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Natural Resource Stewardship and Science

Monitoring Bald Eagles in Wrangell-St. Elias National Park and Preserve, Central Alaska Network

Data Quality Standards Version 1.0

Natural Resource Report NPS/CAKN/NRR—2018/1753

ON THE COVER
Adult bald eagle on the nest, Wrangell-St. Elias National Park & Preserve
Photograph courtesy of the National Park Service, Judy Putera

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September 2018

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

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Please cite this publication as:

Putera, J. 2017. Monitoring bald eagles in Wrangell-St. Elias National Park and Preserve, Central Alaska Network: Data quality standards version 1.0. Natural Resource Report NPS/CAKN/NRR—2018/1753. National Park Service, Fort Collins, Colorado.

NPS 953/148513, September 2018

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Executive Summary

The purpose of this report is to document the standards used by the CAKN for activities related to the collection, processing, storage, analysis, and publication of bald eagle monitoring data as described in Protocol Implementation Plan for Bald Eagle Monitoring in Wrangell-St. Elias National Park and Preserve, Central Alaska Network (Putera and Miller *In review*). The policies and procedures documented in this quality-assurance plan for activities complement the quality-assurance plans for other monitoring activities conducted by the CAKN and supplement National Inventory & Monitoring Division Quality Management Plan. The plan also serves as a guide for all CAKN personnel who are involved in protocol/program activities and as a resource for identifying memoranda, publications, and other literature that describe associated techniques and requirements in more detail.

Acknowledgments

Funding for this project was provided through the National Park Service, Inventory and Monitoring Program.

Introduction

The purpose of this report is to document the standards used by the Central Alaska Network (CAKN) for activities related to the collection, processing, storage, analysis, and publication of monitoring data as described in Protocol Implementation Plan for Bald Eagle Monitoring in Wrangell-St. Elias National Park and Preserve, Central Alaska Network. This work is described in a Protocol Implementation Plan which is based on The Monitoring Bald Eagles in Southwest Alaska Network Parks (SWAN; Wilson et al. 2017) protocol and standard operating procedures serve as the basis for this plan. The policies and procedures documented in this quality assurance plan for activities complement the quality-assurance plans for other monitoring activities conducted by the CAKN, and supplement the National Inventory & Monitoring Division Quality Management Plan. The Standard Operating Procedures provide detailed protocol/program activities associated with bald eagle monitoring. This plan serves as a guide for all personnel who are involved in protocol/program activities and as a resource for identifying memoranda, publications, and other literature that describe associated techniques and requirements in more detail.

Protocol Overview

The Central Alaska Network (CAKN) has adopted a holistic view of network ecosystems and will track the major physical drivers of ecosystem change and responses of the two major components of the biota: plants and animals (MacCluskie et al. 2005). The CAKN has identified Fauna Distribution and Abundance as one of its top three Vital Signs. The Fauna Distribution and Abundance Vital Sign includes monitoring efforts for a suite of vertebrate species spanning the elevational gradient found in CAKN parks, and also includes species of specific interest within each park.

Raptors have been identified as a vital sign within this context because they are top trophic level predators that also act as indicators of bioaccumulative contaminants that persist in our ecosystems. One of three prominent raptor species will be monitored in each CAKN park unit. Golden eagles (*Aquila chrysaetus*) and peregrine falcons (*Falco peregrinus*) nest in some of the highest recorded densities in Denali National Park & Preserve (DENA) and Yukon-Charley Rivers National Preserve (YUCH), respectively and both parks have long-term datasets. In WRST, the Copper River and its major tributaries contains a high density of nesting bald eagles at the northern extent of their range and populations have been monitored there since 1987.

This documents outlines the data quality standards for the bald eagle "Vital Sign", as part of the NPS Vital Signs Inventory and Monitoring program and as described in the CAKN Monitoring Plan (MacCluskie et al. 2005). The study design, data collection methods, and analytical protocols have been previously published in the *Journal of Wildlife Management* (Wilson et al. 2014) and in two National Park Service Natural Resource Technical Report (NRTR) series publications (Thompson et al. 2009, Thompson and Phillips 2011). The methods described here also closely follow those outlined in the United States Fish and Wildlife Service's post-delisting monitoring plan (USFWS 2009).

Conceptual Framework for Monitoring

As in the SWAN protocol, bald eagle reproductive performance is expected to be sensitive to current and long-term changes in terrestrial, freshwater, and marine systems, environmental contaminants, climate change, human disturbance, and catastrophic events such as oil spills. We anticipate that CAKN climate related vital signs such as climate, glaciers, snowpack, and permafrost, as well as vital signs that measure plant phenology and vegetation structure and composition will be important for understanding how long-term ecosystem changes may affect bald eagle nesting and prey abundance. Of equal importance are non CAKN related monitoring efforts including salmon escapement and fish contaminants monitoring.

