



Protocol Implementation Plan for Bald Eagle Monitoring in Wrangell-St. Elias National Park & Preserve, Central Alaska Network

Standard Operating Procedures Version 1.21



ON THE COVER

An adult bald eagle on the nest in Wrangell-St. Elias National Park & Preserve
Photograph courtesy of the National Park Service, Judy Putera

Protocol Implementation Plan for Bald Eagle Monitoring in Wrangell-St. Elias National Park & Preserve, Central Alaska Network

Standard Operating Procedures Version 1.1

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Executive Summary

This document contains the Standard Operating Procedures (SOPs), version 1.1, for the Central Alaska Network (CAKN) Protocol Implementation Plan for Bald Eagle Monitoring in Wrangell-St. Elias National Park & Preserve. 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 document. The procedures provide detailed methods for collecting, managing and reporting monitoring data for bald eagles, as described in the CAKN Monitoring Plan (MacCluskie et. al. 2005). The study design, data collection methods, and analytical protocols are based on the SWAN protocol and 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).

SOP 1 describes how to prepare for the field season. SOP 2 describes methods for conducting the early nest initiation survey and recording data. SOP 3 details methods for conducting the late productivity survey (LPS) and recording data. SOP4 details data management and archiving procedures. SOP 5 contains the reporting schedule for the bald eagle vital sign. SOP 5 describes how to report bald eagle monitoring data update the standard operating procedures. SOP 6 contains information about important field and aviation safety protocols. The appendices contain examples of important forms related to aviation safety.

List of Acronyms

AFF	Automated Flight Following
AQD	Acquisition Services Directorate
ARCC	Alaska Region Communication Center
CAKN	Central Alaska Network
ENIS	Early Nest Initiation Survey
FBMS	Financial and Business Management System
GOC	Gulkana Operations Center
IBC	Interior Business Center
KATM	Katmai National Park & Preserve
LACL	Lake Clark National Park & Preserve
LPS	Late Productivity Survey
PIP	Protocol Implementation Plan
JHA	Job Hazard Analysis
IAT	Interagency Aviation Training
KEFJ	Kenai Fjords National Park
GAR	Green-Amber-Red
OAS	Office of Aviation Services, U.S. Department of the Interior
PASP	Project Aviation Safety Plan
PI	Principal Investigator
PPE	Personal Protection Equipment
SOP	Standard Operating Procedure
SWAN	Southwest Alaska Network
USDOI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
VFR	Visual Flight Rules

WRST Wrangell-St. Elias National Park & Preserve

Dataset ownership and sensitivity

Dataset ownership

U.S. Government Works Data and content created by government employees within the scope of their employment are not subject to domestic copyright protection under 17 U.S.C. § 105. Government works are by default in the U.S. Public Domain. The U.S. Government has an [obligation](#) to make bald eagle monitoring data publicly available.

Dataset sensitivity

Due to historically robust populations, bald eagles have never been listed as threatened or endangered in Alaska. As of this writing the NPS has not formally described any portion of the bald eagles monitoring dataset as sensitive, but a brief discussion of legal requisites to determine if data may be withheld from the public may be useful.

National Parks Omnibus Management Act, Section 207, 16 U.S.C. § 5937, allows NPS to withhold information regarding the nature and specific location of certain cultural and natural resources in the national park system from release under FOIA. The law also identifies conditions under which the Secretary may release this information. Information concerning the nature and specific location of a National Park System resource which is endangered, threatened, rare, or commercially valuable, of mineral or paleontological objects within units of the National Park System, or of objects of cultural patrimony within units of the National Park System, may be withheld from the public (16 U.S.C. § 5937).

The NPS IRMA Data Store User Guide titled '[Reference Sensitivity, Proprietary and Quality Designations](#)' describes specific conditions under which wildlife data may be withheld from the public. The text below been edited to better pertain to the sensitivity requirements of the bald eagles dataset.

For an information resource to qualify as having legally sensitive natural/cultural resource information, all of the following criteria must be met:

- *Internal Resource - The Information Resource contains information about a resource internal to the NPS.*
- *Location-Specific – There are GPS coordinates indicating the exact location of the resource. It is important to note that only disclosing that a resource is present at a park unit is not considered to be location-specific. Likewise, generalized location data (e.g., cutting off the last digits in UTM coordinates) is also not considered to be location-specific. In extremely rare instances, acknowledgement that a particular resource exists at all in a park may reveal too much location information. For example, if there is only one perennial standing water source in a military park, and that pond provides habitat for a listed frog, then saying the frog occurs in the park would provide sufficient information to locate it. In such cases, NPS employees should seek further guidance, including possibly contacting their FOIA officers and/or the Office of the Solicitor, for assistance in deciding how to evaluate the Information Resource.*

- *Not Already Publicly Available* - Information that already is publicly available is not legally sensitive. For instance, the return of condors to the Grand Canyon has been well documented by the press.
- *Resource Type* – The Information Resource contains information pertains to archeological, cave, commercially valuable, cultural, endangered, Indian sacred sites, minerals, security, paleontological, threatened, and/or well resources

To accommodate legally sensitive information, whether resource-related or other, a reference can be attributed with any of the following:

- *Commercially Valuable* – Park-specific, location-specific, and non-public information about a resource that has potential for being traded or sold in legal or illegal markets such that unauthorized removal of the resources from a park is likely to occur despite the potential of civil or criminal penalties.
- *Endangered* - Park-specific, location-specific, and non-public information about a species or population that has been formally designated as endangered or proposed for such a designation by the US Fish and Wildlife Service, National Marine Fisheries Service or other appropriate state agency.
- *Threatened*– Park-specific, location-specific, and non-public information about a species or population that has been formally designated as threatened or proposed for such a designation by the US Fish and Wildlife Service, National Marine Fisheries Service or other appropriate state agency.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), enacted in 1940, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald or golden eagles, including their parts (including feathers), nests, or eggs.

The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part (including feathers), nest, or egg thereof."

The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Regulations further define "disturb" as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.6).

In addition to immediate impacts, this definition also covers effects that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or

interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

SOP 1: Preparation for Bald Eagle Field Sampling

Version 1.1 (March, 2023)

Revision History Log:

Version #	Date of Revision	Revised By	Changes
1.22	2025-01-03	SDMiller	Added section describing how to export certified data using R scripts.

Introduction

This SOP describes how to prepare for and execute the early nest initiation surveys (ENIS), performed in May, and the late productivity survey (LPS) performed in late July or early August. Pre-season field and survey tasks include: a) scheduling personnel and contract pilots; b) taking National Park Service (NPS) standard aviation safety courses (if necessary); c) preparing or updating the project aviation safety plan (PASP); d) reviewing survey techniques; e) preparing maps, datasheets, and GPS units; f) preparing gear and equipment; and g) communicating with dispatch and pilot.

These procedures have been slightly modified from Wilson et.al. 2017 (SOP 1: Preparing for Bald Eagle Field Sampling). The primary difference between this SOP and SWAN methods reflects specific WRST aviation needs and policy. Specific preparation for the ENIS and LPS are covered in SOP 2 and SOP 3, respectively. Otherwise, this SOP is a streamlined version of the SWAN approach

Personnel

The principle investigator (PI) will act as an observer or choose an observer, acquire an aircraft and pilot, produce communications and safety plans, oversee field operations, and ensure that data are managed properly during and after survey flights. The survey will require a fixed-wing aircraft, pilot, and one biologist observer. The biologist observer should have experience conducting aerial raptor nest surveys and be able to tolerate tight circling by the aircraft.

Aviation

Requirements

All aviation operations will comply with the Federal Aviation Regulations, DOI policy, DO 60, RM 60, and Regional Aviation policy in that order. All persons utilizing aircraft resources in WRST should review the WRST 2017 Aviation Management Plan. All flights under this protocol are considered 'Special Use', defined as any flight operation other than point to point and occurring below 500 ft. An approved pilot and aircraft list, with special qualifications listed, can be found at <http://oas.doi.gov/>. Prior to any flight the project PI or aviation manager must ensure that both the pilot and aircraft have been approved to conduct flight operations for DOI work by reviewing the pilot's USDOI Pilot Qualifications Card and that he/she is approved for the mission being performed. An Interagency Data Card indicates specific uses for the aircraft.

The preferred aircraft is a tandem fixed-wing aircraft (e.g. Piper PA-18, Husky, or Maule). Other types of small aircraft may be used if the preferred aircraft are not available, recognizing that increased flight velocities may reduce the observers' ability to find existing nests, resulting in missing values, which if severe can reduce estimator precision. Missing a handful of active nests should not affect estimator performance if sample sizes are large. Aircraft must be equipped with an: FM radio, GPS, automated flight following equipment (AFF or Spidertracks).

Aviation Procurement

Pilot and aircraft resources are available through either the DOI fleet or vendor operations. Use of NPS fixed-wing aircraft is preferred as the most cost-effective means to conduct surveys. A limited number of tandem fixed-wing aircraft are available from vendors in southcentral Alaska, so procurement should be completed well before the survey date. A DOI fleet aircraft and pilot, if well qualified, should be considered first to reduce costs. The use of DOI fleet aircraft and pilot are requested and scheduled at the park level. For vendor aircraft, the Interior Business Center (IBC), Acquisition Services Directorate (AQD) provides centralized contracting for aircraft and related services for all Department of the Interior agencies. To procure a vendor aircraft for a specific project, an AQD-91 form must be completed and provided to administrative personnel at the park or network level. Administrative personnel will use this information to create a purchase request which is entered into the Financial and Business Management System (FBMS). When the flight(s) is approved, a Task Order will be sent back to the person requesting the flight. The flight request form (AQD-91) should be entered into the system at least 10 working days prior to the flight. The AQD-91 form can be obtained from <https://www.doi.gov/aviation/library/forms#aqdforms>. OAS aircraft procurement procedures change frequently; therefore, the project lead should work with the park aviation manager (PAM) to review current policy and to complete and submit procurement paperwork.

Aviation fuel is available at the WRST Gulkana Operations Center (GOC), and the McCarthy and May Creek airstrips. If needed, drums of 100 LL aviation fuel can be stationed at the Chitina airstrip for refueling during surveys of the lower Copper River.

Oversight and Training Requirements

Interagency Aviation Training (IAT) requirements and courses can be found at <https://www.iat.gov/>. Refer to the IAT Aviation Use and Management Qualifications Guide at https://www.iat.gov/docs/IAT_Guide_2017_10.pdf. The PI for this project must complete training as a Project Aviation Manager, which is required for DOI employees who plan, organize, or manage the aviation operations for a project utilizing aircraft. All persons working in and around aircraft that are essential to ensure the safety and successful outcome of the mission are considered Aircrew Members and must complete A-100 Basic Aviation Safety. All NPS fixed-wing flights must have an assigned fixed-wing flight manager. For special use flights the flight manager should be on the entire flight.

Preparing Equipment

Equipment Checklist

- GPS units with current known nest locations
- GPS antenna
- Clipboard
- Data sheets for appropriate survey (ENIS or LPS)
- Maps and other aids for finding nests
- Pencils (with extra lead)
- Extra batteries for all electronics
- Satellite phone with helmet adapter (Kennedy cell set)
- Aviation PPE (flight helmet, vest, gloves, flight suit)
- Survival equipment (3 ways to start a fire: matches, lighter, flint; space blanket; knife; sleeping bag; extra food; water purification tablets; signaling device)
- First aid kit
- Park radio
- Project Aviation Safety Plan (PASP; see SOP 6)

Retrieving and Uploading Waypoints Preparing the GPS

Pilot and observer GPS units will be used to navigate to existing nest sites and to collect latitude and longitude coordinates for new nest sites when they are discovered. DNRGPS will be used to download and upload nest site coordinates as text files and ArcGIS shapefiles. Set the projection in DNRGPS to ensure compatibility with data stored in GIS. Choose OK to save the selection.

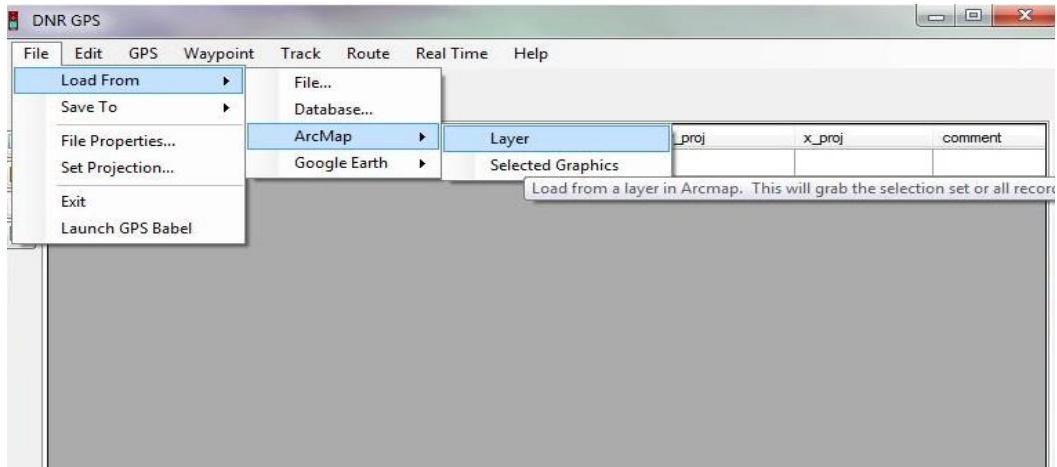
Setup

- Begin by opening or downloading current version of DNRGPS <http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html>.
- Clear old nest waypoints from the Garmin GPS unit.
- Install And Configure DNRGPS - Unzip and install DNRGPS, and Garmin USB drivers as per their installation documentation. Connect a Garmin GPS receiver to the PC using a serial or USB cable, and turn the receiver on.
- It is important to make sure the **Projection** listed in the status bar matches that of the intended source or target GIS layer.
- Complete following steps:
 - Under the file menu, select Set Projection.
 - The Projection properties box will be displayed.
 - Under the POSC Codes pull down menu, choose '20170704011123'.
 - Select North_American_Datum_1983 from the Datum list. The Projection 'NAD_1983_Albers' will automatically be selected.
 - Press OK.
- Other trouble-shooting steps:
 - You must have administrative privileges on your computer to install this program. Contact your system administrator if installation was stalled because of installation rights.
 - If you have an earlier version of the DNR Garmin program on your machine you may need to uninstall before installing the new version. Uninstall previous versions by using the Start | Control Panel | Add/Remove Programs tool.
 - If GPS data does not align with NPS base data, then you may be projecting incorrectly. For NPS users in Alaska using ArcGIS 9.1 ensure the projection in DNRGPS is set to ESRI format 102006. Check by opening DNRGPS, selecting File | Get Projection. You should see the Projection: Alaska_Albers_Equal_Area_Conic_NAD83 is set.
 - For other installation errors please refer to Minnesota DNR Help page at: [http://thoreau.dnr.state.mn.us/mis/gis/tools/arcview/Training/WebHelp/Training.htm#DNR E xt/DN RGPS4/GPSIntro.htm](http://thoreau.dnr.state.mn.us/mis/gis/tools/arcview/Training/WebHelp/Training.htm#DNR%20xt/DNRGPS4/GPSIntro.htm).

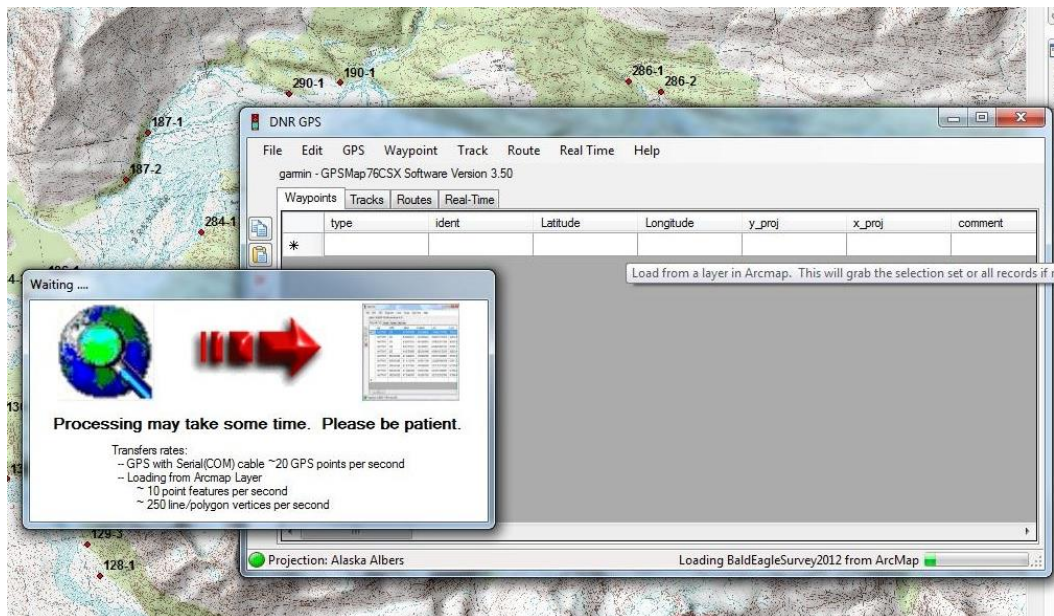
Uploading Nest Locations to the GPS

Clear old waypoints from the GPS unit. Connect the GPS to the PC using a serial or USB cable, and turn the receiver on. Open DNRGPS. The instructions for loading nest waypoints assume the use of ArcGIS but waypoints may be uploaded from many alternative formats including text files, shapefiles, and ArcGIS geodatabases, among others. See the DNRGPS help files for details.

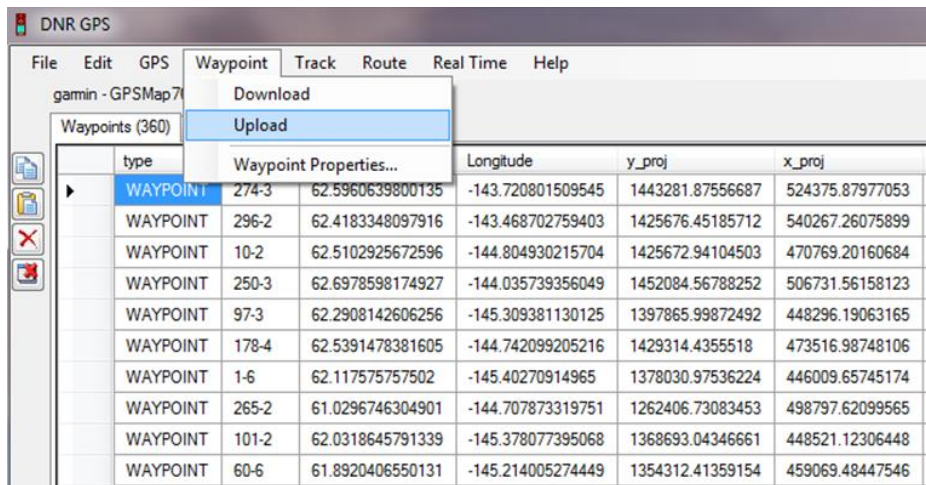
Open ArcMap and display waypoints to be uploaded. In the DNRGPS File Menu, select Load From, ArcMap, Layer.



Waypoints will begin loading into DNRGPS.

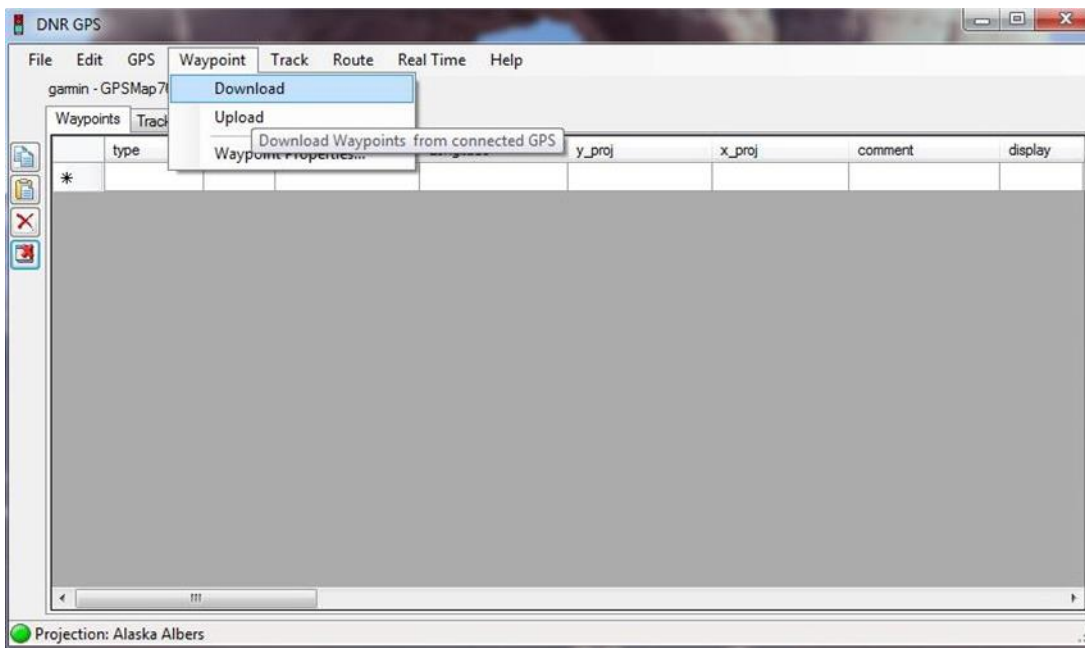


Upload waypoints from DNRGPS to the GPS. From the Waypoint menu, choose Upload. Check the GPS unit to ensure waypoints have uploaded in the correct location. If they don't, check the projection settings on both the GPS and DNRGPS on your computer.



Retrieving waypoints from the GPS

- Turn on the GPS and connect the unit to the PC and open DNRGPS
- Select download all from the GPS menu.



- Select the Waypoints tab and highlight waypoints representing the new nests. The ident field contains the waypoint number as saved using the GPS unit. Make sure these match the number recorded on the data sheets.

