



Alagnak

Aniakchak

Katmai

Kenai Fjords

Lake Clark

Bald Eagles

Pilot phase of monitoring complete, evaluation of methods shows areas for improvement

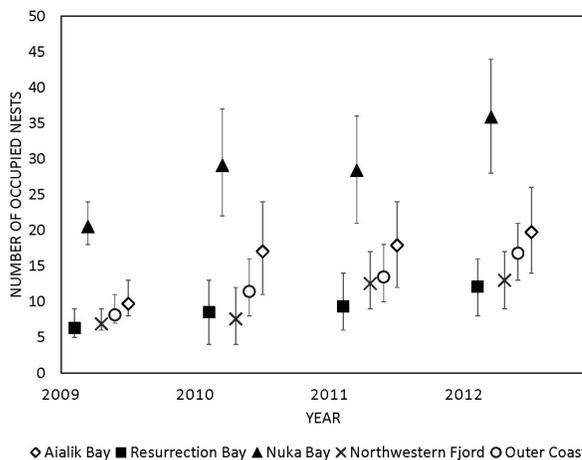
Nest occupancy levels were lower than usual in Katmai (KATM) and Kenai Fjords (KEFJ) in 2013 (Table 1). While these data may represent a reduction in nest occupancy, other potential reasons for the below-normal results include variation in timing of eagle arrival at nests in relation to our single-pass survey. Lake Clark (LACL) observed near-normal occupancy rates, and this rate was based on two occupancy surveys conducted in May. This result illustrates how difficult it is to infer

meaning about annual occupancy based on a single snapshot survey. Recent work by NPS staff to evaluate the survey methodology used to determine bald eagle nest occupancy in SWAN parks has led to improvements in the accuracy with which we report information about local populations of bald eagles (Wilson et al. 2013). From 2009 to 2012 two-observer aerial surveys were flown over much of the Kenai Fjords coastline to determine nest occupancy. The evaluation focused

on identifying areas of bias and the ability to detect nests (Fig. 1). It also identified ways to analyze the data that give both a more accurate estimate of occupied nests as well as localized population information, which is potentially more relevant to local management decisions. Based on the results of the evaluation, we recommended that two occupancy surveys be performed so that eagle nest occupancy and availability can be modeled more precisely.



Initial implementation of the bald eagle monitoring program began in 2009. Four years of data (2009-2012) from Kenai Fjords were used to evaluate and align methods with management needs and ensure robust survey protocols are used.



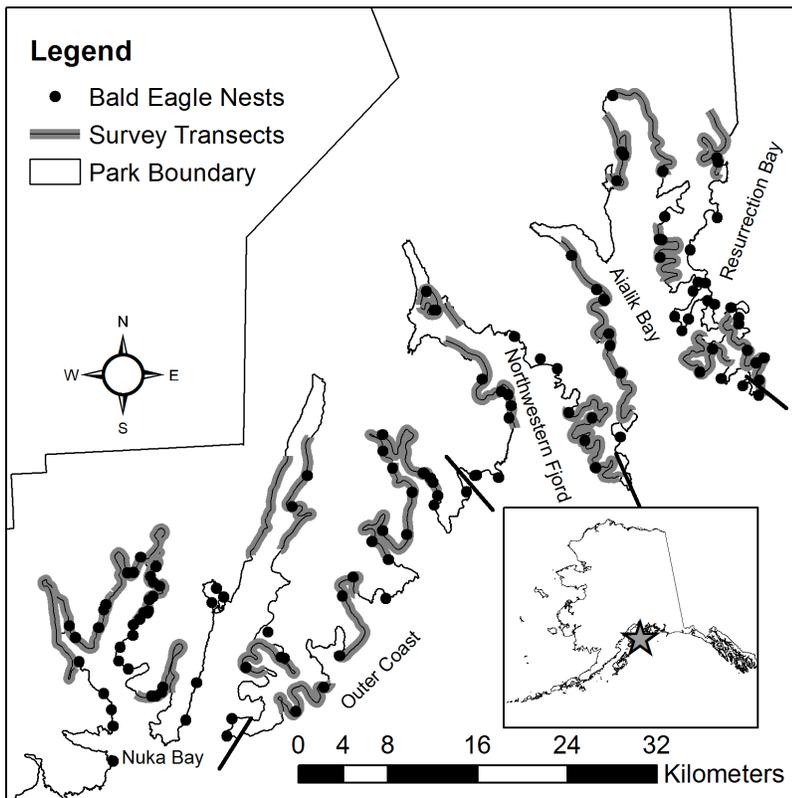
Estimated number of occupied bald eagle nests for each year from 2009-2012 along the coastline of KEFJ. The estimates were derived from the incomplete availability scenario of a Bayesian multistate method used to evaluate protocols. Error bars represent 95% credible intervals for each estimate.

