

- Systematically search suitable habitat.
- Locate Kittlitz's murrelet nests by flushing incubating adult from nest bowl.
- Collect egg measurements including: length, width, mass, and float (to determine stage of incubation).
- Install Reconyx® game camera 1 m from nest.
- Use float benchmarks to estimate hatch date.
- Return to nest at 4-6 days, 14-16 days, and 18-21 days post-hatch to collect chick morphological measurements. Collect fecal samples and estimate percent down.
- Collect nest site characteristics including: slope, aspect, elevation, ocean view, and areal coverage of three rock classes and six vegetation types.
- Review digital camera images post-field-season to record details of nest events.

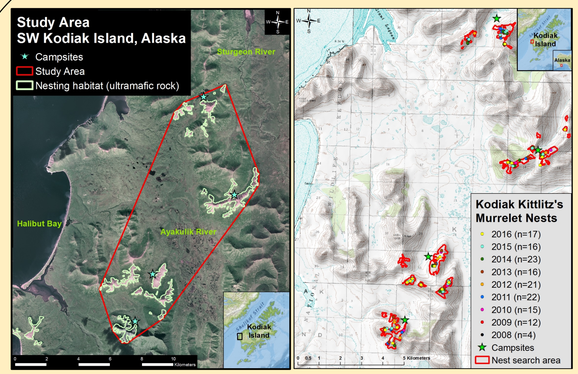

Figure 1. Maps of study area and Kittlitz's murrelet nesting locations on the west side of Kodiak Island, AK, 2008-2016.

Figure 2. Reused nest bowl of KODKIMU1310 and KODKIMU1605.

Table 1. Mean characteristics of Kittlitz's murrelet nests discovered on Kodiak Island, AK, 2008-2016.

Year	Elevation (m)	Distance to Ocean (km)	Slope (deg)	5m %Veg
2008	383	8.81	30	9
2009	344	5.78	29	7
2010	297	6.36	28	7
2011	304	5.56	29	6
2012	298	6.20	29	4
2013	312	5.92	35	10
2014	324	6.44	36	5
2015	323	5.91	35	4
2016	310	6.35	33	4
Mean	315	6.17	32	6

Results

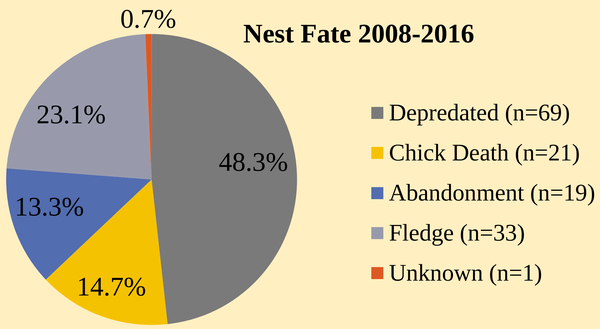

Figure 3. Nest fates of Kittlitz's murrelet nests on Kodiak Island, AK 2008-2016.

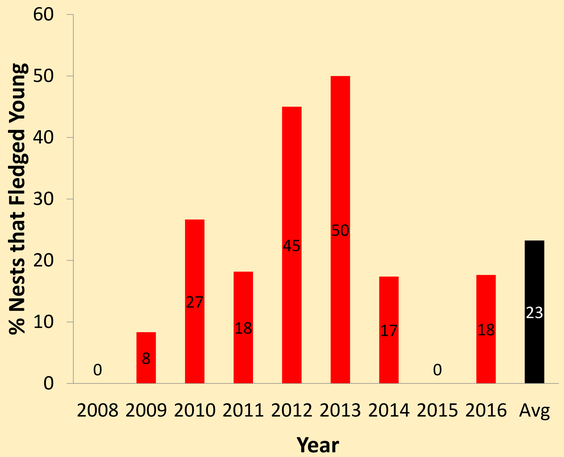

Figure 4. Annual apparent nest success of Kittlitz's murrelets from 2008-2016 on Kodiak Island, AK.

Figure 5. Red fox (*Vulpes vulpes*) depredating Kittlitz's murrelet nest on Kodiak Island, AK.

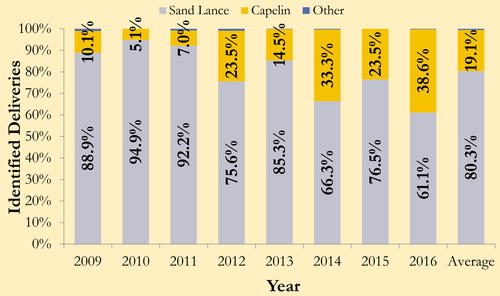

Figure 6. Annual species composition of prey deliveries fed to Kittlitz's murrelet chicks from 2008-2016 on Kodiak Island, AK.

Figure 7. Adult Kittlitz's murrelet delivering capelin to chick on Kodiak Island, AK.

Conclusions

- The Kittlitz's murrelet on Kodiak Island, AK experienced low apparent nest success (23%) from 2008-2016 with wide annual variation (0-50%).
- Of 146 discovered active nests, the main cause of nest failure was depredation (69), and the primary predator observed depredating nests was red fox (41).
- Stomach contents from nine chicks that died on the nest across three different seasons tested positive for saxitoxin, most at lethal levels (42.2 - 338.05 ng/g).
- Nests were found at an average elevation of 315 m and slope of 32°. On average, nests were surrounded by little vegetation (6% in 5-m-radius plot) and located 6.17 km from the coastline. Nest site reuse was documented at 15 nest sites.
- Pacific sand lance (80.1%) was the primary prey species fed to chicks, but diet composition varied annually.
- Continued analysis will examine the relationship between chick growth and the quality and abundance of available prey.

Acknowledgments: We acknowledge the contributions of Hannah Abbott, Adam Price, Alivia Sheffield, Aimee Van Tatenhove, Bailey Yliniemi, Shannon Carvey, Maddie Kombrink, Erik Bolton, Erynn Rebol, Jessica Shapiro, Tamara Payton, Daniel Raleigh, Bob Taylor, Marie McCann, Sonia Kumar, Heather Mackey, Stephen Crane, Deanna Russell, Owen Baughman, Corey Shake, Christina Wells, Erin Burkett, and Amy Westmark. Special thanks to the staff of Kodiak National Wildlife Refuge. This project was funded by National Fish and Wildlife Foundation Pacific Seabird Program, U.S. Fish and Wildlife Service (Kodiak National Wildlife Refuge, Office of Ecological Services), and the U.S. Geological Survey (Alaska Science Center).