DNR GPS

File Edit GPS Waypoint Track Route Real Time Help

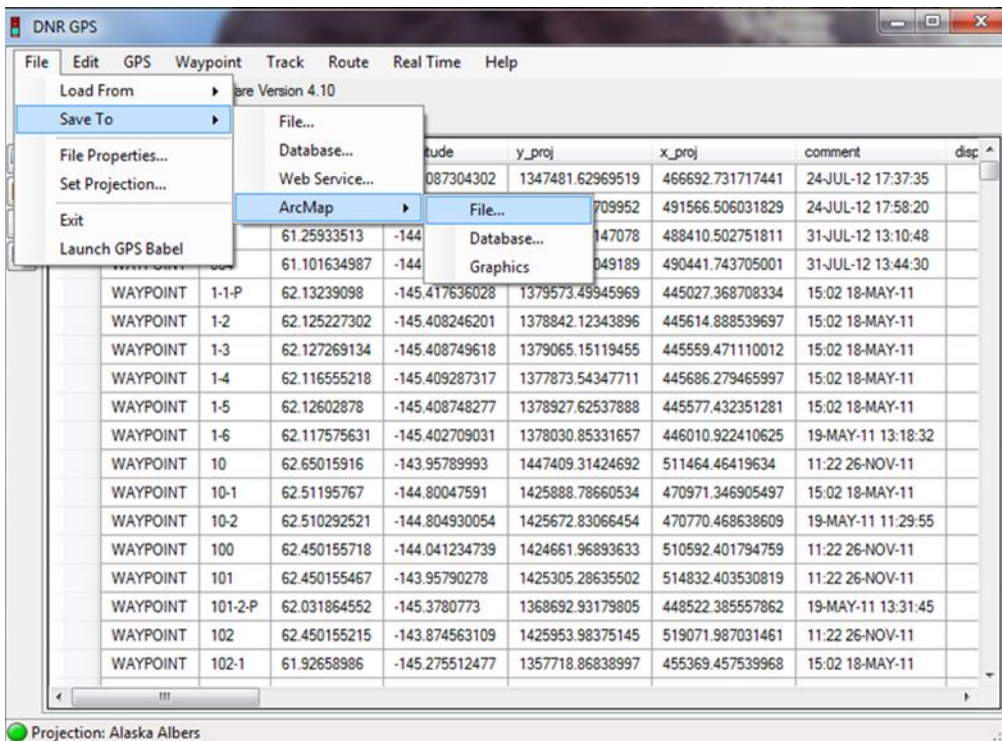
garmin - GPSMap 76CSX Software Version 4.10

Waypoints (677) Tracks Routes Real-Time

	type	ident	Latitude	Longitude	y_proj	x_proj	comment	display
▶	WAYPOINT	001	61.822445719	-145.087304302	1347481.62969519	466692.731717441	24-JUL-12 17:37:35	
	WAYPOINT	002	61.668673083	-144.655546267	1333561.80709952	491566.506031829	24-JUL-12 17:58:20	
	WAYPOINT	003	61.25933513	-144.83640343	1286890.41147078	488410.502751811	31-JUL-12 13:10:48	
	WAYPOINT	004	61.101634987	-144.843821246	1269365.14049189	490441.743705001	31-JUL-12 13:44:30	
	WAYPOINT	1-1-P	62.13239098	-145.417636028	1379573.49945969	445027.368708334	15:02 18-MAY-11	
	WAYPOINT	1-2	62.125227302	-145.408246201	1378842.12343896	445614.888539697	15:02 18-MAY-11	
	WAYPOINT	1-3	62.127269134	-145.408749618	1379065.15119455	445559.471110012	15:02 18-MAY-11	
	WAYPOINT	1-4	62.116555218	-145.409287317	1377873.54347711	445686.279465997	15:02 18-MAY-11	
	WAYPOINT	1-5	62.12602878	-145.408748277	1378927.62537888	445577.432351281	15:02 18-MAY-11	
	WAYPOINT	1-6	62.117575631	-145.402709031	1378030.85331657	446010.922410625	19-MAY-11 13:18:32	
	WAYPOINT	10	62.65015916	-143.95789993	1447409.31424692	511464.46419634	11:22 26-NOV-11	
	WAYPOINT	10-1	62.51195767	-144.80047591	1425888.78660534	470971.346905497	15:02 18-MAY-11	
	WAYPOINT	10-2	62.510292521	-144.804930054	1425672.83066454	470770.468638609	19-MAY-11 11:29:55	
	WAYPOINT	100	62.450155718	-144.041234739	1424661.96893633	510592.401794759	11:22 26-NOV-11	
	WAYPOINT	101	62.450155467	-143.95790278	1425305.28635502	514832.403530819	11:22 26-NOV-11	
	WAYPOINT	101-2-P	62.031864552	-145.3780773	1368692.93179805	448522.385557862	19-MAY-11 13:31:45	
	WAYPOINT	102	62.450155215	-143.874563109	1425953.98375145	519071.987031461	11:22 26-NOV-11	
	WAYPOINT	102-1	61.92658986	-145.275512477	1357718.86838997	455369.457539968	15:02 18-MAY-11	
	WAYPOINT	103	62.450154964	-143.791223438	1426608.00103266	523310.75315629	11:22 26-NOV-11	
	WAYPOINT	103-2	62.266782057	-145.347099127	1394947.56574704	446711.965261142	15:02 18-MAY-11	

Projection: Alaska Albers

- To convert these waypoint positions to an ESRI shapefile, click File – Save To – ArcMap – Shapefile Layer. Make sure the saved file type is a projected shapefile, and that DNRGPS's projection matches the target GIS. Name the shapefile: YYYY_PPPP_SSSS_NewNests, where YYYY is the year, PPPP is the four letter park code, and SSSS is the survey (ENIS1 or ENIS2).



- Track vertices may be saved locally, but are not archived using this protocol. Track files may be helpful for correcting errors during the data quality control phase.

- Switch to the data view in ArcMap to inspect the new shape file. Ensure that the points are located on the map correctly. Projection and waypoint naming errors can be found this way.

SOP 2: Conducting the Early Nest Initiation Survey (ENIS)

Version 1.1 (December 2017)

Revision History Log:

Version #	Date of Revision	Revised By	Changes	Justification

Introduction

This SOP describes how to conduct the early nest initiation survey (ENIS). These procedures have been slightly modified from Wilson et.al. 2017 (SOP 2: Conducting Bald Eagle Aerial Surveys). The primary difference is this SOP only addresses conducting the ENIS. Conducting the LPS is addressed in SOP 3. Otherwise, this SOP is a streamlined version of the SWAN approach

Preparation

Timing of survey

The ENIS survey is conducted during peak nest initiation in early May when most eagles are attending nests and before early nest failures occur. Consider variations in the timing of breeding due to seasonal weather patterns and adjust survey dates accordingly. The lower Copper River segment (south of the confluence with the Chitina River) should be flown last due to later phenology. Plan for 6-8 hours of flight time on 3 days to complete the survey (approximately 20 hours total).

Data sheets

Due to the large number of territories and individual nest sites, data entry forms are arranged by river section and are pre-printed with nest numbers (Figure 1). Update the previous year's data entry forms by deleting any nests that were destroyed or by adding any newly discovered nest territories or nests. Nests that have not been located for two consecutive years are assumed to be destroyed and are removed from the data sheet. Data forms should contain some nest characteristics (e.g. tree species, condition) to facilitate identifying the correct nest during the survey.

Bald Eagle Survey- Upper Copper River													
ENIS 1 Date: _____ Aircraft: _____ Depart Time: _____ Pilot: _____ Begin Survey: _____ Observer: _____ End Survey: _____ Total Flight Time: _____ Return Time: _____ Total Survey Time: _____					ENIS 2 Date: _____ Aircraft: _____ Depart Time: _____ Pilot: _____ Begin Survey: _____ Observer: _____ End Survey: _____ Total Flight Time: _____ Return Time: _____ Total Survey Time: _____					LPS Date: _____ Aircraft: _____ Depart Time: _____ Pilot: _____ Begin Survey: _____ Observer: _____ End Survey: _____ Total Flight Time: _____ Return Time: _____ Total Survey Time: _____			
					ENIS					LPS			
TERR	NEST	TREE	STATUS	COND	ENIS	No. ADs	AD1	AD2	INITIATED?	YOUNG	STAGE	ADULTS	COMMENTS
94	1	Poplar	Dead										
243	1	Poplar	Live										
244	1	Poplar	Live	Poor									
244	2	Spruce	Live										new 2013, part way down tree
245	1	Poplar	Live										
246	2	Poplar	Live										
247	2	Spruce	Live										
248	1	Poplar	Live										
248	2	Spruce	Live										new 2015, half way down tree
249	1	Poplar	Live										
250	2	Spruce	Live										
250	3	Poplar	Live										new 2011
251	1	Spruce	Live										
251	2	Spruce	Live	Old									
252	1	Spruce	Live										
254	1	Spruce	Live										
255	1	Spruce	Live										
255	2	Spruce	Live										new 2015- WP0415 ?
255	3	Spruce	Live	Old									
256	2	Spruce	Live										
257	4	Spruce	Live										new 2015
259	1	Spruce	Live										
260	1	Poplar	Live										
261	1	Spruce	Live										
266	2	Poplar	Live										
273	2	Spruce	Live										

Figure 1. Combined early nest initiation survey (ENIS) and late productivity survey (LPS) data sheet by river section

Maps

The number of nests to be surveyed is large, therefore it is helpful for the observer to generate paper maps with all nest locations to aid in navigation between nests (Figure 2). Often, while in the aircraft, the GPS must be zoomed in to locate a particular nest and it is helpful to refer to paper maps to determine the distance to the next territory, territory number, and the number of nests to be located within that territory. Load nest site coordinates into ArcMap and label with the Nest_ID number. Divide the survey area into several map extents such that clusters of nests are easy to see and not crowded together.

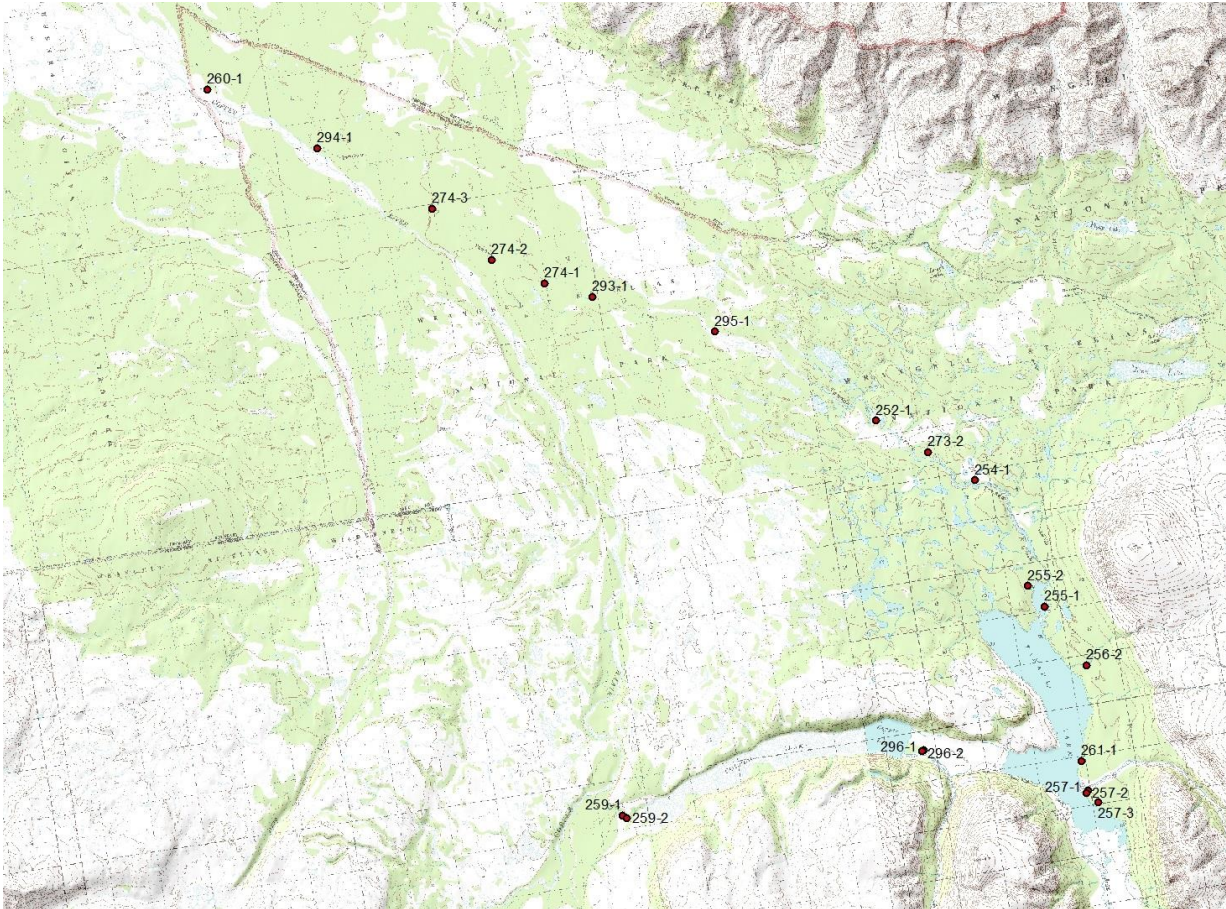


Figure 2. Example of a map extent used during the bald eagle ENIS.

Conducting the ENIS Survey

Communications

Prior to flying each day, each pilot/observer team will file a flight plan (Appendix A) in accordance with Alaska Regional Communication Center (ARCC) guidelines. At a minimum the flight plan will identify the aircraft and tail number, crew members, amount of fuel on board, estimated time of arrival back to the base station, and a map of the survey area and a list of flight transects. A flight plan should be opened with ARCC or the Gulkana Operations Center (GOC) when the aircraft departs. For example, the pilot will call from the airport before take-off and after landing, whether or not NPS staff members are on board.

Current policy requires check-ins with ARCC or GOC 1) prior to and immediately after take-off; 2) prior to and immediately after landing; and 3) every 60 minutes during flight operations. Check-ins will be made via VHF, cell phone or satellite phone. Automated Flight Following (AFF) will be monitored every 15 minutes by ARCC. ARCC will confirm that AFF is functioning during each check in. To view AFF, register at <https://www.aff.gov/>.

Survey Conditions

Surveys should begin no earlier than 0700 ADT and no later than 2000 ADT to avoid low light and excessive shadows. Early morning starts are always preferred to avoid afternoon winds, especially below Chitina. Do not conduct surveys during periods of high turbulence, when winds exceed > 20 mph, or in rain storms. These factors can reduce visibility and accuracy of survey results as well as safety. Winds along the Copper River can dictate what segment can be flown on a daily and hourly basis. If weather is not a factor, an efficient survey route is to start at Copper and Tanada Lakes, following the Copper River/Tanada Creek to the confluence of the Chitina River, which is surveyed next. The lower Copper River from the Chitina River confluence to Miles Lake is surveyed last and can be accomplished in one long day. ENIS's can be fatiguing to both the pilot and observer so breaks should be planned every 90 minutes or so.

Briefing the Pilot about the Survey

The pilot is a critical member of the survey team, and should be thoroughly briefed about the survey protocol prior to the flight. This is especially critical for fixed-wing surveys where the pilot is considered to be a primary observer. It is therefore critical that fixed-wing surveys be flown by experienced pilots. The briefing should include the following information:

- A review of the survey area using maps printed to a known scale so that the pilot can plan for travel times and fuel range.
- Check to make sure that the known nests are properly loaded on the pilot's GPS.
- Discuss the expected elevation and speed of survey.
- Discuss the protocol for recording known nests.
- The pilot should limit nest searches to 10 minutes.
- If the nest is difficult to find, the pilot should approach the coordinates from multiple angles and/or elevations to aid in finding the nest.
- The pilot should allow sufficient time for the observer(s) to record data before resuming the survey.

Procedures

During the survey, the aircraft should fly 46 – 91 meters (150 – 300 ft) above ground level at speeds sufficient to safely locate nests. The GPS unit is used to navigate from one known nest to the other. Nests with their corresponding numbers will be visible to both the observer and pilot on their respective GPS units. As the aircraft moves toward a nest territory, communicate the nest number, type of tree, and any other distinguishing characteristics to the pilot of the nest to be checked. Since the pilot can see far ahead of the observer, it is common for the pilot to locate the nest well before it becomes visible to the observer. Always approach a nest structure so you remain in full sight of the incubating bird. It can be difficult to locate nests even under the best conditions. If a nest cannot be located, have the pilot circle the area in the opposite direction or fly at a greater or closer distance,

or from a different elevation, for a different perspective. All nests within a territory should be checked prior to moving on to the next territory. If a nest cannot be located, indicate that the nest was not located on the data entry form.

The crew will also search for new nests within existing territories and in suitable habitat between territories during the survey. When searching for new nests, target areas containing large, mature trees and look for the presence of adult birds.

Data Recording for ENIS

Start by filling in the header information (date, pilot, observer, etc.) before the start of the survey on page one of the data sheets (Figure 1). For each nest visited, record:

- Number of adults: 0, 1, 2, Not Applicable (NA).
- Behavior for each adult observed: Nesting (N), Flying (F), Perching (P).
- Nest initiation: empty (E), incubating (I), or not found (NL) if nest is missing or not found. Use the code not available (NA) for nests that were missed for other reasons (e.g., weather, GPS malfunction, or observer omission). Indicate in the comments section the specific reason a nest was missed.

Data Recording for New Nests

New nests are those nests, regardless of actual age, that were not previously included on the list of known nests

The following data shall be recorded for new nests:

- Data pertaining to the nest tree: Species, Status, Form Visibility.
 - Nest Substrate: Spruce (S), Hemlock (H), Cottonwood (C), Ground (G), or Not Applicable (NA).
 - Nest Tree Status: Live (L), Dead (D), Live with Large Dead Branches (LD), or Not Applicable (NA).
- Use the GPS to create a waypoint of the nest location. Record an accurate nest position by having the pilot position the aircraft directly above the nest with enough distance between the aircraft and the nest so as to not disturb an incubating adult. This can be done while moving (fixed-wing) or stationary (helicopter). Record the waypoint number in a blank row at the end of the datasheet.
- Collect data and record eagle nest initiation data described below (i.e., Data to record at all nests).
- Optional data pertaining to the nest tree:
 - Nest Tree Form: Normal Complete Top (NT), Abnormal Complete Top (AT), Broken Live Top (BL), Broken Dead Top (BD), or Not Applicable (NA).
 - Nest Visibility: 1 (High visibility), 2 (Medium visibility), 3 (Low visibility), or Not Applicable (NA).

- Record any additional observations that will help in relocating the nest during future visits.

Assigning territory and nest numbers

A bald eagle nesting territory can have one or more nests. All nests within a nesting territory are equally important regardless of the history of use because nests can be used for several years, vacated for one or more years, then used again. Nests may also be abandoned or become unusable for a variety of reasons, or destroyed (e.g., damage or loss from wind, nest tree loss from wind or high water). New nests may be constructed within a territory even though other nests are present. A new nest may also be considered a new territory if it is not associated with any other nests. Each nest is assigned a unique nest number consisting of the territory number followed by the individual nest number within the territory. Territories are numbered in chronological order as they are discovered and nests within territories are also numbered in chronological order when discovered. Individual nest numbers within a territory are not reused if a nest is destroyed. For example, territory 9 has 3 existing nests, numbered 9-1, 9-3, and 9-4 (Figure 3). Nest 9-2 was destroyed. If a new nest is constructed within the territory it would be numbered 9-5.

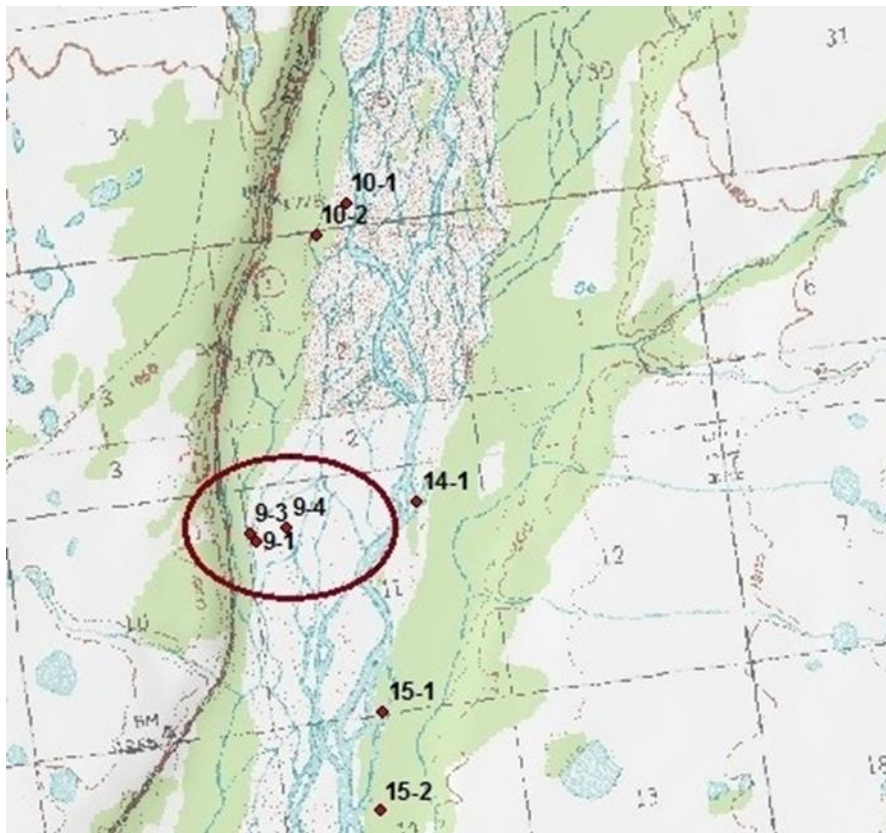


Figure 3. Illustrated example of how to assign a new nest territory and number.

Standardized Field Names and Definitions

Field names and definitions that are not relevant to WRST data collection are ‘greyed out’ in the lists below.

Nest initiation survey data

- **Date_O:** Calendar date of survey. The field is a date with the format: day/month/year.
- **Park:** Four letter code of the park unit: KATM = Katmai National Park and Preserve, KEFJ = Kenai Fjords National Park, LACL = Lake Clark National Park and Preserve, WRST = Wrangell-St. Elias National Park & Preserve. Field is character.
- **Pilot_O:** Full name of the pilot. Field is character.
- **FrObserv_O:** Identity of the front seat observer (Last name or initials). This can be the pilot. Field is character.
- **ReObserv_O:** Identity of the rear seat observer (Last name or initials). Field is character.
- **Side_O:** Side of the aircraft from which observations are made. L = left, R = right. Not applicable for tandem aircraft (e.g. super cub).
- **Aircraft_O:** Type of aircraft used for survey. R44II = R44 helicopter, PA18A = supercub, C185= Cessna 185. Field is character.
- **(Recorder_O:** Observer who recorded the data if different from rear seat observer (Last name or initials). Field is character.) Field is optional.