Protocol Activities

Measurable Objectives

The main objective is to measure changes in the bald eagle breeding population in a region of interest in WRST. The SWAN protocol uses dual-frame (list and area frame) sampling to estimate bald eagle abundance within the area of interest in KATM and KEFJ (Haines and Pollock 1998; U.S. Fish and Wildlife Service 2009). KATM and KEFJ also use double observer (Nichols et al. 2000) sampling to correct for missed nests during surveys, and modified occupancy sampling (Wilson et al. 2017) to correct the proportion of initiated nests if the peak nesting period is missed. LACL employs only list frame and modified occupancy sampling. In this case, abundance is not monitored in LACL. The measurable objectives for this PIP are as follows (Table 1 and Table 2):

1. Estimate annual and long-term trends in the annual proportion of nests and nesting territories in which eagles attempt to reproduce (nest initiation). Nest initiation is not directly observable, and will be modelled using data obtained during two nest initiation surveys conducted in May.
2. Estimate annual and long-term trends in nest initiation success, expressed as the percentage of initiated nests that produced at least one young to near fledging.
3. Estimate annual and long-term trends in nest productivity, expressed as the number of young produced per initiated nest.

Table 1. Project activity matrix for bald eagle monitoring.

Category	Activity #	Activity	Description
Site Reconnaissance: List Frame Maintenance	1	Nest characteristics	New nests only: tree info, photos, site characteristics, location (SOP 2)
Field Observations	3	Adult presence on nest or eggs observed in nest	Nest status: Incubating or Empty (SOP 2)
	4	Presence of chicks	Number of live chicks, chick age (SOP 3; Carpenter 1990)
Derived Data	5	Nest initiation data	Calculated date of nest initiation (SOP 3)
	6	Probability of initiation	Probability that a nest was initiated in any given year or proportion of all nests that were initiated (SOP 2)
	7	Productivity	Mean number of chicks produced in each initiated nest (SOP 3)
	8	Nest success	Probability that a nest was successful or proportion of all nests that were successful (SOP 3)

Table 1 (continued). Project activity matrix for bald eagle monitoring.

Category	Activity #	Activity	Description
Derived Data (continued)	9	Number of nests	Nest abundance (SOP 2, 3)
	10	Number of initiated nests	Number of nesting attempts started in a year (SOP 2)
	11	Number of successful ness	Number of nests that produced chicks in a year (SOP 3)
	12	Number of chicks	Number of chicks raised to fledging age each year (SOP 3)
QA/QC Data	13	Nest location	Check geospatial data for logical errors (e.g. nests that appear over water) (SOP 2)

Table 2. Activity-level sample design matrix for bald eagle monitoring in Wrangell-St. Elias National Park and Preserve.

Category	Activity #	Activity	Sampling Design	Revisit Design
Site Recon, Establishment, and Maintenance	1	List frame	List frame only	All empty nests visited twice during initiation survey; initiated nests visited once during productivity survey
Field Observations	2	Nest initiation data	List frame only	Revisit annually; two surveys in May
	3	Productivity data	List frame only	Revisit annually; one survey in July/August

Sampling Design

The sample area in WRST extends along the Copper River from Copper and Tanada Lakes near the headwaters south to Miles Lake, 53 km upstream from the Gulf of Alaska (Figure 1). The Copper River tributaries to be surveyed include the Chitina River from the Copper River confluence to about 6 km upstream of the Tana River, and the Bremner River from the Copper River confluence to Three Mile Canyon. This sample area was selected because the Copper River is the dominant river in south-central Alaska, draining a basin of 68,600km², is under Federal management, and all or part of the area has been included in bald eagle surveys since 1987. The sample area also contains the majority of bald eagle nests within WRST. Bald eagles are known to nest along the 201 km coastline of WRST, however it would be a logistical challenge to include the coast habitat in the sampling scheme.