	Total Nests Found	Occupied Nests
Katmai		
2012	54	31
2013	62	20
Kenai Fjords		
2012	74	43
2013	81	29
Lake Clark		
2012	114	50
2013	113	58

Table 1. Bald eagle nest occupancy data for KATM, KEFJ, and LACL from 2012 and 2013.



Surveys are conducted in KEFJ using two observers via helicopter at a speed of 40 to 75 km/h. LACL and KATM both used fixed-wing aircraft to conduct surveys.



Importance

All three SWAN park units support large populations of bald eagles. Bald eagles were once listed as endangered in the contiguous 48 states due to human-caused declines. Populations have since recovered, and they were delisted in 2007. As top predators, bald eagles can serve as indicators of the overall health of local ecosystems and environment. Their breeding success is also influenced by food availability and spring weather conditions. Understanding the status and trends of local populations can assist managers address future questions on impacts visitor access or other human caused disturbances, such as oil spills.

Left: Figure 2. Locations of survey transects and bald eagle nests in KEFJ.

Monitoring Approach

The goal of the long-term bald eagle monitoring program is to develop rigorous survey methods to track nest occupancy and productivity in a standardized manner across all three SWAN park units. Additionally, survey methods are compatible with the methods proposed in the post-delisting monitoring plan for bald eagles. Staff began testing methods in KEFJ in 2009 using two-observer aerial surveys to locate nests and determine occupancy state. Ongoing efforts since then have included an assessment of methods used in KEFJ. This analysis accounted for the ability for observers to see nests, but

also identified other potential sources of error related to survey methods. Surveys began in KATM in 2011 after a 20-year break using the draft protocol for KEFJ; LACL has monitored bald eagles for the last 20 years and adapted methods in 2012 to be consistent with the other two parks. One to two occupancy surveys are flown per summer season in each park. In KEFJ, surveys are conducted along the coast. In KATM, they are flown in the Naknek watershed. LACL surveys cover all bald eagle habitat with known nests in the park and preserve.



Bald eagle nests are commonly seen in cottonwood trees, like this one in the twin Lakes area of LACL.

Publications and Reports

Wilson, T. L., J. H. Schmidt, W. L. Thompson, and L. M. Phillips. 2013. Monitoring bald eagle populations in remote landscapes: Are nests available for detection? *Journal of Wildlife Management*. *In preparation*.

Witter, L. A., and B. M. Mangipane. 2011. Bald eagle nest survey Lake Clark National Park and Preserve, Alaska. Natural Resource Data Series NPS/LACL/NRDS—2011/313. National Park Service, Fort Collins, Colorado.

Witter, L. A., and S. A. Anderson. 2011. Bald eagle nest survey Katmai National

Park & Preserve, Alaska. Natural Resource Data Series NPS/KATM/NRDS—2011/311. National Park Service, Fort Collins, Colorado.

Thompson, W. L., and L. M. Phillips. 2011. Evaluation of a dual-frame design to estimate occupancy and productivity of bald eagle nests in Kenai Fjords National Park. Natural Resource Technical Report NPS/SWAN/NRTR—2011/413. National Park Service, Fort Collins, Colorado.

Thompson, W. L., S. Hall, and C. R. Lindsay. 2009. Evaluation of a survey method for

estimating and monitoring the number of active bald eagle nests in Kenai Fjords National Park. Natural Resource Technical Report NPS/SWAN/NRTR—2009/271. National Park Service, Fort Collins, Colorado.