ENIS nest data

- **SUID:** Transect number derived from GPS track logs of the 2009 bald eagle survey of the entire Kenai Fjords coast. This field pertains to KEFJ data only. The field is numeric with x format. Data ranges from 1-51.
- **Nest_ID:** Unique identifier for a nest. Sequential alphanumeric code that cannot be repeated. KATM and KEFJ use a combination of region and number, LACL uses a numeric code (described here). WRST uses a numeric territory number followed by a nest number. Field is character.
- **Fobs:** Seen by front seat observer (or pilot). Pertains to the first time a nest is observed. 0 = no, 1= yes. Field is Boolean.
- **Robs:** Seen by rear seat observer. Pertains to the first time a nest is observed. 0 = no, 1 = yes. Field is Boolean.
- **NestSub:** Nest substrate. S = spruce (e.g., P. Sitchens or P. alba), H = hemlock, C = cottonwood, G = ground. Field is character.
- **TreeStat:** Tree status. L = alive, D = dead, LD = alive with dead branches. Field is character.
- **NestVis:** Nest visibility is a subjective classification of how difficult it was to see the nest. (1 = easy, 2 = moderate, 3 = difficult. Field is numeric.) Field is optional.
- **LAT_DD:** Y coordinate (Latitude) of nest location in decimal degrees. Field is numeric.
- **LON_DD:** X coordinate (Longitude) of nest location in decimal degrees. Field in numeric.

ENIS eagle data

- **NumAds:** Number of adults seen at or near a nest, with 0 meaning no eagles were observed. The eagles do not have to be incubating to be recorded here, therefore unoccupied nests may have a

non-zero number. Field is numeric with a missing data code of -999. Field is numeric.

- **AdBehav:** Behavior of adults (up to 2) at a nest. N = 1 adult nesting, P = 1 adult perched, F = 1 adult Flying, NN = 2 adults nesting (rare), PP = 2 adults perched, FF = 2 adults flying, NP = 1 adult nesting and 1 adult perched (also PN), NF = 1 adult nesting and 1 adult flying (also FN), FP = 1 adult flying and 1 adult perched (also PF). N indicated incubating behavior, and the nest must be classified as 'Incubating' in the next field. Field is character.
- **Nest_O:** Nest initiation status. I = 'incubating' (formerly Active), E = 'empty'. Prior to 2009 in KEFJ and 2011 in KATM and LACL there was a third class: 'Occupied' which had fresh signs of eagle nesting, but in which adults were not observed incubating. This class was considered too subjective and eliminated in favor of the binary 'Incubating' and 'Empty' system used today. Field is character. If the nest is not found, enter 'NL' (not located) here. Blank status records will be recorded as 'NA', implying that no effort was made to locate the nest. Field is character.
- **GPS_Time_O:** Time nest observations are made in GMT (Greenwich Mean Time) as measured by the GPS. (Field is numeric.) Data can be obtained from track logs. Field is optional.
- **Comments:** Notable comments. Field is character.

SOP 3: Conducting the Late Productivity Survey (LPS)

Version 1.1 (March, 20223)

Revision History Log:

Version #	Date of Revision	Revised By	Changes	Justification

Introduction

This SOP describes how to conduct the late productivity survey (LPS). These procedures have been slightly modified from Wilson et.al. 2017 (SOP 2: Conducting Bald Eagle Aerial Surveys). The primary difference is this SOP only addresses conducting the LPS and has be renamed SOP 3. Otherwise, this SOP is a streamlined version of the SWAN approach

Preparation

Timing

Bald eagles incubate eggs for 35 days, and the nesting period can last 56-98 days (Buehler 2000). LPS surveys are typically conducted between 63 and 84 days from 15 May (July 17 – August 8). There is risk that if surveys are conducted too late, then many successful nests will have fledged before the survey. Chick ages should be monitored carefully by biologists so that hatch dates can be estimated. If necessary the survey timing should be adjusted to account for changes in nesting phenology. The lower Copper River segment should be flown last due to later phenology. Plan for 6-8 hours of flight time on 2-4 consecutive days, if possible, to complete the survey (approximately 15 hours total).

Datasheets

Data entry forms from the ENIS are used during the LPS. All nests indicated as having been initiated will be revisited to determine chick productivity.

Loading Waypoints in GPS

GPS units will be used to navigate to individual nests. Prior to loading nest locations into GPS units, it is helpful to identify nests that were initiated during the ENIS and are to be revisited during the LPS. Create an intermediate layer in ArcMap and edit the nest variable in the attribute table for each nest to be visited during the productivity survey. For example, if nest site 245-1 was initiated during the occupancy survey, it would be changed to 245-1-P to indicate that it is to be revisited during the LPS (Figure 4).

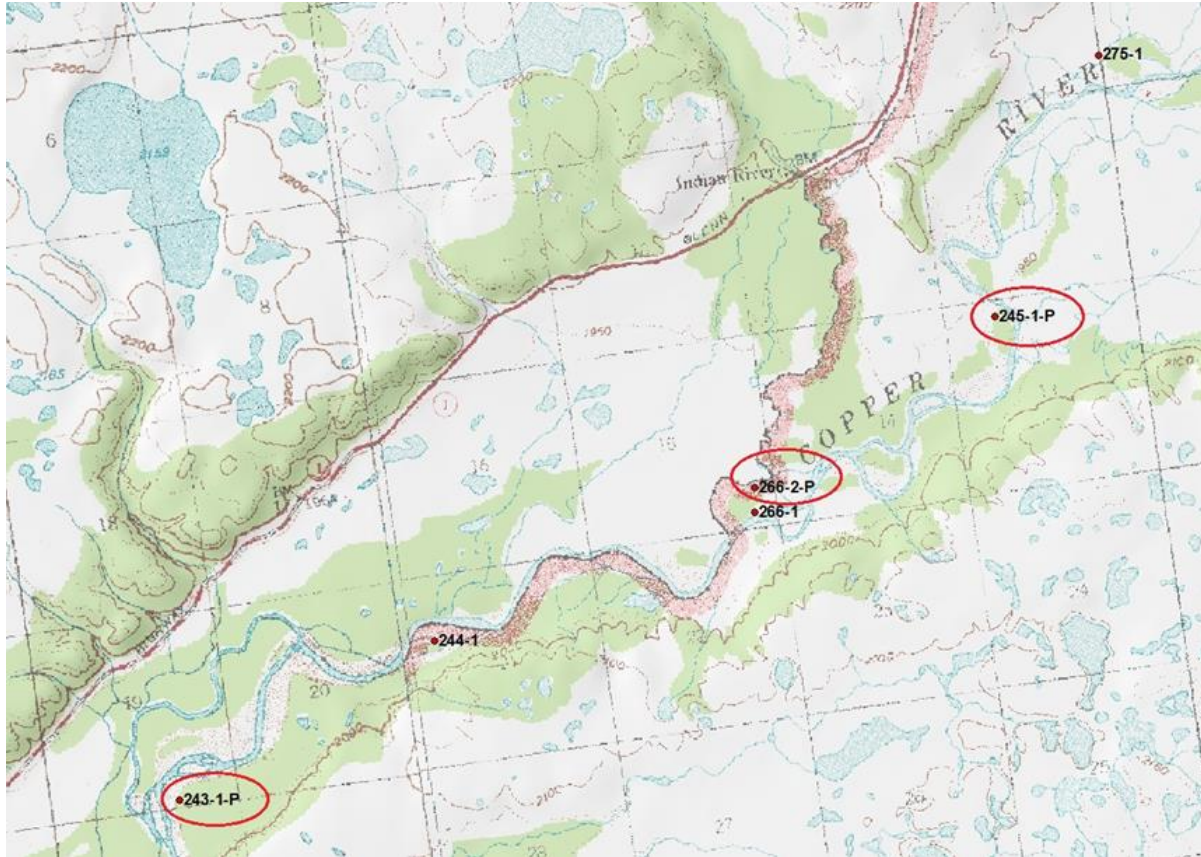


Figure 3. Illustrated example of how to identify nests to be revisited during the LPS.

Maps

After identifying which nests are to be revisited, print map extents of the survey area showing all nest locations labeled with the nest number. It is important to include all nest locations (both initiated and not initiated) to ensure that the correct nest is revisited (Figure 4). These maps are used in combination with the GPS unit to aid in navigation. Often, while in the aircraft, the GPS must be zoomed in to locate a particular nest and it is helpful to refer to paper maps to determine the distance to the next territory, territory number, and the nest to be located within that territory.

Conducting the LPS Survey

Communications

Prior to flying each day, each pilot/observer team will file a flight plan (Appendix A) in accordance with Alaska Regional Communication Center (ARCC) guidelines. At a minimum the flight plan will identify the aircraft and tail number, crew members, amount of fuel on board, estimated time of arrival back to the base station, and a map of the survey area and a list of flight transects. A flight plan should be opened with ARCC or the Gulkana Operations Center (GOC) when the aircraft departs. For example, the pilot will call from the airport before take-off and after landing, whether or not NPS staff members are on board.

Current policy requires check-ins with ARCC or GOC 1) prior to and immediately after take-off; 2) prior to and immediately after landing; and 3) every 60 minutes during flight operations. Check-ins will be made via VHF, cell phone or satellite phone. Automated Flight Following (AFF) will be monitored every 15 minutes by ARCC. ARCC will confirm that AFF is functioning during each check in. To view AFF, register at <https://www.aff.gov/>.

Survey Conditions

Surveys should begin no earlier than 0700 ADT and no later than 2000 ADT to avoid low light and excessive shadows. Early morning starts are always preferred to avoid afternoon winds, especially below Chitina. Do not conduct surveys during periods of high turbulence, when winds exceed > 20 mph, or in rain storms. These factors can reduce visibility and accuracy of survey results as well as safety. Winds along the Copper River can dictate what segment can be flown on a daily and hourly basis. If weather is not a factor, an efficient survey route is to start at Copper and Tanada Lakes, following the Copper River/Tanada Creek to the confluence of the Chitina River, which is surveyed next. The lower Copper River from the Chitina River confluence to Miles Lake is surveyed last and can be accomplished in one long day. LPS's can be fatiguing to both the pilot and observer due to leaf out and the difficulty in locating nests and counting chicks under these conditions. Breaks should be planned every 90 minutes or so.

Briefing the Pilot about the Survey

The pilot is a critical member of the survey team, and should be thoroughly briefed about the LPS survey protocol prior to the flight. This is especially critical for fixed-wing surveys where the pilot is considered to be a primary observer. It is therefore critical that fixed-wing surveys be flown by experienced pilots. The briefing should include the following information:

- A review of the survey area using maps printed to a known scale so that the pilot can plan for travel times and fuel range.
- Check to make sure that the nests to be revisited are properly loaded on the pilot's GPS.
- Discuss the expected elevation and speed of survey.
- Discuss the protocol for recording the number of chicks in the nest.
- The pilot should limit nest searches to 10 minutes.
- If the nest is difficult to find, the pilot should approach the coordinates from multiple angles and/or elevations to aid in finding the nest.
- The pilot should allow sufficient time for the observer(s) to record data before resuming the survey.

Procedures

All initiated nests from the ENIS are revisited during the LPS survey. The aircraft can fly straight paths between each nest without searching for additional nests. During the survey, the aircraft should fly 46 – 91 meters (150 – 300 ft) above ground level at speeds sufficient to safely locate nests. The GPS unit is used to navigate from one known initiated nest to the other as indicated by a ‘P’ attached to the nest number. Nests with their corresponding number will be visible to both the observer and pilot on their respective GPS units. Make the pilot aware of the need to visit only nests with this designation in the GPS. Communicate the nest number, type of tree, and any other distinguishing characteristics to the pilot of the nest to be visited. It can be difficult to locate nests even under the best conditions and during the LPS, nests occurring in deciduous trees are particularly difficult to locate due to the presence of leaves. If a nest cannot be located, have the pilot circle the area in the opposite direction or fly at a greater or closer distance or different elevation, for a different perspective.

Once an initiated nest is located, instruct the pilot to slowly fly toward the nest until you can determine if the nest contains chicks. Make multiple passes if necessary, watching the nest to determine the best angle for viewing it. If present, count the chicks, and record the developmental stage, or approximate age of chicks using the age classes outlined in Carpenter (1990: Figure and Figure 5 and Figure 6). If nestings are not observed in the nest, observers should check adjacent limbs and the ground around the nest for nestlings that have moved out of the nest onto branches or that may have fallen out of the nest. Observers should also look for the presence of adults or fledged young perched on nearby trees. Also note any unhatched (or addled) eggs or dead nestlings in the nest. Occasionally, new or previously unknown nests are found during the LPS. Obtain GPS coordinates for these ‘new’ nests and reference the waypoint number on the data form along with associated nest information including the number of young if present.

Data Recording for LPS

On the data entry form header for the LPS, enter the date, aircraft type, pilot, observer, the time of departure from base, and the time the actual survey begins when the first nest located. During the survey, the observer will record the number of live chicks in the nest or on nearby branches and the number of adults present.

- Number of chicks (No. of Young): entered as an integer, likely 0, 1, 2, or 3.
- Developmental stage of chicks (Carpenter 1990): use classes shown in Figures 5 and 6.
 - 1a = Small 1st down
 - 1b = Large 1st down
 - 2 = 2nd down
 - 3a = Early contour growth
 - 3b = Late contour growth
 - 3c = Contour with down patches
 - 3d = Complete contour stage (Figures SOP 2-3 and SOP 2-4) should be determined and the appropriate code recorded

- Number of adults: entered as an integer, likely 0, 1, or 2.

Once the survey is finished for the day, the header information should be filled out on all data sheets. Also, as with the ENIS, any corrections or edits to the original data should be made using a different color pen so that they are readily distinguished from the original (raw) data.

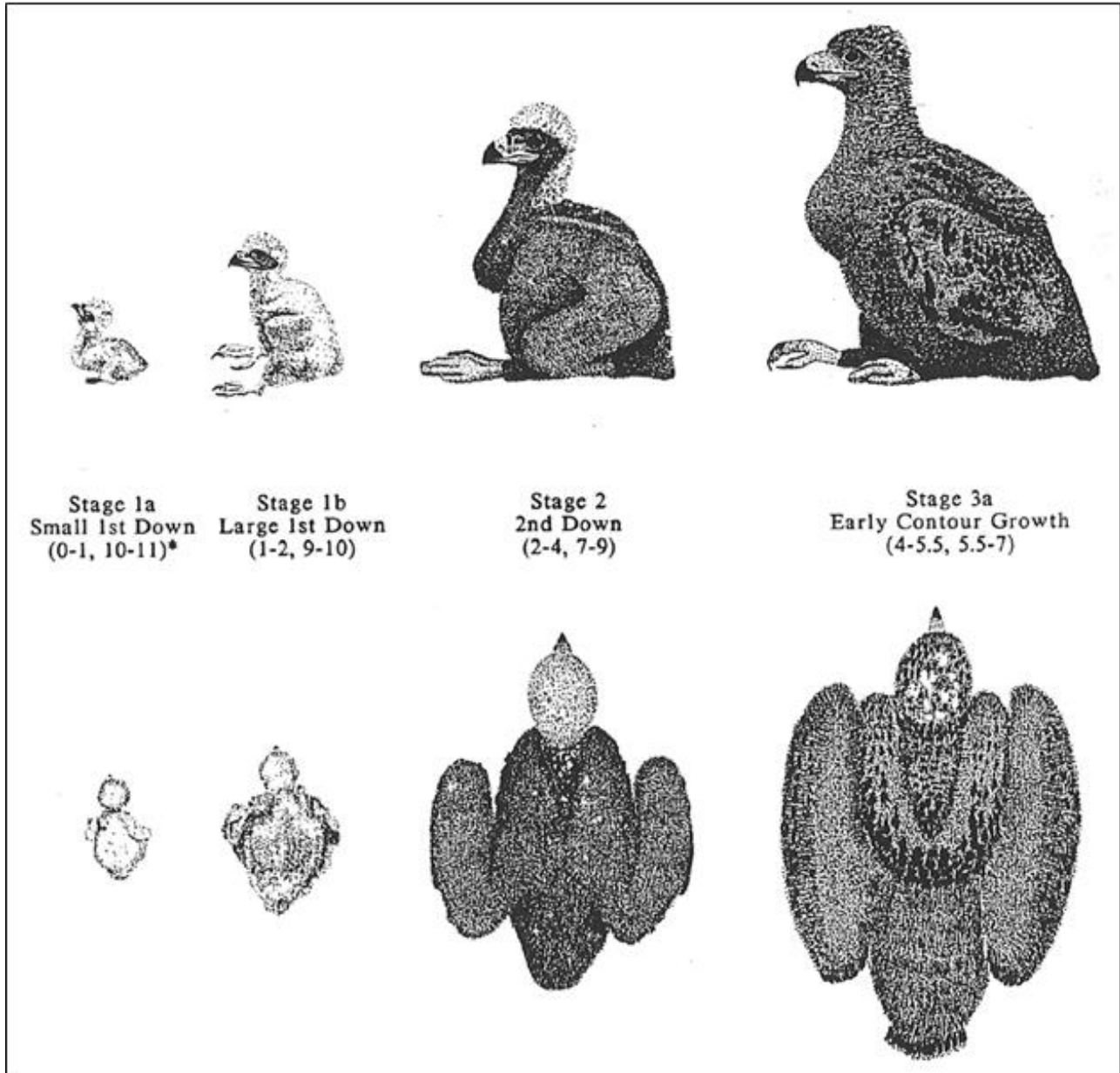


Figure 5 . Early developmental stages for bald eagle chicks. Diagram from Carpenter (1990).

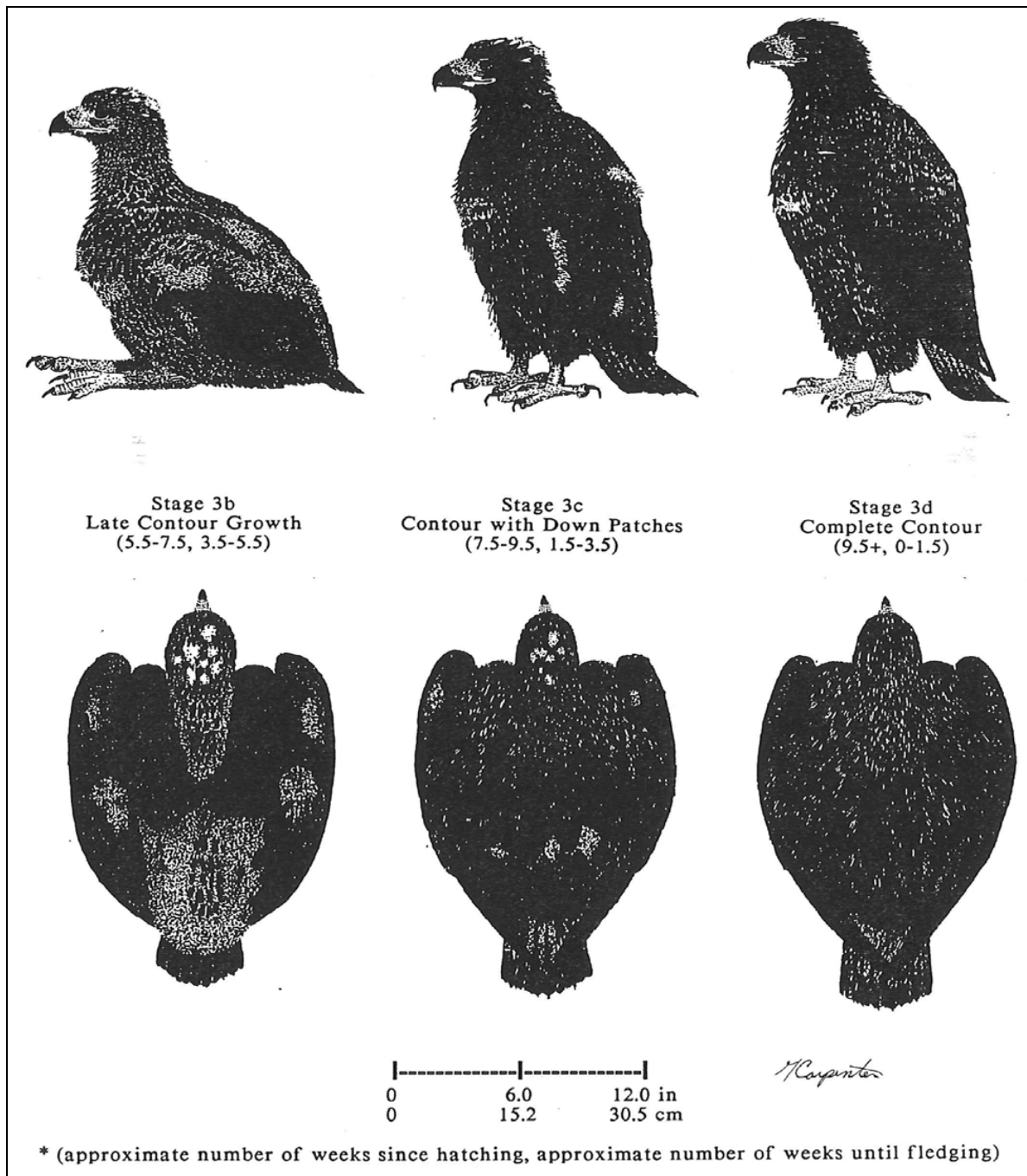


Figure 6. Late developmental stages for bald eagle chicks. Diagram from Carpenter (1990).

Standardized Field Names and Definitions

Field names and definitions that are not relevant to WRST data collection are 'greyed out' in the lists below.

LPS Survey Data

- **Date_P:** Date of productivity survey. Field is a date with format Month/Day/Year.
- **Park:** Four letter code of the park unit: KATM = Katmai National Park and Preserve, KEFJ = Kenai Fjords National Park, LACL = Lake Clark National Park and Preserve, WRST = Wrangell-St. Elias National Park & Preserve. Field is character.
- **Recorder_P:** Observer who recorded the data (Last name or initials). Field is character.
- **Pilot_P:** Full name of the pilot. Field is character.
- **FrObserv_P:** Identity of the front seat observer (Last name or initials). This can be the pilot. Field is character.
- **ReObserv_P:** Identity of the rear seat observer (Last name or initials). Field is character.
- **Aircraft_P:** Type of aircraft used for survey. R44II = R44 helicopter, PA18A = supercub, C185= Cessna 185. Field is character.

Nest Productivity data

- **NumYng:** Number of chicks observed, with 0 meaning no chicks were observed. Field is numeric with a missing data code of -999.
- **Chick_age [1-3]:** Chick age from chart. If there are additional chicks present, enter the data in a separate column. Field is character.
- **NumAds_P:** Number of adults observed, with 0 meaning no adults were observed. Field is numeric with a missing data code of -999.

SOP 4: Data Management for Bald Eagle Monitoring

Version 1.1 (March, 20223)

Revision History Log:

Version #	Date of Revision	Revised By	Changes	Justification

Introduction

This SOP describes the steps necessary for handling the field data, completing quality assurance/quality control, data certification, and uploading the data into the bald eagle nest database.

Data Management Architecture and Life Cycle

The heart of the WRST bald eagles monitoring program is an authoritative client/server database (Microsoft SQL Server) housed at the Fairbanks Administrative Center, in Fairbanks, Alaska (Figure 4). Standard data deliverables are described in the bald eagles monitoring protocol. These deliverables are collected in the field and then further developed until they meet specifications, and then the data is integrated with the master database. The primary workbenches for developing deliverables will be the shared network drives in Fairbanks and Copper Center, Alaska, but finished versions of deliverables will always be archived in the IRMA Data Store. Once the data in the database pass quality control procedures the data are certified for analysis at which point the project leader and biometrician may analyze and report on the dataset. Certified datasets are published to the Data Store.