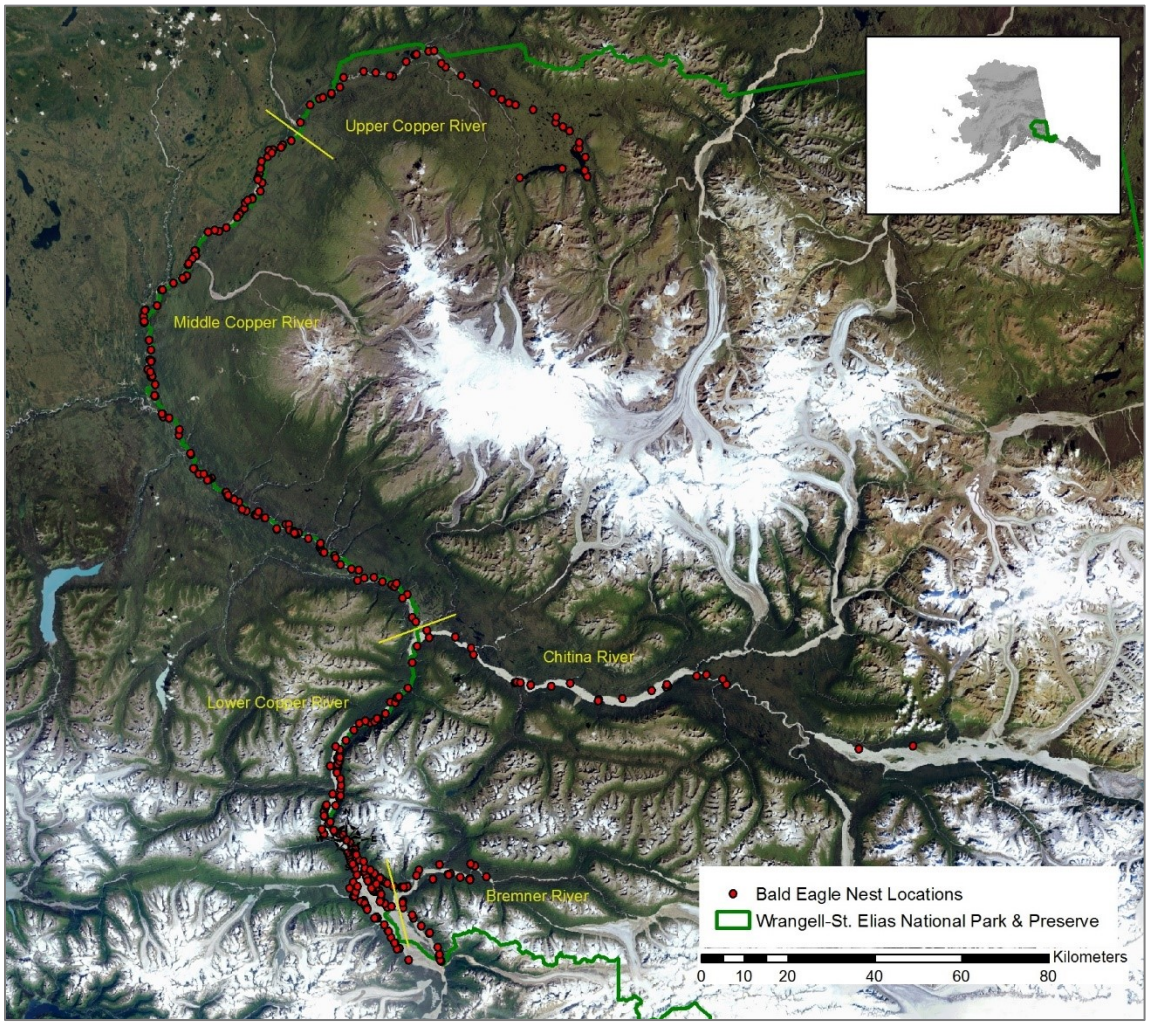

Figure 1. Sample area, including bald eagle nest sites, in Wrangell-St. Elias National Park & Preserve.

Data Quality Objectives

Data quality objectives are provided in Table 3.

Table 3. Data Quality Values (DQVs) to be considered in development of quality assurance plans for bald eagle monitoring in Wrangell-St. Elias National Park and Preserve.

Category	Data Quality Value	Definition	Protocol Considerations
Intrinsic Data Quality	Accuracy	Measurements reflect the true value of the parameter being observed. This applies to measures (length, width, position) or classes (species, types, or categories). Includes components of precision and bias. [Measurements reflect what observers saw in the field]	The quantities of interest cannot be observed directly in the field. Quantities of ecological interest are obtained from unbiased estimators that use the field data. Bias and precision are properties of the estimators. The recorded data are assumed to be accurate representations of what the observer(s) saw in the field. We do not place standards on the magnitude of the bias, only that the revisit design allows estimators that can account for it.
	Representativeness	Measurements represent conditions at the time of sampling. Combined with accuracy, leads to repeatable data collection. [Statistical Inference]	List frame samples pertain to the nests sampled. Observations represent conditions at the time of sampling.
Contextual Data Quality	Comparability	The degree to which data can be compared among sample locations, data sources, or periods of time.	Metrics pertaining to the list frame are comparable across parks and through time.
	Completeness	All data/measures required to evaluate accuracy representativeness are present; incomplete data sets (either at a location, across sampling locations, or over time) lose utility or relevance. Data records contain values as planned across the period of record.	Every effort will be made to complete the two ENIS and LPS surveys. All data/ measures required to evaluate accuracy representativeness are as complete as possible. Field conditions are difficult, and incomplete datasets are often recorded. Incomplete data sets are still valuable and are analyzed using model-based inference that accommodates missing records. Data records contain values that are complete as possible across the period of record.