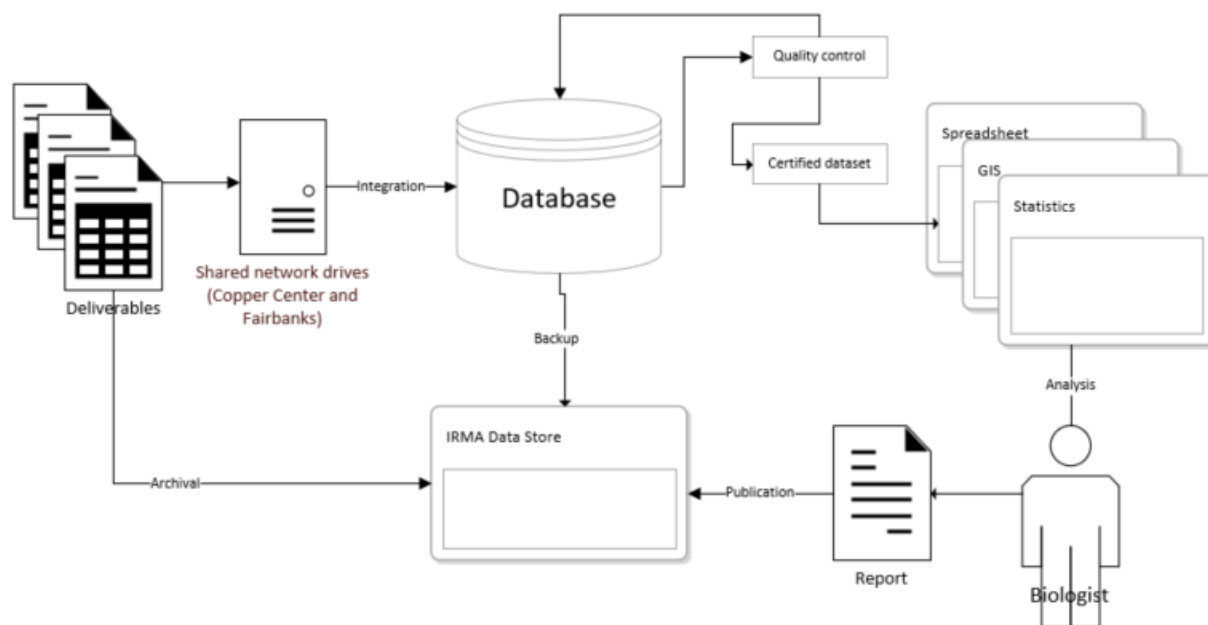


Figure 4. Data management architecture and project life cycle for the bald eagles monitoring program in WRST. Deliverables are developed on local shared network drives and then integrated with the master database. Quality control procedures are executed until the dataset is certified. The dataset is analyzed and reported. At seasonal close-out all critical documents are backed up and/or published to the IRMA Data Store.

Deliverables Schedule

The data deliverables, schedule, and responsible party are presented in Table 1.

Table 1. WRST bald eagle monitoring deliverables schedule.

Identifier	Deliverable	Schedule	Responsibility
BE-01	Paper data collection forms	Sample date +1 year	PI
BE-02	Scans of field data collection forms	Sample date +1 year	PI
BE-03	Aerial survey images	Sample date +1 year	PI
BE-04	Waypoint files	Sample date +1 year	PI
BE-05	Tracklog files	Sample date +1 year	PI
BE-08	Field data deliverable	Sample date +1 year	PI
BE-10	Field data deliverable database import file	Sample date +1 year	DM

PI = Principal Investigator, DM = Data Manager

Deliverables Descriptions

Deliverable BE-01: Paper data collection forms

Description: Complete and annotated paper data collection forms for population and occupancy surveys.

Format: Physical copy

Schedule: Sample date +1 year

Responsibility: PI

Specifications: Paper data collection forms from a survey campaign, ordered, complete and annotated.

File naming scheme: N/A

Data handling summary: Paper data collection forms are stored with the project leader. Scans of the forms become deliverable BE-02.

Quality control summary: Data validation checks include:

Visual data quality checks by the builder and validator.

Cross checking cross-summing values between data collection forms and the digital data deliverable.

Archival: Project leader secures the complete and annotated data collection forms in a fireproof safe.

Builder tasks: The builder is responsible for creating the paper data collection forms and instructing field crews in their use. The builder ensures the data is collected and recorded correctly, and annotates corrections on the sheets. The builder copies the data collection forms. The builder delivers the deliverable to the validator.

Validator tasks: The validator ensures the data collection forms meet specifications. The originals are delivered to the certifier (project leader) and the copies are delivered to the Network data manager.

Certifier tasks: The certifier receives the deliverable from the validator, certifies it and stores the originals in a secure location in a fire-proof safe.

Deliverable BE-02: Scans of field data collection forms

Description: Scans of BE-01 paper data collection forms.

Format: PDF

Schedule: Sample date +1 year

Responsibility: PI

Specifications: Deliverable BE-02 consists of all the complete and annotated data collection forms from a bald eagle survey campaign scanned into a single portable document file (PDF) format.

File naming scheme: BE-02_YYYY-MM-DD_ScannedDataCollectionForms.pdf

Data handling summary: Scans of paper data collection forms (BE-01) are archived in the IRMA Data Store (<https://irma.nps.gov/DataStore/Reference/Profile/2296835>) and are secured in the bald eagle monitoring /Data directory on the CAKN shared drive (J:\Monitoring\Bald_Eagles\Data).

Quality control summary: Scans are legible, annotated, sorted.

Archival: Authoritative versions of deliverables from each survey campaign, including BE-02 are archived in a single Dataset reference in the IRMA Data Store

(<https://irma.nps.gov/DataStore/Reference/Profile/2296835>). Copies are also stored in the bald eagle directory of the CAKN I&M shared drive.

Builder tasks: The builder ensures the data forms are complete and ordered with corrections written on them. The builder then scans the forms into a single portable document file (PDF) and names it according to its deliverable identifier, survey name, and date. The builder delivers the deliverable to the validator.

Validator tasks: The validator receives the deliverable from the builder and ensures it is complete, error free, with corrections noted and all forms in a single PDF file. The validator delivers the deliverable to the certifier.

Certifier tasks: The certifier receives the deliverable from the validator and certifies it. The certifier then uploads the deliverable as a holding of the survey's private Dataset reference in the IRMA Data Store (<https://irma.nps.gov/DataStore/Reference/Profile/2296835>).

Deliverable BE-03: Aerial survey images

Description: Images of bird nests taken during aerial survey.

Format: TIFF

Schedule: Sample date +1 year

Responsibility: PI

Specifications: Deliverable BE-03 consists of all images taken during a survey campaign, dated and named informatively and consistently, zipped into a single archive. BE-03 contains metadata including the date the photo was taken, location, photographer and survey details.

File naming scheme: BE-03_YYYY-MM-DD_Images.zip

Data handling summary: Eagle survey photographs (BE-03) are archived in the IRMA Data Store and are secured in the bald eagle monitoring directory on the CAKN shared drive.

Quality control summary: Photos are usable. Non-data photos are culled. Metadata exists.

Archival: Authoritative versions of deliverables from each survey campaign, including BE-03 are archived in a single Dataset reference in the IRMA Data Store. Copies are also stored in the bald eagle directory of the CAKN I&M shared drive.

Builder tasks: The builder takes images during aerial surveys. The builder assembles the images in a directory, removes extraneous images and documents them with metadata. The builder delivers the deliverable to the validator.

Validator tasks: The validator receives the images from the builder and ensures they meet specifications, are useful and well documented. The validator delivers the deliverable to the certifier.

Certifier tasks: The certifier receives the deliverable from the validator and certifies it. The certifier then assembles the images in a single zip archive, labels it according to the deliverable identifier and survey and then uploads the deliverable as a holding of the survey's private Dataset reference in the IRMA Data Store (<https://irma.nps.gov/DataStore/Reference/Profile/2296835>).

Deliverable BE-04: Waypoint files

Description: Aerial survey waypoints, coordinates in WGS1984 GCS and descriptions

Format: Comma separated values text file

Schedule: Sample date +1 year

Responsibility: PI

Specifications: Deliverable BE-04 contains a single comma separated values text file containing all the waypoints accumulated by all survey aircraft in a survey campaign. WGS1984 geographic coordinate system (lat/lon).

File naming scheme: BE-04_YYYY-MM-DD_Waypoints.csv.

Data handling summary: Waypoint files are used to develop Deliverable BE-08.

Quality control summary: Data validation checks include: Visual and automated data checks by the builder and validator. Cross checking, cross-summing, preliminary data analysis and summary statistics, etc.

Archival: Authoritative versions of deliverables from each survey campaign, including BE-04 are archived in a single Dataset reference in the IRMA Data Store (<https://irma.nps.gov/DataStore/Reference/Profile/2296835>). Copies are also stored in the bald eagle directory of the CAKN I&M shared drive.

Builder tasks: The builder assures that waypoints collected during an aerial eagle survey are valid, and converted to a comma separated values text file. The builder creates a metadata documentation file. The builder delivers the deliverable to the validator.

Validator tasks: The validator receives the waypoints from the builder, validates them for accuracy, information content and metadata. The validator delivers the deliverable to the certifier.

Certifier tasks: The certifier receives the deliverable from the validator and certifies it. The certifier then uploads the deliverable as a holding of the survey's private Dataset reference in the IRMA Data Store (<https://irma.nps.gov/DataStore/Reference/Profile/2296835>).

Deliverable BE-05: Tracklog files

Description: Aerial survey track logs, coordinates in WGS GCS

Format: Comma separated values text file

Schedule: Sample date +1 year

Responsibility: PI

Specifications: Deliverable BE-05 contains a single comma separated values text file containing all the tracklog points accumulated by all survey aircraft in a survey campaign. WGS1984 geographic coordinate system (lat/lon).

File naming scheme: BE-05_YYYY-MM-DD_Tracklogs.csv

Data handling summary: Tracklog files are used to assist in developing BE-08. BE-05 files are archived in the IRMA Data Store and are secured in the bald eagle monitoring directory on the CAKN shared drive.

Quality control summary: Data validation checks include: Visual and automated data checks by the builder and validator. Cross checking cross-summing values between data collection forms and the digital data deliverable. Database application acceptance/rejection. Preliminary data analysis and summary statistics.

Archival: Authoritative versions of deliverables from each survey campaign, including BE-05 are archived in a single Dataset reference in the IRMA Data Store. Copies are also stored in the bald eagle directory of the CAKN I&M shared drive.

Builder tasks: The builder assures that tracklogs collected during an aerial eagle survey are collected correctly, downloaded, edited, and converted to a comma separated values text file. The builder creates a metadata documentation file. The builder delivers the deliverable to the validator.

Validator tasks: The validator receives the tracklogs from the builder, validates them for accuracy, information content and metadata. The validator delivers the deliverable to the certifier.

Certifier tasks: The certifier receives the deliverable from the validator and certifies it. The certifier then uploads the deliverable as a holding of the survey's private Dataset reference in the IRMA Data Store (<https://irma.nps.gov/DataStore/Reference/Profile/2296835>).

Deliverable BE-08: Field data deliverable

Description: Deliverable BE-08 consists of a single data file containing nest observation data from both the occupancy and productivity surveys, with data for each active nest on a single line. A template to automatically generate BE-08 is available at

J:\Monitoring\Bald_Eagles\Procedures\Generate survey datasheets.

Format: Comma separated values text file format.

Schedule: Sample date +1 year

Responsibility: PI

Specifications:

Deliverable BE-08 consists of a CSV data file with the following columns:

Column Name	Data Type	Description
RiverSegment	String	River Segment
NEST #	String	Nest identifier
TREE SPP	String	Tree species
LIVE/DEAD	String	LIVE/DEAD
CONDITION	String	Nest condition
GONE	Bit	True if the nest is gone
NOT FOUND	Bit	True if the nest was not found
NOT COUNTED	Bit	True if the nest was not counted
NO. ADULTS	String	Number of adults
AD1 BEHAV	String	Adult behavior 1
AD2 BEHAV	String	Adult behavior 2
OCCUPIED?	Bit	True if the nest was occupied
YOUNG	String	Number of young in the nest
STAGE	String	Chick stage (consult SOPs)
ADULTS	String	Number of adults (productivity)
COMMENTS	String	Comments
LAST COMMENT	String	Last survey comment, if any
Longitude	Double	Longitude
Latitude	Double	Latitude

File naming scheme: BE-08 YYYY WRST BAEA Survey Data.csv

Data handling summary: The data in the deliverable is imported into the database and the deliverable is archived in the IRMA Data Store.

Quality control summary: Data validation checks include:

Visual and automated data checks by the builder and validator.

Cross checking cross-summing values between data collection forms and the digital data deliverable.

Database application acceptance/rejection.

Preliminary data analysis and summary statistics.

Archival: Authoritative versions of deliverables from each survey are archived in a single Dataset reference in the IRMA Data Store (<https://irma.nps.gov/DataStore/Reference/Profile/2296835>).

Copies are also stored in the bald eagle directory of the CAKN I&M shared drive.

Builder tasks: The builder transcribes the data from the survey data collection forms (BE-01) into a spreadsheet according to the deliverable's specifications. The builder corrects and annotates errors on the original data sheets. The builder then delivers BE-08 to the Validator.

Validator tasks: The validator ensures the deliverable meets specifications and loads the data into the database using the application's data import utilities. Errors require a round of quality control and validation procedures. When the data is accepted by the database the Validator ensures the data in the database matches the spreadsheet. The Validator then notifies the Certifier that the data is ready for certification and archival in the IRMA Data Store.

Certifier tasks: The Certifier receives the deliverable from the validator and, with authorization of the project leader, certifies it by uploading it to a public Dataset reference in the IRMA Data Store (<https://irma.nps.gov/DataStore/Reference/Profile/2296835>).

Deliverable BE-10: Field data deliverable database import file

Description: Late productivity database import file, This deliverable contains the late productivity nest survey collected data. Validated and formatted for integration with the monitoring database.

Format: Structured Query Language file of insert queries used to insert the data from BE-08 into the master BAEA database.

Schedule: Sample date +1 year

Responsibility: PI

Specifications: Structured Query Language (SQL)

File naming scheme: BE-08_YYYY-MM-DD_BAEA_NestInitiationSurvey.csv.sql. Note: the file name is the same as the BE-08 deliverable to indicate that the two are related. This deliverable is not named 'BE-10'.

Data handling summary: NA

Quality control summary: NA

Archival: Deliverable BE-10 is stored in the same directory as deliverable BE-08. You do not need to upload BE-10 to Data Store.

Builder tasks: The builder uses standard data management software to convert the records in BE-08 into SQL INSERT queries and then executes them to insert the data into the BAEA database.

Validator tasks: The validator ensures the data transferred correctly by comparing summed values in BE-08 against what is in the database.

Certifier tasks: NA

Preparing survey maps

There is no standard way of making field survey maps. The steps below focus on getting the active nests locations into ArcGIS Pro. Setting the projection, scale, etc., is left to the preferences of the survey leader.

Objective

- Ensure the active nests inventory is correct
- Create a tabular data file of nest locations to import into GIS
- Import the tabular data file of nest locations into GIS so that survey maps can be created.

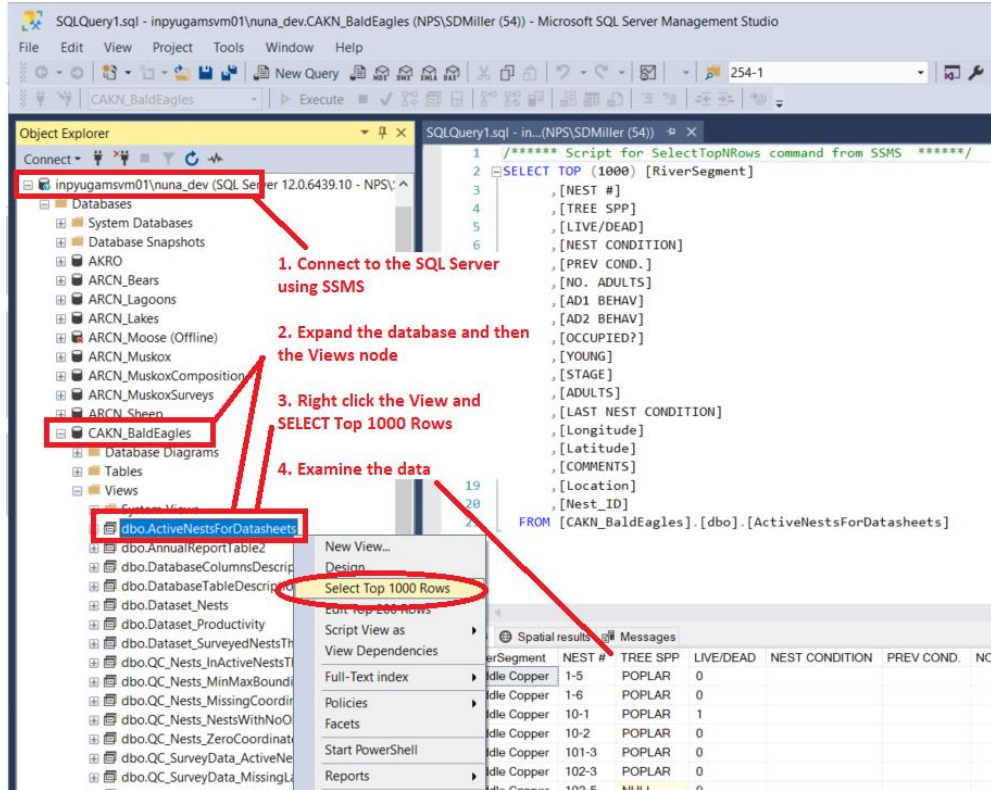
Nest data preparation

Start with high quality data by ensuring all quality control procedures have been done. Ensure that the inventory of active nests is correct (Each nest in the Nests table has a column IsActive. Nests that have not been found more than twice should be de-activated by setting IsActive to 0. Active nests have IsActive set to 1).

To preview the active Nests:

1. Start by performing a quality control check by examining the nests inventory for nests that probably should be inactivated. Select the records in the QC_NestsThatProbablyShouldBeInactivated view (`SELECT * FROM QC_NestsThatProbablyShouldBeInactivated ORDER BY Nest_ID`). Determine if the list of active nests is correct and take corrective action if they are not.
2. Select active nests
3. **Run QC script:** It is a good idea to [run the DataQualityReport script](#) before generating maps in order to see if any anomalous data exist.

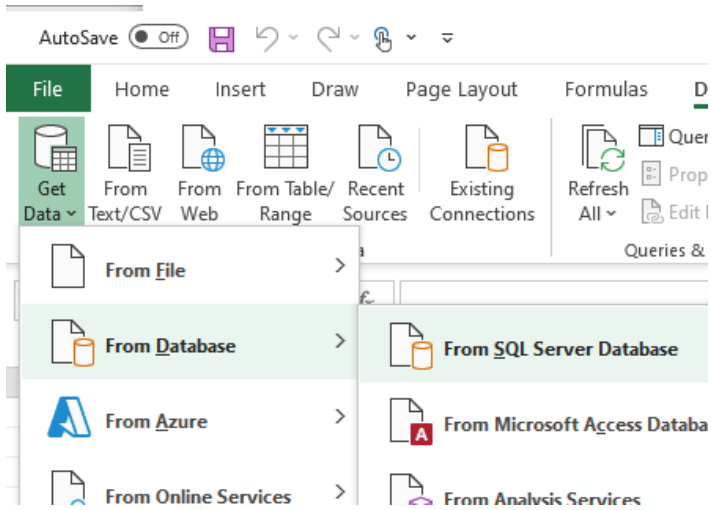
- Preview the list of active nests by executing the ActiveNestsForDatasheets view (`SELECT * FROM ActiveNestsForDatasheets ORDER BY RiverSegment, Nest_ID`)



- Ensure the data in the ActiveNestsForDatasheets view is all correct and change requests that were put in the previous survey's Comments columns have all been addressed (new nests, deactivate nests, change tree species, etc.).

Create an Excel worksheet of active nests Procedure

- Start Microsoft Excel
- Open a blank workbook
- Data -> Get Data -> From Database -> From SQL Server Database



- 4.
5. Enter the [database connection parameters](#)

SQL Server database

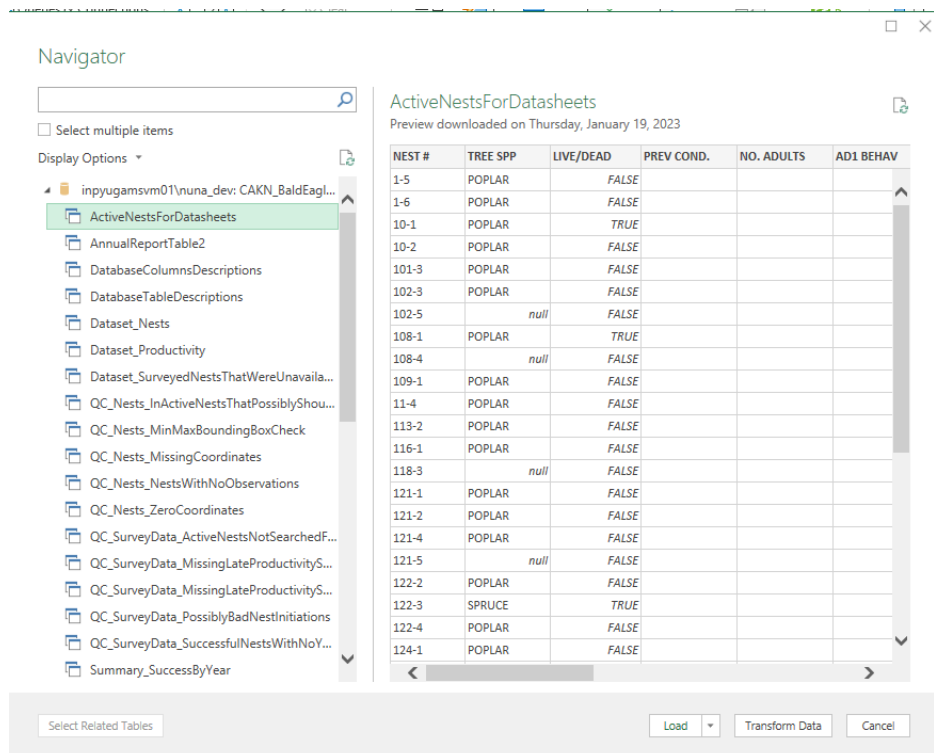
Server ⓘ

Database (optional)

Advanced options

OK

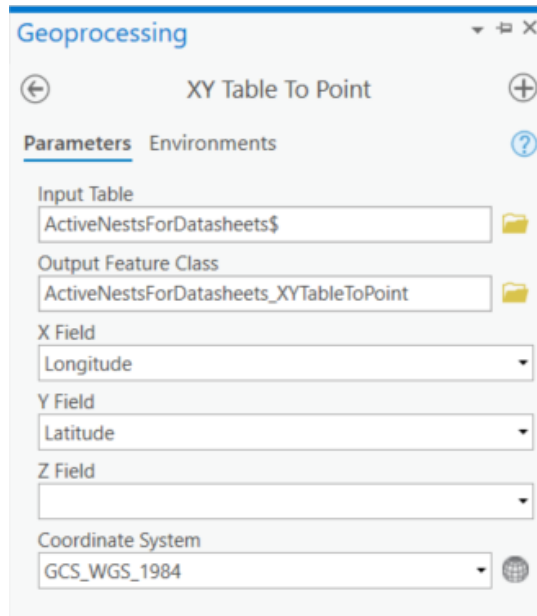
- 6.
7. OK
8. Select ActiveNestsForDatasheets in the Navigator



- 9.
10. Click Load
11. Save the workbook somewhere

Import the Excel worksheet of active nests into GIS

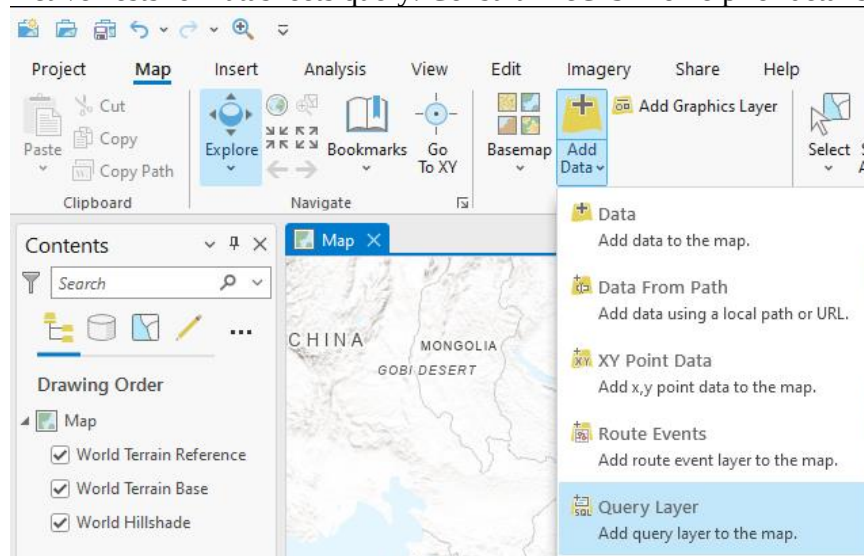
1. Open ArcGIS Pro
2. Add a new map
3. Add data -> XY Point Data
4. The XY Table To Point Geoprocessing tool opens
 1. Input Table: Point ArcGIS Pro to the spreadsheet you created earlier
 2. Select ActiveNestsForDatasheets\$ (I don't know why Excel appends a \$ to the end of the worksheet name)
 3. Ensure the remaining parameters are correct as shown below



- 4.
5. Click Run
6. The nests appear in the map
7. From here adjust the map to meet your field survey needs

Alternatively, you may query the active nest locations directly into GIS (ArcGIS Pro) as follows:

1. Start Pro
2. Add a Query Layer using the SQL Server address, database name and the *ActiveNestsForDatasheets* query. Consult ArcGIS Pro help for details on query layers.



Printing data collection forms

Data collection forms can be printed through a standardized Excel spreadsheet. This spreadsheet pulls data from the *ActiveNestsForDatasheets* database query. Obtain the spreadsheet at `J:\Monitoring\Bald_Eagles\Procedures\Generate survey datasheets\BE-08 YYYY WRST BAEA`

Survey Data.xlsx. This spreadsheet does double duty as both data collection forms and as a template for entering survey data ([Deliverable BE-08](#)) after the survey.

Objective

- Create a new data directory in the bald eagles monitoring shared network drive to store the new survey data.
- Create a new BE-08 deliverable from a standard template.
- Print data collection forms.

Procedure

Step 1. Copy the standard data forms spreadsheet into the current year's /Data directory

1. Navigate to *J:\Monitoring\Bald_Eagles\Data*
2. Open the annual directory for the current year's data. If it doesn't exist then create it (example: *J:\Monitoring\Bald_Eagles\Data\2023*).
3. Copy *J:\Monitoring\Bald_Eagles\Procedures\Generate survey datasheets\BE-08 YYYY WRST BAEA Survey Data.xlsx* to the directory you just created.
4. Alter the file name by changing the YYYY in the file name to the current year (example: *BE-08 2023 WRST BAEA Survey Data.xlsx*).

Step 2. Print the data forms

1. Open the spreadsheet you created in step 1 above
2. Open the 'Data sheets' worksheet
3. Click Refresh All to ensure you have the latest snapshot of active nests.
4. Ensure the nests inventory looks correct. Compare the nests to last years list.
5. Print the 'Data sheets' worksheet

Time saving tip: When you come back from the survey you can enter the data from the field forms into this file which then becomes Deliverable BE-08.

Data Processing

Data processing instructions and specifications are described for each field data deliverable in the section below.

Organizing field survey data deliverables

After a new bald eagle survey, organize the field data deliverables in the bald eagles monitoring shared network drive at *J:\Monitoring\Bald_Eagles\Data*

1. Create a new directory annotated with the year. Example: *'J:\Monitoring\Bald_Eagles\Data\2023'*.
2. Organize and re-name field survey data files as you process them. Match file names to the corresponding deliverable from the [deliverables schedule](#).

Building finished deliverables typically happens in the bald eagles monitoring data directory (above), but this directory should be viewed as a workbench; when you are done with all the data management and database import procedures, upload the deliverables to the authoritative reference for deliverables at <https://irma.nps.gov/DataStore/Reference/Profile/2296835>. Archiving the deliverables there ensures they are available to future personnel.

Adding new nests

Prerequisites

You must have permission to access the following resources:

- The [CAKN BaldEagles database](#).
- The bald eagles monitoring shared network drive at J:\Monitoring\Bald_Eagles\Data.

Begin the data import process by creating Deliverable BE-06 (new nests data file) and then inserting the new Nest records from BE-06 into the Nest database table. New nests must exist in the database before the field survey data can be imported.

Usually new nests do not have an authoritative and unique Nest_ID; they are usually recorded on the field data collection sheet with a Comment such as 'New nest', or similar. The first order of business is, therefore, to create a new Nest_ID for each nest. This is done by determining the TerritoryID for the new nest and then incrementing the nest identifier by one. See SOP-2, page 13 'Assigning territory and nest numbers', for details. As an example, if the new nest falls spatially in Territory 69 and there are already two nests in that territory, then the new nest must become '69-3'.

Objectives

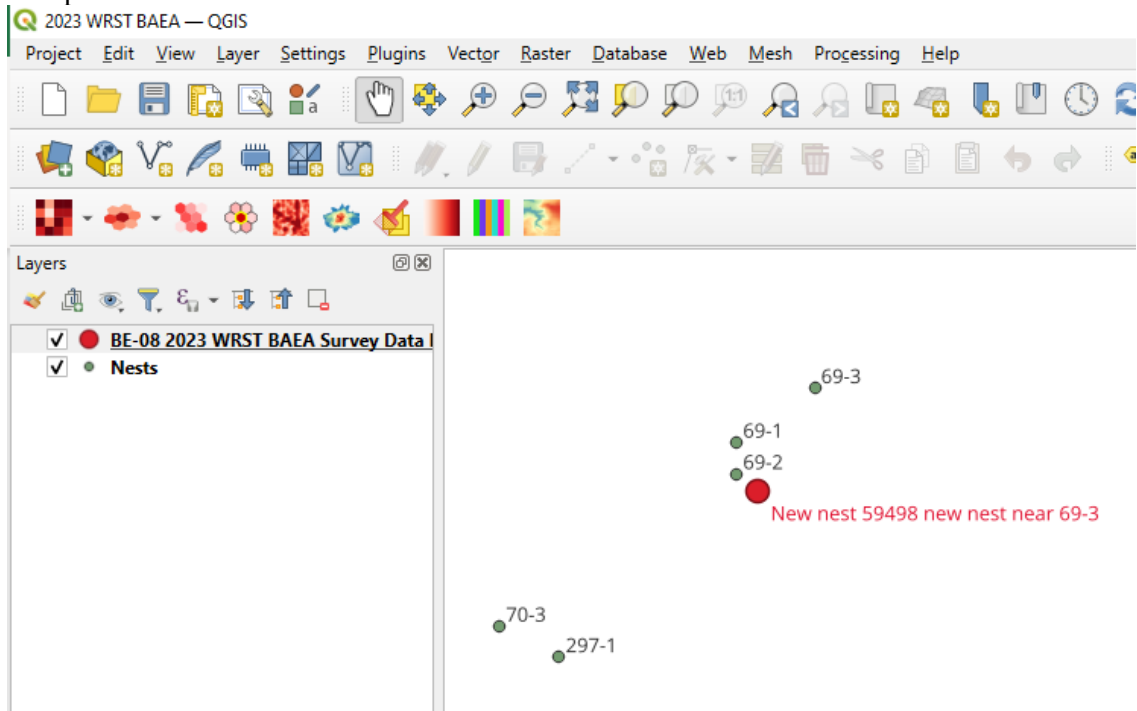
- Determine a TerritoryID for each new nest.
- Create a Nest_ID for each new nest.
- Build Deliverable BE-06 (new nests data file).
- Import the records from BE-06 into the master bald eagles monitoring database.

Procedure

1. Open BE-08 spreadsheet.
2. Scan the comments and other data to determine if new nest records exist.
3. For each new nest record ensure there is a unique placeholder nest identifier. Example: 'New nest 1', 'New nest 2', etc. You will change these placeholder identifiers later, in GIS. See Column E, below for an example.

	Year	Date (occ)	Date (prod)	Territory ID	Nest Site	Deactivat	NestDest	TreelsDes	ChangeSp	IsNewNes	Comment_O
1											
2	2023	5/15/2023	7/9/2023	256	New nest 256						1 New Nest
3	2023	5/15/2023	7/9/2023	NewNest	NewNest 1						1 New Nest, WP9493
4	2023	5/17/2023	7/10/2023		New nest 2						1 new nest
5	2023	5/17/2023	7/10/2023		New nest 3						1 new nest
6	2023	5/17/2023	7/10/2023	See GPS Coord	New nest 4						1 new nest 9496 plus a second r
7	2023	5/18/2023	7/29/2023		New nest 5						1 9498 new nest near 69-3
8	2023	5/18/2023	7/29/2023		New nest 6						1 9502 New nest approx location

- 4.
5. Save the BE-08 deliverable as a CSV file.
6. From here the objective is to overlay the new nests in the CSV, above, with existing nests in the master database in GIS.
 1. Open the CSV file you just created in GIS as an XY layer, or Delimited Text file layer.
 2. Now load the Nests table from the master CAKN_BaldEagles database as a layer in the GIS (*Use your GIS documentation for accomplishing this. See Query Layers for ArcGIS, or database connections in QGIS*)
 3. You should see something like the screenshot below where the layer 'BE-08 2023 WRST...' represents the CSV data file you created above, and the 'Nests' layer represents the spatial location of the nests in the master database's Nests table:



4. From the example in the screenshot, it should be apparent that 'New nest5' (ignore the appended comment in the label) should be designated '69-4' because it is the 4th nest in territory 69. In this case you would go back to the BE-08 CSV file, locate the record containing the nest identified as 'New nest 5' and re-name it '69-4', and then refresh the

GIS (Note: Edit the CSV in Notepad, rather than Excel. Excel will complain about the CSV file being open in GIS; Notepad will not). The name should change in GIS.

- Continue modifying the new nests until each has a new, unique Nest_ID. Once this is done, go to the next section to import the new nests into the master database.

Create Deliverable BE-06

Once all the new nests have valid Nest_IDs it is time to insert the records into the master eagles monitoring database.

Objective

- Separate Nest_IDs and spatial coordinates for new nests from deliverable BE-08 (survey data) into BE-06 (new nests) so that the new nests can be inserted into the Nests database table
- Insert the new nests into the database

Procedure

- In the deliverable BE-08 data file, separate the new nest records from the other data so that you can insert them into the Nests database table. Name the file 'BE-06 YYYY New Nests.csv', or similar, replacing YYYY with the survey year.
- Remove extraneous columns. The Nests database table only requires, at minimum, Nest_ID, IsActive, DiscoverDate, although the more information you can import, the better.
- There are multiple ways to import nests into the CAKN_BaldEagles database, but the simplest is often to write an SQL INSERT query using a formula. An example screenshot of BE-06 with INSERT queries for the 2023 data importing event appears below:

= "INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('"& C2 &"',1,'" & TEXT(A2,"YYYY-MM-DD") &"',NULL," & E2 &"','" & D2 &"','" & B2 &"','" & F2 &"')"									
A	B	C	D	E	F	G	H	I	J
Date	O	Territory ID	Nest_ID	Lon	Lat	Comments	BEGIN TRANSACTION -- COMMIT ROLLBACK		
5/15/2023		256	256-3	-143.36563	62.436	New Nest	INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('256-3',1,'2023-05-15',NULL,62.436,-143.36563,'256','New Nest')		
5/15/2023		295	295-2	-143.5453816	62.54089225	New Nest WP9493	INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('295-2',1,'2023-05-15',NULL,62.54089225,-143.5453816,'295','New Nest')		
5/17/2023		236	236-5	-145.42085	62.08727	new nest	INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('236-5',1,'2023-05-17',NULL,62.08727,-145.42085,'236','new nest')		
5/17/2023		62	62-4	-145.27811	61.94788	new nest 9495 down from	INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('62-4',1,'2023-05-17',NULL,61.94788,-145.27811,'62','new nest 9495 down from')		
5/17/2023		43	43-4	-144.4658038	61.61478692	new nest 9496 plus a secc	INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('43-4',1,'2023-05-17',NULL,61.61478692,-144.4658038,'43','new nest 9496 plus a secc')		
5/18/2023		69	69-4	-144.901938	61.19216725	9498 new nest near 69-3	INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('69-4',1,'2023-05-18',NULL,61.19216725,-144.901938,'69','9498 new nest near 69-3')		
5/18/2023		211	211-3	-144.8990889	61.1500694	9502 New nest approx loci	INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('211-3',1,'2023-05-18',NULL,61.1500694,-144.8990889,'211','9502 New nest approx loci')		
5/18/2023		124	124-2	60.84451558	-144.4984649	new nest 9501	INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('124-2',1,'2023-05-18',NULL,-144.4984649,60.84451558,'124','new nest 9501')		

- Example formula – modify as needed:
- = "INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('"& C2 &"',1,'" & TEXT(A2,"YYYY-MM-DD") &"',NULL," & E2 &"','" & D2 &"','" & B2 &"','" & F2 &"')"
- Once the INSERT queries are developed, copy them into a text file with the same name as BE-06 file, but with a '.sql' file extension.
- Open the .sql file in SQL Server Management Studio.
- Execute the insert queries inside a transaction in SQL Server Management Studio.
- Be sure to COMMIT the inserts in the transaction if they all succeed, or ROLLBACK, if any fail. You must do one or the other or the database will hang.

```

1 USE CAKN_BaldEagles
2 BEGIN TRANSACTION -- COMMIT ROLLBACK -- Be sure to COMMIT or ROLLBACK the insert queries or the database will be left hanging.
3 INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('256-3',1,'2023-05-15',NULL,62.436,-143.36563,'256','New Nest')
4 INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('295-2',1,'2023-05-15',NULL,62.54089225,-143.54538163,'295','Ne
5 INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('236-5',1,'2023-05-17',NULL,62.08727,-145.42085,'236','new nest
6 INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('62-4',1,'2023-05-17',NULL,61.94788,-145.27811,'62','new nest 9
7 INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('43-4',1,'2023-05-17',NULL,61.61478692,-144.46580378,'43','new
8 INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('69-4',1,'2023-05-18',NULL,61.19216725,-144.98193801,'69','9498
9 INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('211-3',1,'2023-05-18',NULL,61.1500694,-144.89908892,'211','950
10 INSERT INTO Nests(Nest_ID,IsActive,DiscoverDate,RiverSegment,[Lat-NAD83],[Lon-NAD83],TerritoryID,Comments) VALUES('124-2',1,'2023-05-18',NULL,-144.49846487,60.84451558,'124','ne
11
12
13

```

- 11.
12. Verify the new nests have been correctly inserted into the Nests table by issuing the following SELECT query in SSMS, substituting the survey year for '2023': `SELECT * FROM Nests WHERE (YEAR(DiscoverDate) = 2023) ORDER BY Nest_ID`

Editing Nests records

If you discover auxiliary information about the new nests after the records are inserted you may update the Nests table in SSMS by right-clicking the Nests table and selecting 'Edit Top 200 Rows'. The Nests table will open and you may edit it much like a spreadsheet. Be careful, edits are saved directly, without confirmation.

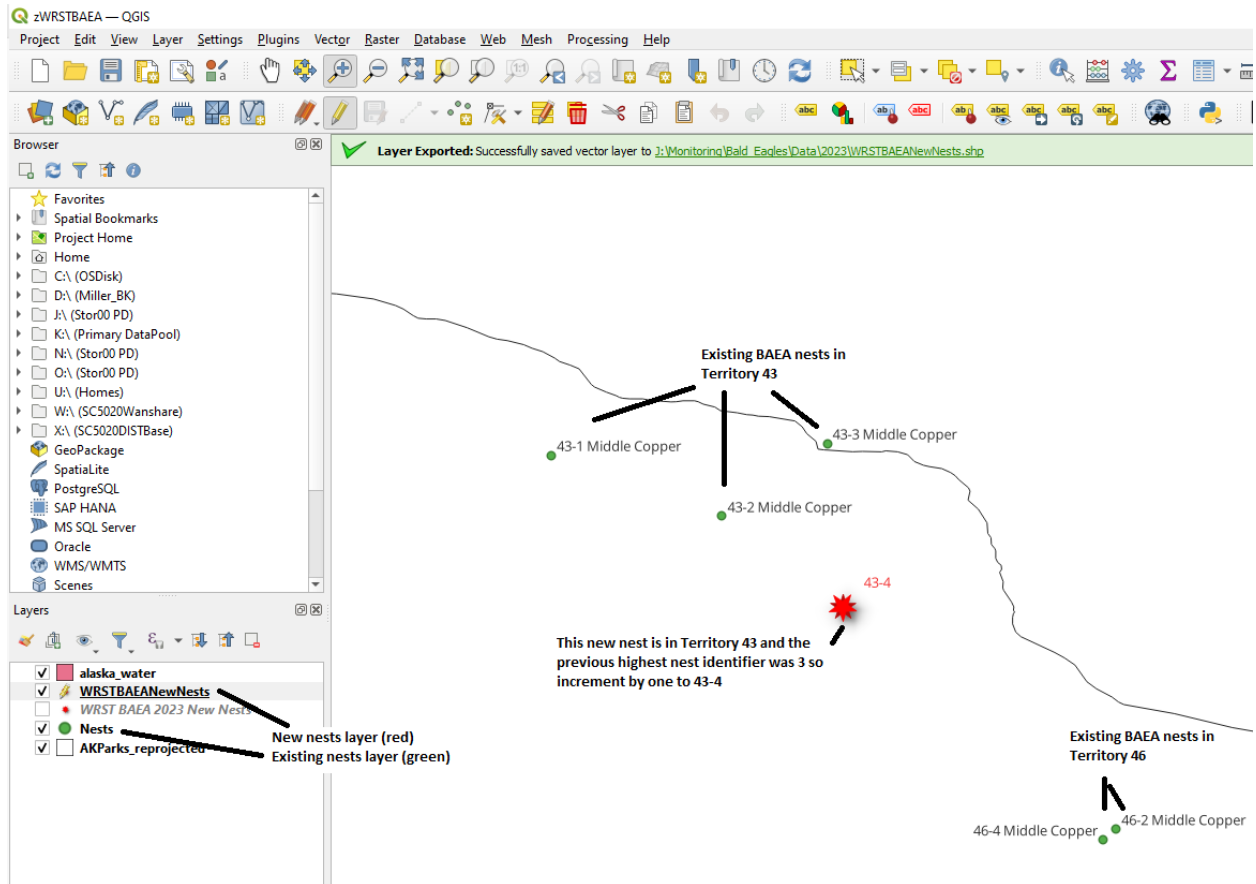
New nests that are discovered during a survey must be added to the database before any survey data can be imported. If you try to import a record into the SurveyData table having a Nest_ID that does not exist in the Nests table, you will get database errors.

Procedure:

Typically, new nests are known from the BE-08 field data deliverable comments. Broadly, tasks involve developing a Nest_ID for the new nest and figuring out which river segment the new nest should be assigned.

1. Copy the data from BE-08 into a new worksheet (this is done to preserve the data deliverable; in order work with new nests you will have to be pare away a lot of irrelevant data to get at just the pertinent columns for just the new nest records).
2. Delete all rows that do not contain information on new nests.
3. Delete all columns for the remaining new nest records except for Latitude, Longitude, Tree species,River Segment, and Comments.
4. Save this worksheet as a .CSV file.
5. The next step is to generate names for the new nests. Name generation is covered in the SOPs, but basically involves figuring out which territory the new nest is in and incrementing the Nest_ID by one for the new nest.
6. Import the CSV file above into a GIS.
7. Export the CSV file to a spatial layer, such as a shapefile; it doesn't matter what it is because this file will be temporary. Name it something memorable, *2023NewNests.shp*, for example.
8. Next, load the existing BAEA nests into the GIS in a separate layer (I did this in QGIS as an SQL Server query – consult the QGIS documentation, but you can do it as an XY layer or other method. The only thing that matters is to have existing nests plotted in the same GIS as the new nests).

9. You should have something like this:



10.

11. In the above figure the new nests shapefile is called WRSTBAEANewNests (red explosion symbol) and the existing nests from the CAKN_BaldEagles database was imported to the Nests layer (green dots). In looking at the map you should be able to see that the new nest is in Territory 43 and if you increment the nest number by one you should arrive at a new Nest_ID of 43-3. Edit the new nests shapefile to reflect the new Nest_ID.

12. Once you have assigned a new Nest_ID to each new nest, make sure you have valid coordinates and non-NULL and non zero length RiverSegment attributes.

13. Export the records to a CSV or other format that will make it easy to import the new nest data into the Nests table of the database.

De-activating lost nests

Occasionally nests are lost or destroyed. Such nests need to be deactivated in the database's Nests table so that field crews don't continue to look for them. Usually crews note missing or destroyed nests in the comments field of data collection forms.