Table 3 (continued). Data Quality Values (DQVs) to be considered in development of quality assurance plans for bald eagle monitoring in Wrangell-St. Elias National Park and Preserve.

Category	Data Quality Value	Definition	Protocol Considerations
Representational Data Quality	Consistent representation	Use of standard definitions when describing data quality or resource quality based on data	Standard field definitions are described in the data management SOP4
Data Accessibility	Secure	Access to data, products, and systems limited to appropriate audiences.	No protected data are being collected as part of this protocol.

Measurement Quality Objectives and Performance Standards

Measurement data quality objectives are provided in Table 4 and Table 5.

Table 4. Example Measurement Quality Objective table to be included in Quality Assurance Plans for protocols implemented by the NPS Inventory & Monitoring Division. Measure/Indicator numbers (second column) match those in the Protocol Activity Matrix Table (Table 1).

Category	Measure /Indicator #	Measure/Indicator	Quality Objective
Site Reconnaissance: List Frame, New Nests	1	Location accuracy	+/- 300m (horizontal), no standards for vertical accuracy
	1	Tree information	The substrate the nest is built on (generalized tree species or ground): spruce, hemlock, cottonwood, or ground.
	1	Tree condition	The status of the tree: Live or Dead (NA if nest is built on the ground). Value may change in subsequent years.
	1	Site characteristics	If collected, additional information about the nest or structure of the tree (e.g. broken top). May assist in identification of the nest in subsequent years.
	1	Photos	If photos are taken, they can be used to help identify the nest during the subsequent years.

Table 4 (continued). Example Measurement Quality Objective table to be included in Quality Assurance Plans for protocols implemented by the NPS Inventory & Monitoring Division. Measure/Indicator numbers (second column) match those in the Protocol Activity Matrix Table (Table 1).

Category	Measure /Indicator #	Measure/Indicator	Quality Objective
Site Reconnaissance: List Frame, New Nests (continued)	1	List frame completeness	Nest is able to be found during the survey. A max time of ten minutes searching for nest should be used. If the nest is not found, it will be recorded as Not Located. Weather conditions or time considerations may shorten the amount of time spend searching for individual nest from the ten minute max. Nests will be removed from the list frame if it is observed to be destroyed or if it has not been found in 2 consecutive years.
Field Observations: Nest Initiation data	3	Nest status	Incubation status of the nest. An incubating nest is determined from adults sitting on the nest or observation of eggs in the nest. An empty nest has no signs of adults sitting on the nest nor are eggs visible. If the nest cannot be found, the status will be Not Located.
Field Observations: Productivity data	4	Chick count	Chick count at each nest is <4 chicks. If the nest is not located, the value will be null.
	4	Chick age	Observations are recorded accurately, or with null value indicator.
Derived quantities	6	Nest initiation	2-visit spring revisit design used
	7-8	Nest productivity/success	Summer productivity sampling conducted

Taxonomic Standards

The taxonomic standards used in this protocol are for Bald eagle (*Haliaeetus leucocephalus)* as described in Buehler 2000 (Table 5).

Table 5. Example activity-level sample design matrix to be included in Quality Assurance Plans for protocols implemented by the NPS Inventory & Monitoring Division. Numbers (second column) should match those in the Protocol Activity Matrix Table (Table 1) and may be combined as appropriate.

Category	Activity #	Activity	Standard to be Used	Reference / Authority
Options	1	Taxonomic Identification	• Scientific publication reference and year of the reference for identification or publication (to distinguish among reporting versions), or • Field Subject Matter Expert if/when Position(s) responsible for data are collected in the field or performing the identifications verified in the office to one or more undetermined standards , or • Taxonomic Subject Matter Expert Name and organization of taxonomic if/when data are collected and subject matter expert verified by an individual with documented taxonomic expertise.	Buehler 2000
Field Observations	1	Nest tree species	Scientific Publication	Flora of North America (1993, 2010)

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NPS 953/148513, September 2018

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