Nest de-activation circumstances:

- Nest is noted as gone by a field crew
- Nest was not found over two surveys

Procedure

- Examine field comments for notes indicating the nest is gone.
- In the CAKN_BaldEagles database Set the Nests.IsActive attribute to 0 and Nests.DateDiscoveredGone to the last time the nest was observed intact. Example:
-

It's a good idea to run the *QC_NestsThatProbablyShouldBeInactivated* view to reveal nests that have not been tagged NF (Not Found) on the last two surveys:

```
SELECT * FROM [CAKN_BaldEagles].[dbo].[QC_NestsThatProbablyShouldBeInactivated]
```

This view suggests corrections – ensure you have informed reasons for making changes based on the query results.

Importing survey data into the master database

Survey data is contained in Deliverable BE-08. If the procedure for printing data forms was followed carefully then there should exist:

- A new annual data directory in the J:\Monitoring\Bald_Eagles\Data directory.
- A complete BE-08 deliverable (example: *BE-08 2023 WRST BAEA Survey Data.xlsx*).

There are many ways to import data from a spreadsheet into an SQL Server database. SSMS has a data import utility. You can write insert queries in Excel using a formula. Other data transfer software exist. The objective is to convert the records in deliverable BE-08 into SQL INSERT queries, and then execute them to insert the records.

Always start by making any changes to existing nests in the database's Nests table, and by adding any new nests. You must make these changes first because any records you intend to add to the SurveyData table must have an existing, related Nest_ID record in the Nests table.

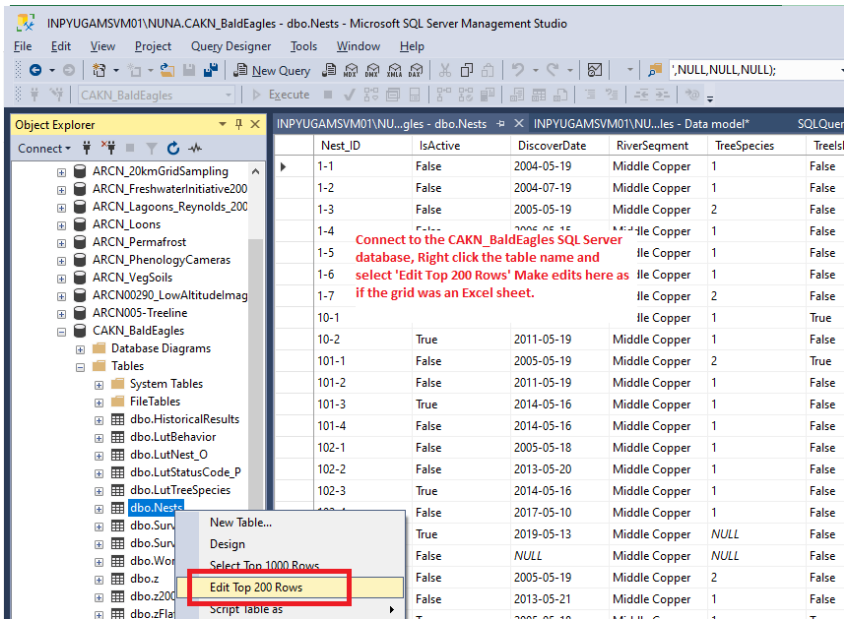
Usually during surveys there are additions or changes that must be made to nests in the Nests database table.

Editing existing nests

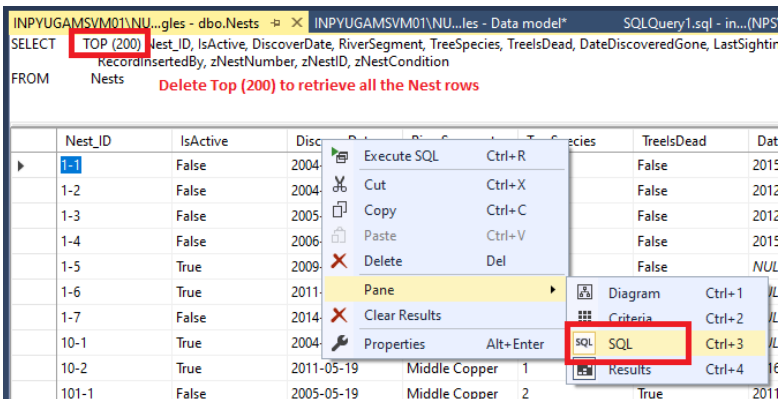
There are many ways to edit Nest records in the database. Two of the easiest methods are to edit the records directly using SQL Server Management Studio, or to write SQL UPDATE queries using Excel.

SQL Server Management Studio Method

1. Open SQL Server Management Studio (SSMS)
2. Connect to the CAKN_Bald Eagles database (contact the CAKN data manager for the server name).
3. Right click the Nests table and select Edit Top 200 Rows.



- 4.
5. If you need to edit more than 200 rows (an SSMS default) then right – click the column headers, select Pane -> SQL and then delete ‘Top (200)’ from the query and re-execute to retrieve all the rows.



- 6.
7. Make your edits directly into the cells. Be cautious, there is no confirmation before your edits are committed.

Excel Formulas Method

This procedure describes editing Nests by writing SQL UPDATE queries as Excel formulas, and then executing the queries in SSMS.

Procedure:

1. Open the BE-08 field data deliverable and examine the comments to plan what database changes are needed.
2. Copy comments out of the BE-08 field data deliverable into a new Excel sheet so that you can write SQL UPDATE queries to effect the changes.

- Write UPDATE queries in the form of formulas to isolate records to be updated and specify their new attributes.
- Below is a screenshot of an Excel worksheet of field data comments being converted to UPDATE queries. One query below will set a nest tree's TreeIsDead attribute to 1 (TRUE), and the other two will change two Nest records' TreeSpecies attributes to 1 (TreeSpecies code 1 = POPLAR).

A	B	C
1	Nest Site	
2	7-3	
3	7-2	
4	2-1	Tree dead
5	77-2	too many leaves
6	76-5	too many leaves
7	329-2	Spruce Tree
8	317-2	Spruce Tree

- Once all your queries are written, copy them into SSMS.

```

1 USE CAKN_BaldEagles
2 BEGIN TRANSACTION -- COMMIT ROLLBACK
3 -- Be sure to COMMIT the updates if everything goes well,
4 -- otherwise execute ROLLBACK and make changes until all
5 -- the queries execute successfully
6 UPDATE Nests Set TreeIsDead=1 WHERE Nest_ID='2-1'
7 UPDATE Nests Set TreeSpecies=2 WHERE Nest_ID='329-2'
8 UPDATE Nests Set TreeSpecies=2 WHERE Nest_ID='317-2'
9 UPDATE Nests Set IsActive=0 WHERE Nest_ID='235-1'
10 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='89-2'
11 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='87-3'
12 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='96-3'
13 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='195-1'
14 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='190-1'
15 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='190-3'
16 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='121-5'
17 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='68-3'
18 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='268-4'
19 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='224-3'
20 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='223-4'
21 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='48-2'
22 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='304-2'
23 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='276-5'
24 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='302-4'
25 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='215-5'
26 UPDATE Nests Set IsActive=0 WHERE Nest_ID='192-3'
27 UPDATE Nests Set IsActive=0 WHERE Nest_ID='57-3'
28 UPDATE Nests Set IsActive=0 WHERE Nest_ID='51-2'
29 UPDATE Nests Set IsActive=0 WHERE Nest_ID='62-2'
30 UPDATE Nests Set IsActive=0 WHERE Nest_ID='328-1'
31 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='122-3'
32 UPDATE Nests Set IsActive=0 WHERE Nest_ID='122-2'
33 UPDATE Nests Set IsActive=0 WHERE Nest_ID='4-2'
34 UPDATE Nests Set IsActive=0 WHERE Nest_ID='27-1'
35 UPDATE Nests Set IsActive=0 WHERE Nest_ID='39-4'
36 UPDATE Nests Set IsActive=0 WHERE Nest_ID='320-1'
37 UPDATE Nests Set IsActive=0 WHERE Nest_ID='299-2'
38 UPDATE Nests Set TreeSpecies=1 WHERE Nest_ID='1-6'

```

- Execute them in a TRANSACTION (the transaction requires all the queries to succeed or fail as a group. If any one of them fails, execute ROLLBACK to undo the changes, fix any problems and re-execute. Once they all succeed, then execute COMMIT to write them to the

database. While not strictly necessary, it's a good habit to make changes within transactions in case unexpected things happen).

9. If you are uncertain about doing any of these edits, have the CAKN data manager do them for you.

Importing survey data

There is no standardized method of importing bald eagle survey data into the database. SQL Server Management Studio has a data import wizard that can be used for this task. You could use formulas written in Excel to generate database SQL INSERT queries. Other methods certainly exist. Be sure to import any new nests into the Nests table before attempting to import survey data since Nest_IDs must exist for each record imported into the database's SurveyData table.

Quality Control

Quality control consists of the steps taken to ensure the data meets expectations. This is distinct from quality assurance which consists of the steps taken before data collection to ensure high data quality. Quality control takes the following forms:

Quality control methods

1. Checking field data at the time of collection to ensure it is complete and accurate
2. Database enforced adherence to business rules at the time of entry. Rejection of records not meeting minimum standards.
3. Preliminary data analysis will reveal outliers and anomalous, illogical or impossible values.
4. Running quality control stored procedures to interrogate the dataset and report potential problems such as logical inconsistencies, missing values or impossible values. QC scripts will be run and data anomalies repaired and documented in a cycle until the data are clean enough to certify.

Quality control stored procedure

Execute the stored procedure DataQualityReport (send the result to text, rather than grids). This stored procedure shows many quality control issues, one of which is nests that possibly should be inactivated.

1. Open Sql Server Management Studio (SSMS).
2. Connect to the bald eagles database
3. Connect to the SQL Server
4. Open a New Query
5. Right click the background of the new query and select Results To -> Results to Text (the default is Results to Grid, which is fine but the written context of the data in the grids will not be apparent).
6. Type: EXEC DataQualityReport

7. Examine the various QC results and make corrections as needed.

Dataset certification

Certification is the process whereby a dataset are declared to be sufficiently clean and logical for data analysis and reporting. Each record in the database's SurveyData table has a column, CertificationLevel. Data fresh from the survey are tagged CertificationLevel = 'Raw'. Once basic quality control procedures are run the data is ready for preliminary data analysis and reporting 'in-house'. Such records may be tagged 'Provisional'. Once all quality control procedures have been run and the data is ready for analysis and publication they will be tagged 'Certified'. Once records are certified they may not be altered again without good reason; in fact, a database trigger prevents altering certified records.

Object Explorer

Connect

CAKN_BaldEagles

Database Diagrams

Tables

System Tables

FileTables

dbo.HistoricalResults

dbo.LutTreeSpecies

dbo.Nests

dbo.SurveyData

Columns

- Year (PK, FK, int, not null)
- Nest_ID (PK, FK, varchar(5), not null)
- Date_O (date, not null)
- NumAds_O (int, null)
- AdBehav1_O (nvarchar(255), null)
- AdBehav2_O (nvarchar(255), null)
- NumEggs_O (int, null)
- Nest_O (varchar(2), not null)
- Date_P (date, null)
- NumAds_P (int, null)
- AdBehav1_P (nvarchar(255), null)
- AdBehav2_P (nvarchar(255), null)
- NumYng (int, null)
- NumFig (int, null)
- Chick_Age (varchar(10), null)
- StatusCode_P (varchar(4), not null)
- NestCondition_O (varchar(100), null)
- Park (varchar(4), null)
- Pilot_O (varchar(50), null)
- ReObserv_O (varchar(50), null)
- Aircraft_O (varchar(10), null)
- ReObserver_P (varchar(50), null)
- Aircraft_P (varchar(20), null)
- Pilot_P (varchar(50), null)
- NestSub (varchar(1), null)
- TreeStat (varchar(1), null)
- NestVis (int, null)
- Lon_DD (float, null)
- Lat_DD (float, null)
- Comments_O (varchar(1000), null)
- Comments_P (varchar(1000), null)
- SourceFile (varchar(1000), null)
- RecordInsertedDate (datetime, not null)
- RecordInsertedBy (varchar(50), not null)
- RecordUpdatedDate (datetime, null)
- RecordUpdatedBy (varchar(50), null)
- ValidationDate (datetime, null)
- ValidatedBy (varchar(30), null)
- CertificationLevel (varchar(20), not null)
- CertifiedBy (varchar(50), null)

SQLQuery4.sql - in...(NPS\SDMiller (65))

SQLQuery3.sql - IN...(NPS\SDMiller (64))*

```

1 /***** Script for SelectTopNRows command from SSMS *****/
2 SELECT TOP (1000) [Year]
3     , [Nest_ID]
4     , [Date_O]
5     , [NumAds_O]
6     , [AdBehav1_O]
7     , [AdBehav2_O]
8     , [NumEggs_O]
9     , [Nest_O]
10    , [Date_P]

```

100 %

Results Messages

	idDate	RecordUpdatedBy	ValidationDate	ValidatedBy	CertificationLevel	CertifiedBy	CertificationDate
1	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
2	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
3	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
4	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
5	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
6	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
7	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
8	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
9	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
10	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
11	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
12	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
13	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
14	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
15	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
16	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
17	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
18	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
19	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
20	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
21	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
22	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
23	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
24	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
25	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
26	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
27	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
28	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
29	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
30	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
31	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
32	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
33	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
34	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
35	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
36	6:18:29.220	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
37	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL
38	2:32:54.303	NPS\SDMiller	NULL	NULL	Raw	NULL	NULL

Figure 5. Screenshot of the SurveyData table structure and data, showing the CertificationLevel column. The data shows eagle survey records that have been tagged 'Raw', indicating they have not undergone any quality control actions. The red rectangle on the left

Certifying records

When all quality control procedures have been run and data anomalies documented and/or repaired then the records may be certified. Referring to the Builder-Validator-Certifier model presented in the Deliverables Schedule, the recordset is ready for certification when:

- The Builder has entered the data into BE-08 and done basic quality control and delivered the spreadsheet to the Validator and has provided for importing the data into the database.
- The Validator has run all quality control procedures, documented and corrected anomalies and reported the data quality to the Certifier.

- The Certifier then gives permission to certify the records. Certified records have their
 - CertificationLevel attributes set to 'Certified'
 - CertificationDate attribute is set to the current date, and
 - The Certifier's name is added to the CertifiedBy attribute.

Product Archival, Seasonal Closeout

The WRST bald eagle monitoring program will follow the standard CAKN plan for archiving data deliverables, seasonal closeout, product archival and dataset certification. These procedures are described in *Product Archival, Seasonal Closeout and Dataset Certification Procedures for the Arctic and Central Alaska Inventory and Monitoring Networks* (Miller 2017).

Bald eagle monitoring deliverables are to be archived annually in the IRMA Data Store in the following URL: <https://irma.nps.gov/DataStore/Reference/Profile/2296835>.

Checklist

- Each deliverable is named correctly so that context is preserved in the list of files in the Data Store reference, e.g. the files sort correctly by deliverable identifier, year, etc. Consult the [deliverables schedule](#) for file naming conventions, or emulate existing files from past years.
- Each deliverable is uploaded in human and machine readable formats (comma separated values files, for example) in addition to proprietary formats.
- Each deliverable is described with a formal ([EML](#)) or informal metadata document or descriptive document (ReadMe.txt).
- A data quality report, if needed, to describe data defects, repairs, etc.

Dataset publication

Certified data for the bald eagles monitoring is published with metadata and a Data Release Report to the IRMA Data Store reference <https://irma.nps.gov/DataStore/Reference/Profile/2297222>

Resources

[NPS Data Publication Best Practices](#)

Create a new certified dataset directory in the bald eagles shared network drive

While authoritative copies of the certified bald eagles monitoring dataset files are stored in Data Store at the URL described above, working copies are build in the bald eagles monitoring shared network drive at J:\Monitoring\Bald_Eagles\Data\Certified Dataset.

Method 1: R script

We have written an R script to export certified data to comma separated values (CSV) text files in the Certified Datasets directory at J:\Monitoring\Bald_Eagles\Data\Certified Dataset for IRMA. Though the CSVs are exported here, this is not the final destination. NPS Data Store is the authoritative data store and you will have to version the current certified dataset reference in Data Store and upload the files you generate here to the new reference.

Procedure:

1. The R script is in a GitHub repository. Using a browser, navigate to <https://github.com/NPS-ARCN-CAKN/WRST-BAEA>.
2. Obtain the scripts:
 - a. If you are familiar with Git:
 - i. Open a command prompt and navigate to the parent directory where you would like to clone the CAKN_Glaciers repository
 - ii. Execute `git clone https://github.com/NPS-ARCN-CAKN/WRST-BAEA.git`
 - iii. Example session (this session is from the glaciers monitoring but eagles is the

```

(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>cd C:\Temp

C:\Temp>git clone https://github.com/NPS-ARCN-CAKN/CAKN_Glaciers.git
Cloning into 'CAKN_Glaciers'...
remote: Enumerating objects: 21, done.
remote: Counting objects: 100% (21/21), done.
remote: Compressing objects: 100% (16/16), done.
remote: Total 21 (delta 5), reused 13 (delta 3), pack-reused 0 (from 0)
Receiving objects: 100% (21/21), 9.06 KiB | 4.53 MiB/s, done.
Resolving deltas: 100% (5/5), done.

C:\Temp>cd CAKN_Glaciers

C:\Temp\CAKN_Glaciers>dir
Volume in drive C is OSDisk
Volume Serial Number is 8684-D55D

Directory of C:\Temp\CAKN_Glaciers

01/02/2025  03:48 PM    <DIR>          .
01/02/2025  03:48 PM    <DIR>          ..
01/02/2025  03:48 PM                138 README.md
01/02/2025  03:48 PM           9,584 SnowDataToDatabase.ps1
01/02/2025  03:48 PM        10,470 StakesDataToDatabase.ps1
               3 File(s)          20,192 bytes
               2 Dir(s)  149,107,388 bytes free

```

- same):C:\Temp\CAKN_Glaciers>
 - b. If you are a non-Git user: Click the link for *ExportCertifiedDataset.R*.
 - c. Try to download the script. DOI may block it. If so, simply cut and past the code into a local text file named the same as the file in the repository.
3. Open the ExportCertifiedDataset.R script in R studio.
4. Read the documentation and look over the script to familiarize yourself with what it does. Basically it will create a new subdirectory with the current date at J:\Monitoring\Bald_Eagles\Data\Certified Dataset for IRMA and dump out a nests data file and a productivity data file.
5. Ensure the CSV files that were exported look OK. Now skip to the section titled 'Procedure to publish the data in Data Store'.

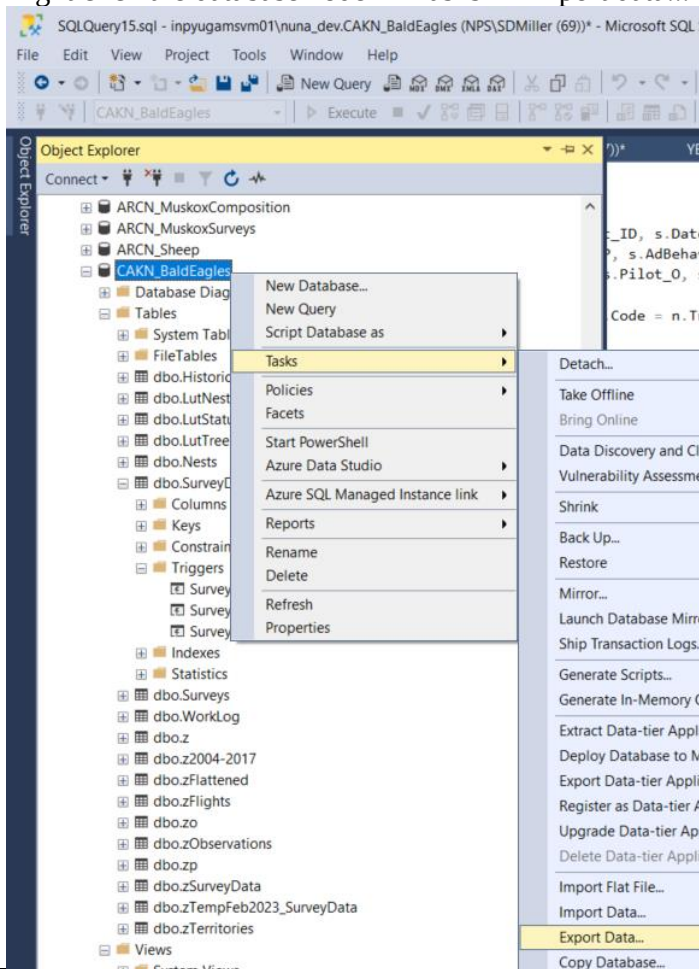
Method 2. SQL Server Management Studio Data Import and Export Wizard Procedure

- Create a new directory following the naming and versioning scheme of the existing directories. Example: 'J:\Monitoring\Bald_Eagles\Data\Certified Dataset\WRST BAEA Certified Dataset Version 1.0 2023-02-24'

Procedure to export a certified dataset file from the database using SQL Server Management Studio Export Data Wizard

NOTE, 2024: This doesn't work very well – the wizard is buggy. Use the CSV method, below

1. ~~Open Sql Server Management Studio (SSMS)~~
2. ~~Connect to the CAKN_BaldEagles database~~
3. ~~Right click the database node -> Tasks -> Export data...~~



4.
5. ~~Step through the SQL Server Import and Export Wizard to export the Dataset_Productivity view to a comma-separated values text file in the new directory you created earlier.~~
6. ~~Name and version the file according to the scheme of existing versions. Example: 'WRST BAEA Certified Dataset Version 2023 02 24.csv'.~~
7. ~~NOTE: This process may omit the headers; you may have to add them in manually.~~

Procedure to export a certified dataset file from the database

The objective is to export a certified dataset into a format that can be pulled into GIS. This method exports the data from the *Dataset_Productivity* and *Dataset_Nests* views into spatial data files that can be pulled into GIS.

Procedure:

1. Start by creating a new directory to hold the certified dataset files.
 - a. Using Windows Explorer navigate to *J:\Monitoring\Bald_Eagles\Data\Certified Dataset for IRMA*
 - b. Create a new directory named with the current date in YYYY-MM-DD format.
Example: *J:\Monitoring\Bald_Eagles\Data\Certified Dataset for IRMA\2024-04-24.*
2. Open SQL Server Management Studio (SSMS)
3. Click the New Query button
4. Copy the following SQL into the query interface:

```
USE CAKN_BaldEagles
SELECT [Year]
,[RiverSegment]
,[Nest_ID]
,[Date_O]
,[Nest_O]
,[OccupancyStatus]
,[Date_P]
,[StatusCode_P]
,[ProductivityStatus]
,[NumYng]
,[NumAds_O]
,[AdBehav1_O]
,[AdBehav2_O]
,[NumEggs_O]
,[NumAds_P]
,[AdBehav1_P]
,[AdBehav2_P]
,[Chick_Age]
,[NestCondition_O]
,[TreeSpecies]
,[TreeIsDead]
,[NestSub]
,[TreeStat]
,[NestVis]
,[Lat-NAD83]
,[Lon-NAD83]
,[NestComments]
,[Park]
,[Pilot_O]
,[ReObserv_O]
,[Aircraft_O]
,[ReObserver_P]
,[Aircraft_P]
,[Pilot_P]
,[Comments_O]
,[Comments_P]
,[DataProcessingComment]
,[CertificationLevel]
,[WKT] FROM [CAKN_BaldEagles].[dbo].[Dataset_Productivity]
```

5. Execute the query.

6. Right click the upper-rightmost cell of the results grid to select all rows and columns. You should see a dialog with '*Copy with Headers*' as an option. Select it. This will copy the data to the clipboard.
7. Open Excel
8. Copy the data from the clipboard into Excel.
9. Now replace all the NULL values with blanks using Excel's Find/Replace functions.
10. Save the Excel file to the directory you created in step 1 and name it following the convention in the example: 'WRST BAEA Certified Productivity Dataset Version 2024-04-24.xlsx, replacing YYYY-MM-DD with today's date.
11. Export the data in the Excel sheet above to Comma Separated Values (CSV) format with the same name but .csv file extension.
12. Repeat the above procedure, but exporting the Dataset_Nests view. Save the exported CSV in the same directory as the productivity dataset above, and name it WRST BAEA Certified Productivity Dataset Version YYYY-MM-DD.csv

Procedure to write Ecological Metadata Language

At this point you should have a CSV file. Now you need to write a metadata file in Ecological Metadata Language.

Procedure 1: Write basic EML using ezeml

1. Open a browser and navigate to <https://ezeml.edirepository.org/eml/auth/login>.
2. Log in.
3. Create an EML file for the CSV data file you created above. Use the ezEML help.
4. Export the EML package to J:\Monitoring\Bald_Eagles\Data\Certified Dataset\WRST BAEA Certified Dataset Version 0.0 YYYY-MM-DD\Ecological Metadata Language replacing Version with your latest version number and YYYY-MM-DD with the version date.
5. NOTE if using Microsoft Edge: You have the option to download the eml (xml) file or the package. Edge will not download the xml file, but will download the package. Since the package contains the xml file you can download the package and decompress it to pull out the eml file.

Procedure 2: Add the NPS specific tags to the EML

See the instructions at <https://nationalparkservice.github.io/EMLEditor/articles/EMLEditor.html>

Procedure to write a Data Release Report

See the instructions at https://nationalparkservice.github.io/DRR_Template/.

Procedure to publish the data in Data Store

1. Navigate to <https://irma.nps.gov/DataStore/Reference/Profile/2297222>
2. Version the Reference

3. Upload the certified dataset in CSV format, the EML metadata file and the Data Release Report to the versioned Reference.
4. Activate the Reference.

Data access

This section covers how to access WRST BAEA monitoring data. Data may be accessed statically, through Data Store, or by connecting to the database dynamically.

Table 2. Static versus dynamic data access. Static datasets are snapshots in time of data in the CAKN bald eagles monitoring database that are stored in the IRMA Data Store. Dynamic data is accessed in real time, directly from the database. The table below discusses the benefits and drawbacks of both.

Mode	Description	Best for
Static	Static, 'snapshots in time' files of the bald eagles datasets accessed through the IRMA Data Store.	'Fast food' dataset for analysis. Only certified data is included.
Dynamic	Direct database access using the software of your choice	Using the full database its current state. Includes data in all stages of quality and certification.

Static datasets

Static datasets include files in the IRMA Data Store containing information about nests, productivity and historical survey results. These files are in machine and human readable file formats and include documentation and/or metadata. Static datasets will be versioned and updated annually in years when surveys are conducted.

Table 3. Bald eagle monitoring datasets in Data Store.

Dataset	
Nests	Information about nests https://irma.nps.gov/DataStore/Reference/Profile/2297222
Productivity	Productivity data https://irma.nps.gov/DataStore/Reference/Profile/2297222
Historical results	Results of surveys 1989-1996 https://irma.nps.gov/DataStore/Reference/Profile/2297286

Data files for the above datasets are in Comma Separated Values text files, a format that is easily imported into analytical software or may be accessed directly through the internet.

Dynamic database access

Dynamic database access means connecting with software to the bald eagles monitoring database directly, as opposed to accessing static snapshots of the data as described above.

Database connection parameters

Bald eagle monitoring data will reside in an authoritative client/server database (Microsoft SQL Server) housed at the Fairbanks Administrative Center, in Fairbanks, Alaska. Database connection information is described in Table 4, below.

Most data management, statistical and GIS software will consume data from an SQL Server database. Typically, the only information you need to supply is the server name and a database. You must be on the NPS network or Virtual Private Network. Additionally, you must have permission to access the database. No user account or password is required assuming the above prerequisites exist since your Windows authentication credentials are passed through to the database. Sometimes, if you are writing code rather than using software you may need to supply a [ConnectionString](#) which encapsulates the above information. A ConnectionString example is in Table 4..

Table 4. CAKN_BaldEagles database connection parameters.

Parameter	Attribute
SQL Server	inpyugamsvm01\nuna
Database	CAKN_BaldEagles
Authentication mode	Windows authentication (OS authentication)
Typical ConnectionString	Server=inpyugamsvm01\nuna;Database=CAKN_BaldEagles;Trusted_Connection=True;

Important views

There are three main database views (queries) that should be used for analysis and these are described in Table 5.

Table 5. Important database views (queries).

Database view	Description
Dataset_Nests	Information about the inventory of nests with basic summary statistics
Dataset_Productivity	The productivity dataset.
HistoricalResults	This table contains the productivity metrics from 1989-1996 taken from Kozie, 1996. These data are also available at https://irma.nps.gov/DataStore/Reference/Profile/2297286 .

Database access with SQL Server Management Studio

Below is the procedure for connecting to the bald eagles database using Microsoft SQL Server Management Studio.

Procedure

1. Ensure you are on the NPS network or VPN.
2. Ensure you have permission to access the CAKN_BaldEagles database.
3. Start SQL Server Management Studio (SSMS).
4. In the Object Browser click Connect.
5. Enter the database connection parameters (Table 4) and choose Windows Authentication
6. Click Connect.
7. If all goes well you should see a list of nodes.
8. Expand the Databases node
9. Expand the CAKN_BaldEagles node. You should see database objects including:
 1. Database diagrams - These show you the structure of the database and provide metadata

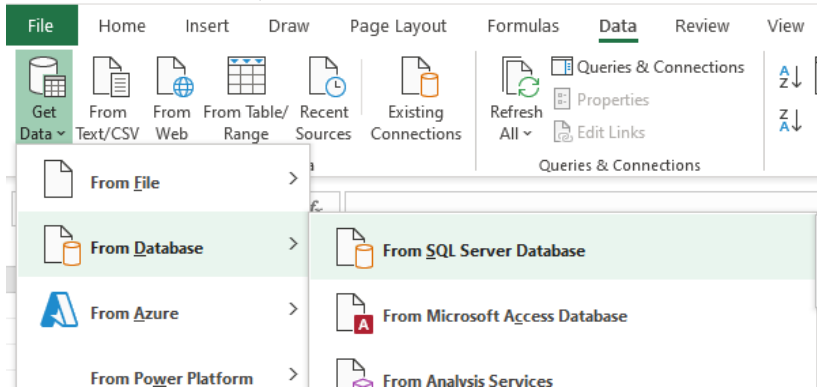
- about the tables, columns and relationships
2. Tables - Normalized database tables. While you can select and use data from tables, keep in mind that database tables are normalized which optimizes them for efficient data storage and quality, not necessarily for data analysis.
 3. Views - Also known as queries, views are virtual tables that are optimized to answer analytical questions. Most of the time you will want to access views to perform data summaries and analyses. See [Important views \(queries\)](#)

Database access with Microsoft Excel

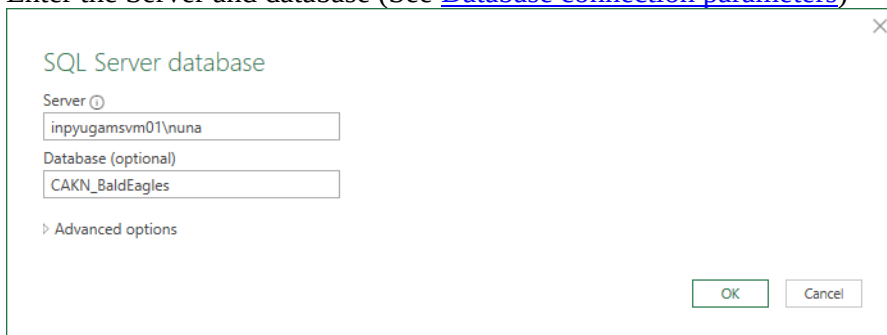
Excel is a common software used by scientists for generating summary tables, charts and other functions. It is easy to pull data from the SQL Server database into Excel. Keep in mind that the flow of data is one-way. Any edits you make in Excel stay in Excel - they do not cascade back to the database. The best way to edit the records in the database is through [Sql Server Management Studio](#).

Procedure

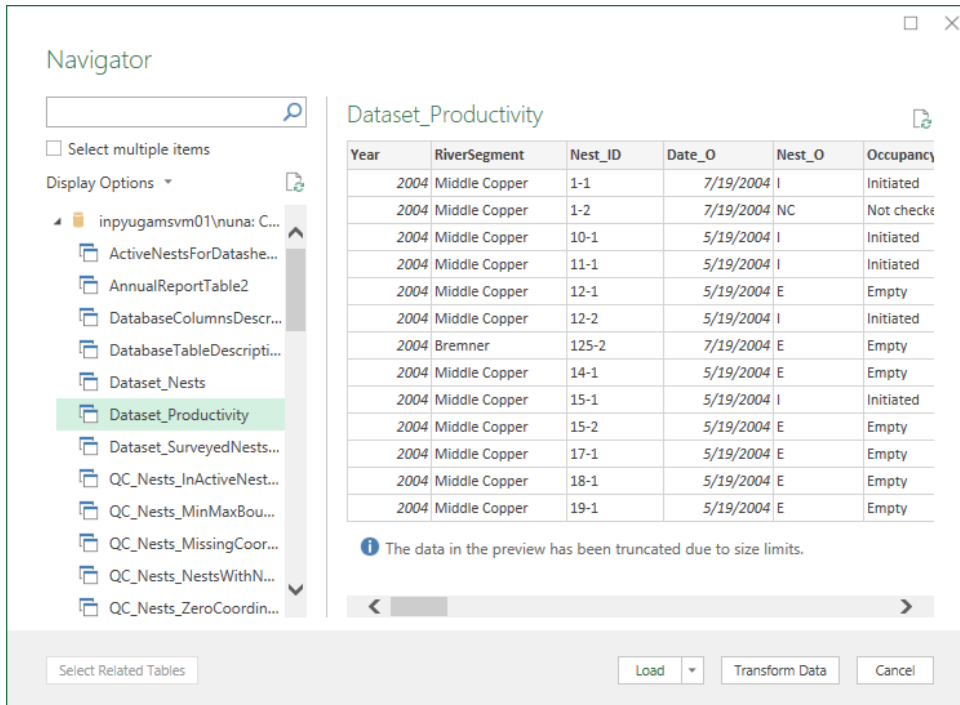
1. Ensure you are on the NPS network or VPN.
2. Ensure you have permission to access the CAKN_BaldEagles database.
3. Start Excel.
4. Open a new blank workbook
5. Click the Data menu, then Get Data -> From Database -> From SQL Server Database



6. Enter the Server and database (See [Database connection parameters](#))



8. Click OK
9. Click OK
10. The next screen gives you options on which database tables or views you would like to retrieve. Any database view prefixed with 'Dataset_' is optimized for analysis. Most likely you will want the productivity dataset (Dataset_Productivity) or the nests dataset (Dataset_Nests).



- 11.
12. The screenshot above shows the Dataset_Productivity view selected. Click Load
13. The database view is loaded into a new worksheet:

The screenshot shows an Excel worksheet titled 'Book2 - Excel'. The 'Table Name' is 'Dataset_Productivity'. The table is loaded into a new worksheet with the following data:

Year	RiverSegment	Nest_ID	Date_O	Nest_O	OccupancyStatus	Date_P	StatusCode_P
2006	Middle Copper	1-1	5/15/2006	E	Empty		E
2007	Middle Copper	1-1	5/7/2007	E	Empty		NC
2008	Middle Copper	1-1	5/21/2008	E	Empty		NC
2009	Middle Copper	1-1	5/13/2009	E	Empty		NC
2011	Middle Copper	1-1	5/19/2011	E	Empty		NC
2012	Middle Copper	1-1	5/15/2012	I	Initiated	7/24/2012	S
2013	Middle Copper	1-1	5/20/2013	I	Initiated	7/23/2013	IF
2005	Middle Copper	1-1	5/18/2005	I	Initiated	8/4/2005	NC

- 14.
15. From here you can perform any functions available in Excel.

Notes:

- The data is a snapshot - your edits do not cascade back to the database.
- To refresh the data click Data -> Refresh (any edits will be lost as the worksheet is refreshed from the database).

- I have no idea how to change the green color scheme.

Database access with Power BI

Power BI is a useful software for generating summary statistical tables, pivot tables, maps and analytical graphics.

Procedure

1. Open Power BI
2. From the Home menu select Get data -> SQL Server
3. Enter the database connection parameters (Table 4)
4. Choose Import or Direct Query. The former will pull a static data snapshot, the latter will allow you to refresh the dataset and graphics if you are making changes in the database.
5. Use the Power BI help files and tutorials to create data visualizations.

Database access with R

There are multiple ways to connect to an SQL Server database but a popular method is to use the RODBC package. It's far beyond the scope of this SOP to describe data analysis, but an example R snippet to select 10 records from the Dataset_Nests view into an R data frame appears below:

```
# Load the RODBC package
library(RODBC)

# Create a connection string to the CAKN_BaldEagles database
# Note: You will have the SQL Server Native Client 11.0 driver if you have installed
SQL Server Management Studio
BaldEaglesConnectionString = "Driver=SQL Server Native Client
11.0;Server=inpyugamsvm01\\nuna;Database=CAKN_BaldEagles;trusted_connection=YES"

# Create a database connection
BaldEaglesConnection = odbcDriverConnect(connection = BaldEaglesConnectionString)

# Pull a database view into a data frame
NestsDataFrame = sqlQuery(BaldEaglesConnection, "SELECT TOP 10 * FROM Dataset_Nests")

# Examine the data frame
head(NestsDataFrame)
```

Database access with GIS

There are two ways to pull the BAEA data into a GIS. You can pull the data directly through a database connection such as a Query Layer (ArcGIS), or a database connection (Quantum GIS), or you can export the data, including latitude/longitude pairs from the database to a comma separated values (CSV) file, and then import the data as an XYLayer. The former method has the benefit of always being connected to the database and having the latest data at all times, but in practice these sorts of connections rarely work as well as advertised and are often limited by poor internet bandwidth. The latter method is static, meaning you only have a snapshot of the dataset, but the data

is local on your computer and thus, very fast. Since database updates happen rarely, the latter method is probably best.

ArcGIS Pro

Method 1: XYLayer to shapefile or geodatabase

Objective: Export productivity or nest data from the BAEA database to a comma separated values text file and then import into a GIS.

Procedure

1. Extract the productivity or nests data from the bald eagles database to an Excel worksheet using the instructions at [Excel](#).
2. Save the worksheet from above as a comma separated values (CSV) text file.
3. Open ArcGIS Pro
4. Add a map
5. Click Map -> Add Data -> XYPoint Data
6. The XY Table to Point Geoprocessing tool opens. Select the CSV file from above as the Input Table. Give the Output Feature Class a name, validate the X and Y fields, and the coordinate system (GCS_WGS_1984) are correct.
7. Click Run
8. The dataset should appear in the map.
9. For more functionality and better performance export the XYTable layer to a shapefile or geodatabase.

Method 2: Query Layers

As of February, 2023 ESRI's SQL Server functionality through Query Layers, which was formerly good, has been crashy and buggy. If you want to try it see the ArcGIS Pro help on [Query Layers](#) and use the [Database connection parameters](#).

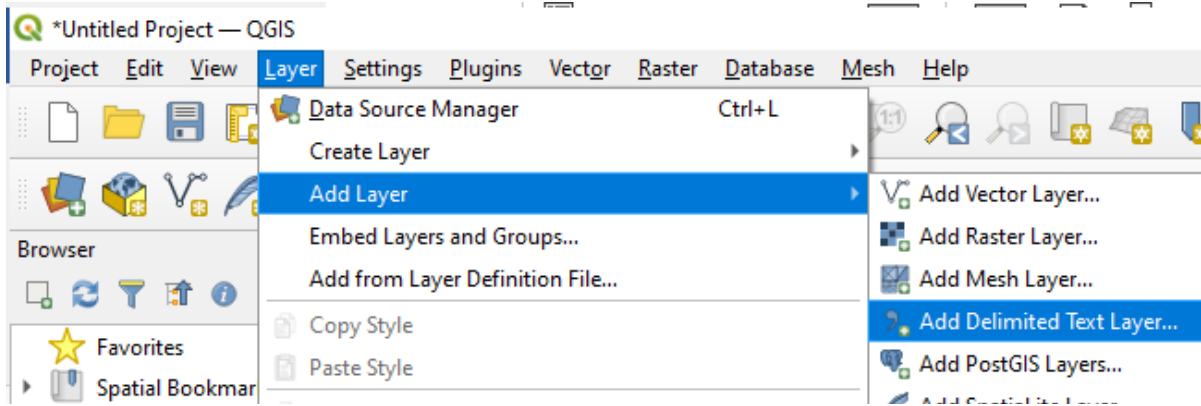
Quantum GIS

Method 1: Delimited Text Layer to shapefile

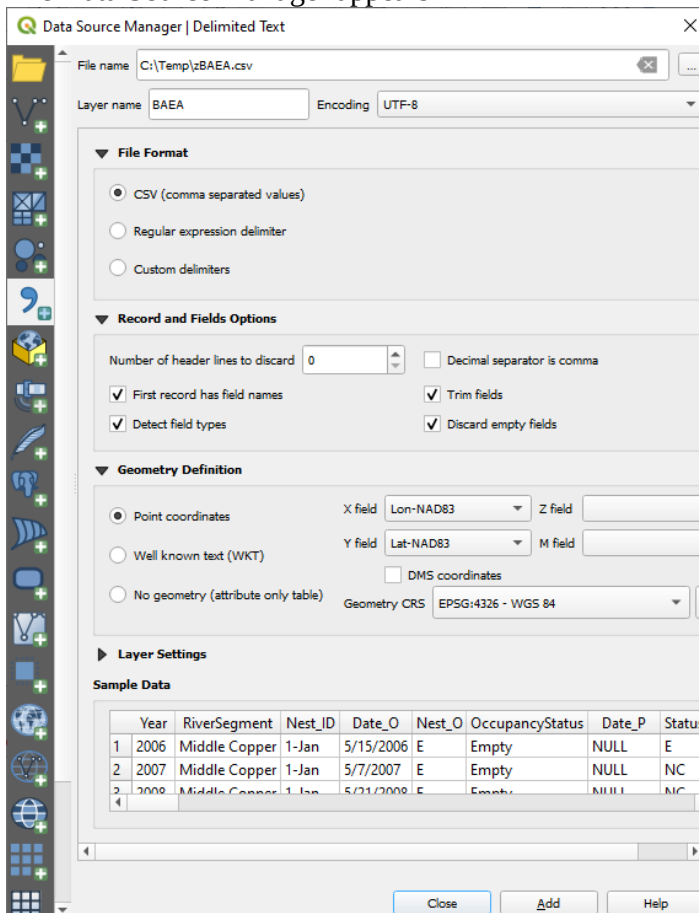
Objective: Export productivity or nest data from the BAEA database to a comma separated values text file and then import into QGIS.

Procedure

1. Extract the productivity or nests data from the bald eagles database to an Excel worksheet using the instructions at [Excel](#).
2. Save the worksheet from above as a comma separated values (CSV) text file.
3. Open QGIS
4. Click Layer -> Add layer -> Add Delimited Text Layer



- 5.
6. The Data Source Manager appears



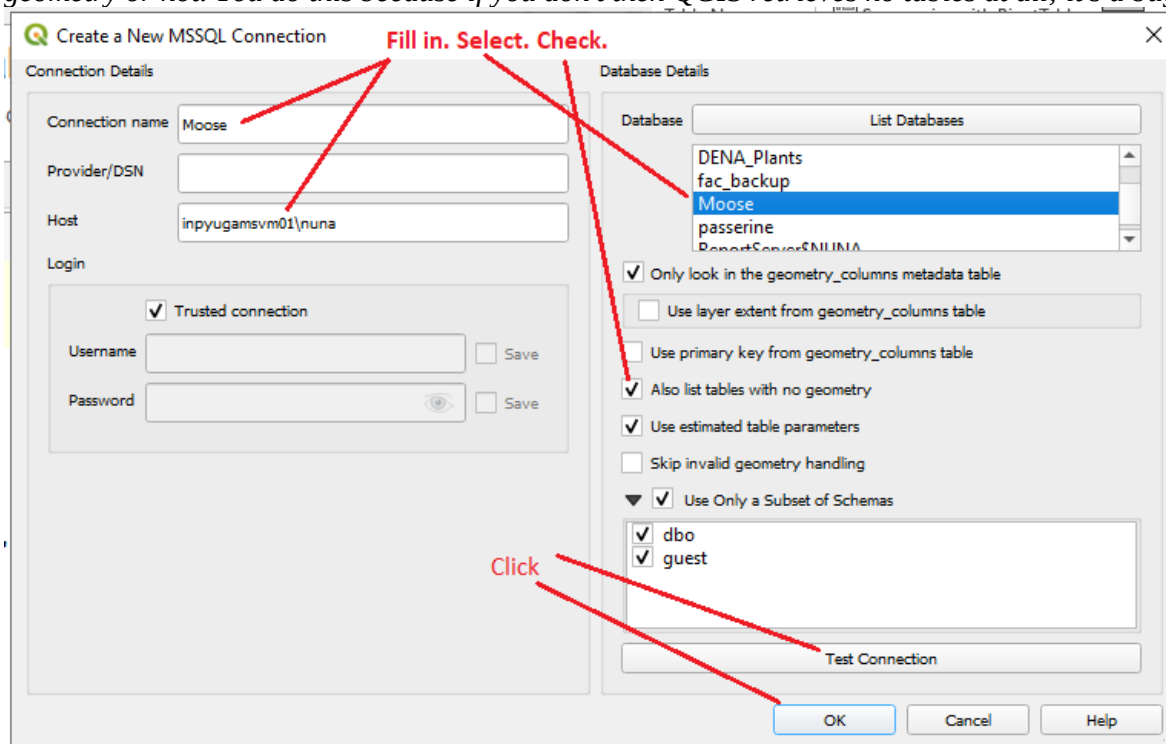
- 7.
8. Navigate to the CSV file you create earlier
9. Normally the default options are all good but ensure the options resemble the screenshot above. The Geometry Definition can be Point Coordinates with latitude/longitude columns selected, or Well Known Text, if your CSV has a WKT column. Either will work. Ensure the Geometry CRS is WGS1984.
10. Click Add
11. The data should appear in the map. Export to a shapefile, SQLite database or other format for enhanced performance and/or functionality.

Method 2: MSSQL Connection

Warning: this method is buggy and crashy and may not work at all

Procedure

1. Ensure you are on the NPS network or VPN.
2. Ensure you have permission to access the CAKN_BaldEagles database.
3. Start QGIS.
4. Create a new database connection using the bald eagles [database connection parameters](#). **BE SURE TO CHECK Also list tables with no geometry.** *Explanation: Tables with geometry are database tables that store geometry data types (i.e. spatial data - points, lines, polygons). By checking the field you are telling QGIS to retrieve all tables and views, whether they store geometry or not. You do this because if you don't then QGIS retrieves no tables at all; it's a bug.*



- 5.
6. Click OK
7. If all goes well your database connection appears in the Browser.

Data Analysis

Data Model

Annotated Winbugs code used to analyze bald eagle data is presented below. The model analyzes annual survey data to generate the proportion of nests initiated in a given year (formerly occupancy) and the mean number of chicks produced for each nest initiated (productivity).

```
#####  
#####  
#####  
#####  
#####
```

```
##### Note this code uses the term occupancy to refer both to the nest initiation
status and for the
##### modeling technique used. Users must please read this code carefully.
```

```
#### Hierarchical model using double occupancy data to determine true p, psi, and
productivity (lambda)
#### Model created by T.L. Wilson 9 December 2015
#### Data analyses based on this model were published in: Wilson et al. (in press)
```

```
### Bugs Model
sink("nest.occ.prod.RE.tx
t") cat("
  model {
    # Single season occupancy model for determining bald eagle occupancy and
productivity
    # This version of the model originally made for the KEFJ SOTP is a random
effects model
    # accounting for state heterogeneity in the transects (groups).

    # Priors
    ## loop over the number of transects (groups) to generate a priors for psi
(occupancy) and lambda (productivity)
    p~dunif(0,1)
    for (i in 1:n.groups) {
      alpha.psi[i]~dnorm(mu.psi,tau.psi
      )
      alpha.lam[i]~dnorm(mu.lam,tau.lam
      )

    }
    mu.psi~dnorm(0,0.01)                #hyperparameters for random
    psi tau.psi<-1/(sigma.psi*sigma.psi)
    sigma.psi~dunif(0,5)
    mu.lam~dnorm(0,0.01)                #hyperparameters for random
    slopes tau.lam<-1/(sigma.lam*sigma.lam)
    sigma.lam~dunif(0,5)

    # Likelihood

    # Model for partially observed true nest Occupancy and nest productivity that
uses a 2-visit occupancy design
    # to obtain: probability of occupancy for observed nests (psi) and the latent
true occupancy state of all nests (z)
    # Treat the true occupancy state as a filter for obtaining lambda from the data,
generating counts for occupied nests
    # and using the latent counts to estimate productivity for all occupied nests

    for (i in 1:R){                      # Start initial loop over
R sites
      prod[i]~dpois(lambda[i])            # getting lambda from
      data log(lambda[i])<-alpha.lam[tx[i]]
      z[i]~dbern(psi[i])                 # latent state true
      occupancy logit(psi[i])<-alpha.psi[tx[i]]
      prod.eff[i]~dpois(lambda.eff[i])    #latent count, true productivity
      lambda.eff[i]<-z[i]*lambda[i]      #applies lambda to true
      occupancy

      # Observation model
      for(j in 1:t){                      # Start of second loop over t replicates
        # Observation model for the actual
```

```

        observations y[i,j]~dbin(p,z[i])

    }

}

# Derived Quantities
lambda.bt<-exp(mu.lam) #
Backtransformed lambda
occupancy.bt<-exp(mu.psi)/(1+exp(mu.psi)) # Backtransformed occupancy
chicks<-sum(prod.eff[]) # Expected number
of chicks produced
occ.nest<-(occupancy.bt)*R # Expected number
of occupied nests
productivity<-chicks/occ.nest # Chicks per occupied
nest

}
",fill=TRUE
) sink ()

```

Calculate Bald Eagle Nest Parameters

The following parameters should be generated on an annual basis.

- **Number surveyed nesting territories.** The number of nesting territories surveyed during the current year ENIS.
- **Total number of surveyed nest sites.** The number of individual nest sites surveyed during the current year ENIS.
- **Number of initiated nesting territories.** The number of nest territories determined to be initiated by a territorial pair during the current year.
- **Occupancy rate.** The proportion of surveyed nesting territories that are initiated by territorial pairs during the current year. The initiation rate is calculated by dividing the number of initiated nesting territories by the total number of territories surveyed during the ENIS.
- **Number of successful nesting territories.** The number of initiated nests (territories) that successfully produced at least one chick.
- **Nesting territory success rate.** The proportion of initiated territories that successfully produced at least one chick. The success rate is calculated by dividing the number of successful initiated nesting territories by the total number of initiated nesting territories.
- **Mean brood size.** The number of chicks produced per successful nesting territory.
- **Total number of chicks produced.**
- **Productivity.** The number of chicks produced per initiated nest. Productivity is calculated by dividing the total number of chicks produced by the number of initiated nesting territories.

Monitoring Trends in Occupancy and Productivity

Trends analysis of the three key parameters (occupancy rate, success rate, productivity) will be conducted by the Principal Investigator with guidance from the CAKN Biometrician. Trends analysis should be conducted after 5 years of monitoring. Linear regression methods are recommended for evaluating trends. The annual parameter values should be plotted over time (year) to aid in determining whether a data transformation is required and to graphically display the results of the statistical tests to detect a trend. If the plotted values are curvilinear over time, a data transformation is required. The ANOVA table of the regression will indicate the significance of model fit and the slope parameter. A significant model fit and slope parameter indicate a trend different from zero, where the sign of the slope parameter indicates the direction of change (increasing or decreasing), and the magnitude of the slope parameter equates to the rate of change.

One of the strengths of this project is the long-term data on occupancy and reproductive success of individual nesting territories. Identifying and understanding variation of occupancy and reproductive success within individual nesting territories provides insights into variation at the population level and perhaps spatial variation across the study area. All of the statistical procedures presented for analysis of the long-term trends in the population can be used to examine the long-term trends within individual nesting territories.

SOP 5: Reporting Bald Eagle Monitoring Data

Version 1.1 (March, 20223)

Revision History Log:

Version #	Date of Revision	Revised By	Changes	Justification

Introduction

This SOP describes the steps necessary for handling the field data, completing quality assurance/quality control, data certification, and uploading the data into the bald eagle nest database. These procedures have been slightly modified from Wilson et.al. 2017 (SOP 4: Reporting Bald Eagle Monitoring Data). The primary difference between this SOP and SWAN methods is that an annual report will be produced summarizing data for the current year instead of a biennial resource brief. Otherwise, this SOP is a streamlined version of the SWAN approach

Annual Reports

An annual report will be written following each season of bald eagle monitoring. The purpose of the report is to summarize the data for the current year, describe the current condition of the population in the region of interest, highlight significant findings, and provide a limited comparison with data from previous years. The report will be developed by the Principal Investigator. The report will be written by the PI implementing the bald eagle monitoring protocol, and peer-reviewed within the CAKN.

Procedure:

1. Download R Markdown template: <https://github.com/NPS-ARCN-CAKN/WRST-BAEA-Annual-Report-R-Markdown>
2. Run in R Studio
3. The markdown template will produce an html document in the same directory as the script. Re-name the html file with the year and then open it in Word
4. Apply the NRDS template to the Word document (see <https://www.extendoffice.com/documents/word/4524-word-apply-template-to-existing-document.html>)

Multi-year Reports

Every 3-5 years a report summarizing multiple years of data collection will be produced. The report can include: methodological or analytical advancements, trend (time series analysis), or eagle nesting

ecology (e.g. nest site selection, fecundity, or survival). This document will be of the quality and caliber to be published in a professionally respected peer-reviewed journal.

SOP 6: Revising the Bald Eagle Monitoring Protocol or SOP

Version 1.1 (March, 20223)

Revision History Log:

Version #	Date of Revision	Revised By	Changes	Justification

All edits and amendments made to the SOPs should be recorded in the revision history log table at the beginning of this document. Users of this protocol should promptly notify the project leader of the monitoring program of recommended edits or changes. The project leader will review and incorporate suggested changes as necessary, record these changes in the revision history log, and modify the date and version number on the title page of this document to reflect these changes. It is anticipated that following at least five years of annual data collection it will be important to evaluate, in terms of power and sensitivity, the ability of the sampling design to detect change in the data derived from bald eagle data collection protocols. Following such analyses it may be appropriate to consider revising sampling design or data collection protocols.

SOP 7: Safety Considerations for Bald Eagle Monitoring

Version 1.1 (March, 20223)

Revision History Log:

Version #	Date of Revision	Revised By	Changes	Justification

Introduction

This SOP describes the safety paperwork, training and communication protocol necessary for conducting fieldwork. These procedures have been slightly modified from Wilson et.al. 2017 (SOP 6: Safety Considerations for Bald Eagle Monitoring). The primary difference between this SOP and SWAN methods is to incorporate WRST specific safety policies. Otherwise, this SOP is a streamlined version of the SWAN approach

Use of Aircraft

From a risk assessment perspective, wildlife aerial surveys have a high level of risk. With this in mind, survey operations will be conducted with safety as the priority in personnel decision making processes. The use of aircraft within the NPS is managed by the Department of Interior, National Business Center (NBC), Aviation Management Directorate (AMD). See the DOI Office of Aviation Services (OAS) website: <http://www.doi.gov/aviation>.

The bald eagle survey is considered to be a low level resource reconnaissance flight, and is classified as a special use activity. Flights must be conducted under visual flight rules (VFR), with the following minimum ceiling and wind restrictions: The minimum conditions necessary for the flight are regulated by Federal Aviation Administration. Flights will be conducted in weather conditions with a cloud ceiling above ground level (AGL) of no less than 370 m (fixed-wing) or 152 m (helicopter) and wind speeds no greater than 25 km/hr. These minimum standards are more restrictive than FAA guidelines. All persons who fly in aircraft are required to wear PPE, consisting of a nomex flight suit, aviation helmet with integrated communication hardware, nomex gloves, high-top leather boots, and an inflatable floatation aid containing survival gear in the pockets.

Aviation Safety Training

Required Safety Training for Observers as outlined by AMD/IAT (2016)

Training requirements change frequently. Project leaders, helicopter managers, and fixed-wing special use flight managers should stay abreast of training required to maintain current certification by consulting the Interagency Aviation Training Center (IAT) website, <https://www.iat.gov>. Many aviation courses may be completed online at <http://www.iat.gov>.

- Aviation 100 Basic Airplane and Helicopter Safety (A-100: 8 hours, formerly B-3)
- The initial course is required to be taken in person and an A-100 Refresher is required every 3 years.
- 5 modules are required for the A-100 online refresher course:
 - A101 Aviation Safety
 - A105 Aviation Life Support Equipment
 - A106 Aviation Mishap Reporting
 - A108 Preflight Checklist & Briefing/Debriefing
 - A113 Crash Survival

Additional Recommended Safety Training for Observers

- Operational Leadership
- CPR/1st Aid/Wilderness Safety

Safety Training Requirements for Other Project Participants

- M3 DOI Aviation Management Training for Supervisors (for project lead or supervisors of field staff)

Pre-flight safety briefing

The team will complete a go-no go checklist (Aviation handbook pp. 47; Appendix C). Pilots will be required to possess a current AMD certification for low level surveys. If contract aircraft are used, the fixed-wing flight manager will check the pilot and aircraft cards to ensure that the pilot and aircraft are currently certified to fly low level surveys, inspect the condition of the aircraft, and review pilot flight time and duty days. If helicopters are used, the helicopter manager will complete a load calculation. The pre-survey safety briefings should include a review of the field plan and local hazards so the pilot has a firm understanding of the mission and potential hazards (seabird colonies, glaciers, etc.). The pilot will conduct a briefing describing the safety features and protocols of the aircraft. The flight manager (helicopter) or pilot (fixed-wing) will then check in with ARCC or GOC to ensure the AFF is working, and open the flight plan. Once these safety items are completed the survey crew will brief the pilot on observation and survey protocols (see SOP 2 and SOP 3).

Project Aviation Safety Plan

Each survey requires a project aviation safety plan (PASP) that details all important information about the flight. This document should be available to all participants and supervisors involved in the project. Include critical elements such as:

- Project description, objective, justification and dates.
- Base of operation.
- Description of aircraft, fuel, and communication equipment.
- Detailed communication plan: Emergency Locator Transmitter and Automated Flight Following and schedule of these safety precautions detailing check-ins with ARCC.

- Aerial Hazard Analysis: should detail the physical hazards near base operations and survey sites (e.g. powerlines, towers, large seabird colonies).
- Pre-Accident Plan: a Missing/Overdue Aircraft procedure that is initiated in case of failure to meet a scheduled check-in requirement. The aircraft is considered “overdue” one-half hour after missing a check-in and Aviation Mishap Response Plan will be initiated. Notify necessary personnel via phone (e.g. Chief Ranger, any Park Ranger or Park Superintendent and then the Regional Aviation Manager).
- Risk assessment: Aviation Risk Assessment /Aerial Hazard Analysis and or GAR model to identify risk and present mitigation recommendations to the park aviation manager (see Risk Management Worksheet in Appendix B and GAR model in Appendix C).
- Mission briefing, orientation, pre-flight safety briefing, necessary PPE, personal duties and responsibility.
- Air space coordination (potential complications), unimproved landing sites description and necessity.
- Reference to this SOP and the Interagency Helicopter Operations Guide (IHOG) (<http://gacc.nifc.gov/sacc/logistics/aircraft/IHOG.pdf>).
- Signature approval of project leader, supervisors, and park superintendent.

Literature Cited

Wilson, T.L., E.A. Weiss, T. Shepherd, L.M. Phillips, and B. Mangipane. 2017. Monitoring bald eagles in Southwest Alaska Network parks: Standard operating procedures version 1.0. Natural Resource Report NPS/SWAN/NRR—2017/1384. National Park Service, Ft. Collins, Colorado.

Appendix A: ARCC Flight Plan Form

NPS ARCC FLIGHT FORM V 3.3 4/4/2013

ARCC		Dates of Mission: _____ to _____		DOI Flight Manager: _____		☐ Fleet ☐ Vendor	
AK Region Flight Plan							
1. TYPE	2. AIRCRAFT IDENTIFICATION	3. AIRCRAFT TYPE	4. TRUE AIRSPEED	5. DEPARTURE POINT	6. DEPARTURE TIME	7. CROSSED ALTITUDE	
☐ VFR ☐ IFR ☐ OVER	N-	SPECIAL EQUIPMENT	KTS		☐ (A) ☐ (D) PROPOSED ACTUAL*		
8. ROUTE OF FLIGHT (USE BOX 26 FOR FLIGHT LEGS)							
3. DESTINATION Airport City		10. EST. TIME ENROUTE HOURS MINUTES		11. PILOT NAME PILOT PHONE		14. NUMBER ABOARD	
				12. PROJECT MANAGER 13. PARK AVIATION MANAGER			
15. FUEL ON BOARD HOURS MINUTES		16. ALTERNATE AIRPORT(S)		17. REMARKS (INCLUDE PROJECT AND AVIATION MANAGER PHONE NUMBERS IF NOT ON FILE)			
18. AIRCRAFT COLOR		19. GEAR CONFIGURATION		20. MISSION PURPOSE ☐ IT TO FT ☐ SPECIAL USE ☐ IRON BECOM ☐ OTHER		21. ORN DOOR (OPTIONAL)	

*FOR ARCC OFFICE USE ONLY

Additional Information	22. AIRCRAFT HOME BASE (LOCATION, COMPANY AND PHONE)	24. TYPE OF TRACKING (ARCC MUST HAVE ACCESS PRIOR TO FLIGHT) ☐ AFF ☐ Spidertracks ☐ Other:
	23. AIRCRAFT SAT PHONE ☐ Panel Mount ☐ Handheld	25. ADDITIONAL INFORMATION

Flight Segments	26. FLIGHT SEGMENTS		
	Leg - Start	Leg - End	Pass Information:
	1)		
	2)		
	3)		
	4)		
	5)		
	6)		
	7)		
	8)		
9)			

EMAIL: DENA_CommCenter@nps.gov

PHONE: (907) 683-9555

FAX: (907) 683-9640

Sat Phone: 8816-3145-8390

Mobile Phone: (907) 378-5751

Appendix B: Example Risk Analysis Chart

RISK ANALYSIS CHART		
METHOD		
1. Is there an alternative method which would accomplish the mission more safely and/or efficiently (including accomplishment by ground methods)?		No
2. Is the method selected approved and do detailed instructions for safe accomplishment exist?	Yes	
3. Have adequate flight following and communications methods been established?	Yes	
MEDIUM		
1. Can factors of terrain, altitude, temperature, or weather, which could adversely affect the mission's success, be mitigated?	Yes	
2. Will the mission be conducted at low (below 500' AGL) or high altitudes -- can the same objective be achieved by flying at a higher altitude AGL?	Yes	No
3. If low-level flight, have all known aerial hazards been identified during the planning process and are they known to all participants?	Yes	
4. If there is a potential for an airspace conflict (military, media, or sightseeing aircraft), have mitigating measures been taken?	Yes	
5. Have adequate landing areas been identified and/or improved to minimum requirements?	Yes	
MAN (GENERIC)		
1. Is the Pilot properly carded for the mission to be conducted?	Yes	
2. Will the flight be conducted within the Pilot flight time/duty day requirements and limitations?	Yes	
3. Have the minimum number of personnel necessary to accomplish the mission safely been assigned, and do they meet personnel qualifications and experience requirements?	Yes	
4. Will adequate personnel (flight and ground crew) and Pilot briefings be conducted prior to the flight?	Yes	
5. Are users aware that the Pilot-in-command has final authority over any operations conducted involving the aircraft or its occupants?	Yes	
MACHINE		
1. Is the aircraft capable of performing the mission in the environment (altitude, temperature, terrain, and weather) where the operation will be conducted?	Yes	
2. Is the aircraft properly carded for the intended mission?	Yes	

Hazard Analysis
With
Risk Mitigation Measures

Flight Operation	HAZARD/RISK ID	Risk	Risk Mitigation/Control Measures	Residual Risk
Low Level Reconnaissance	Flight operations below 500 feet AGL.	High	Pilot and aircraft carded and approved for mountain and low-level reconnaissance. Perform high-level recon and/or a map recon and/or get local knowledge of area planned for low-level flight ops to identify potential hazards. Maintain safe speed during low-level flight operations. Pilot and passengers wearing appropriate PPE.	Low – pilot's decision
Overwater	Ditching	Medium	Aircraft equipped with fixed utility floats Passengers wearing inflatable PFDs.	Low
Low Level Reconnaissance	Aggressive behavior from Bald Eagles directed at helicopter.	Medium	Pilot and passengers will maintain situational awareness. Maintain safe distance from Bald Eagle nests. Pilot and aircraft prepared for evasive maneuver.	Low

Appendix C: Example of a GAR model

Category	Description	Risk 1-10	Mitigation(s)
Supervision	Presence, accessibility and effectiveness of leadership for all teams and personnel. Clear chain of command.	2	Various levels of training are in place. Basic aviation safety, operational leadership, etc..
Planning	Current SOP/Operational Guidelines, team trained in accordance with same. Adequate mission planning time. Required equipment and associated training is provided. Briefs/debriefs planned, team input solicited.	2	Eagle nests are loaded into aircraft GPS. Route is pre-planned. Previous experience with this type of survey. PASP in place.
Contingency Resources	MOUs in place with participating cooperators. Planning accomplished with cooperators. Shared communications plan and frequencies.	1	There are no cooperators associated with this project
Communication	Infrastructure: radio communications possible throughout area of operations (presence of portable repeaters). Communication plan established/rehearsed.	2	NPS radio systems are present and functional in most survey areas. Aircraft satellite phone will be used in areas without radio coverage. Established communication protocols will be followed.
Team Selection	Level of individual training and experience. Cohesiveness and atmosphere that values input/self critique.	2	Pilot is highly experienced. Crew member training up to date with 15 years experience with eagle surveys. Pilot and crew member have conducted this survey together 4 times.
Team Fitness	Level of overall physical fitness of team. Level of crew rest/fatigue and overall morale. Team members with major life events/distractions.	2	Breaks will be taken to relieve fatigue during the survey. Crew knows what to expect due to previously conducting this survey.

Environment	Extreme temperatures, elevation, difficulty of terrain (aspect, foliage, slope, etc.), long approach, remoteness.	7	Low level flight with circling is greatest risk factor. Pilot is familiar with local conditions, including off-airport airstrips. Project will be delayed if turbulence or visibility is a factor.
Incident Complexity	Severity and probability of mishap. Potential for incident that would tax the current staffing levels.	7	Mitigated by mishap response protocols, mission planning, aircraft AFF and flight following, verbal communication with dispatch, aircraft operating within capabilities.
TOTAL		25	

Mitigations should be considered for any category rated higher than 5.

Overall Mission risk:

Green (1-35)	Amber (36-60)	Red (61-80)
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CHARACTERISTICS OF A SAFE OPERATION

- ✓ Well briefed
- ✓ Clear desired results
- ✓ Clear team expectations
- ✓ Clear responsibilities
- ✓ Identification of available resources
- ✓ Established climate for learning
- ✓ Climate that values input
- ✓ Positive attitude/High morale
- ✓ High degree of accountability at all levels
- ✓ Atmosphere of self-critique

BRIEFING FORMAT FOR EMERGENCIES:

- ✓ Here's what I think we face;
- ✓ Here's what I think we should do;
- ✓ Here's why;
- ✓ Here's what we should keep an eye on
- ✓ Now, talk to me.

AFTER ACTION REVIEW

- ✓ What was planned?

- Incident objectives and expected actions
- ✓ What actually happened?
 - Identify effective and non-effective performance
 - Review any non SOP actions or safety concerns
- ✓ Why did it happen?
 - Discuss reasons for ineffective or unsafe performance
 - Concentrate on WHAT, not WHO, is right
- ✓ What can we do next time?
 - Determine how to apply lessons learned next time

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS XXXXXX, Month Year (The Fort Collins Support Office will fill out this line for you)

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