

**Appendix C  
Inventory and Monitoring Plan**

**Executive Summary**

**Wildlife Inventory Plan  
Koyukuk/Nowitna National Wildlife Refuge Complex**

**Koyukuk National Wildlife Refuge  
Nowitna National Wildlife Refuge  
Northern Unit Innoko National Wildlife Refuge**

**Galena, Alaska  
July 2008**



**The role of wildlife inventory on the Refuge:** The aim of wildlife and fishery inventory is to provide baseline data on status, distribution, population trends, and habitat use of the most important resource species on the refuge Complex. This information is crucial to making scientifically supportable land and resource management decisions. Such inventories were mandated in ANILCA. Purposes of refuges include the following species: Peregrine Falcon, waterfowl (especially Canvasback Ducks, White-fronted Geese and Trumpeter Swans), moose, caribou, black bear, furbearers (especially marten), salmon, sheefish, and northern pike. Because these species were specifically mentioned in ANILCA, the Comprehensive Conservation Plans and the Refuge Operational Plan also indicate the importance of their monitoring. It was within this framework that the objective of the inventory plan was set: “to provide a management tool for monitoring trends in distribution and abundance of wildlife on the refuges.” The Wildlife Inventory Plan (WIP) defines the means by which refuge staff will obtain consistent and reliable baseline data for species of local, regional, national, and international significance. The choice of species to address was based largely on mandates and anticipated resource conflicts or threats to the species.

Once the species of interest were identified based on ANILCA, the Comprehensive Conservation Plan, and other legal mandates, refuge staff reviewed published literature, refuge progress reports, and files, plus they consulted with active researchers and other refuge and Alaska Department of Fish and Game (ADF&G) biologists to formulate each procedure. The procedures were then peer reviewed in Alaska and other states by experienced field personnel. Finally, each procedure was field tested and necessary changes made to the procedure or cost estimate. In cases where criteria were available, such as for moose and caribou, the levels of population density, or age/sex ratios that would trigger concern or management recommendation are given in the specific procedure.

Once procedures were developed, priorities for the individual procedures were set, again based on mandates, anticipated issues, significant conflicts, and existing information needs. The staff was unanimous in the philosophy that each inventory procedure should be implemented fully and thoroughly, so the indicated sample sizes would provide quality data with reliability to adequately support management decisions. If budget cuts need to be made, the plan dictates that full procedures are to be dropped from the bottom of the list. For the expensive procedures, a three-tiered approach was used consisting of “primary” procedures/species (designated as mandatory inventories), “secondary” procedures/species (designated as optional), and finally, the third tier, which includes periodically scheduled, cyclic population estimates and censuses of species such as moose and swans. In this manner, least important would be cut first. Refuge staff rely on the Service’s Fairbanks Fisheries Resource Office for all fisheries management and inventories. The biological staff at the Refuge recommends that fishery projects become fully integrated into the station inventory procedures in the future.

**Budgeting for wildlife inventories:** In fiscal year 2007–2008, the primary wildlife procedures budget was \$75,000, with an additional estimated \$300,000 of permanent salaries and \$50,000 for fuel that were in the base budget. The total costs of primary wildlife inventory work represented approximately 25 percent of the total refuge budget in FY 2007. It is the collective opinion of all of the professional staff on the Refuge that we are currently understaffed and require additional positions to adequately fulfill wildlife inventory needs.

For baseline resource data to be reliable and defensible, it must be collected consistently over a period of years. The great degree of annual variation we observe in wildlife statistics allows very limited utility from a single year of data. We look at consistent, standardized wildlife inventory work over a period of many years as an investment in the future ability of the Service to make

sound resource decisions that have strong scientific reliability. We cannot wait for the need for data to arise before deciding to gather it, because in most instances, it will be too late to gather reliable data applicable to the decision at hand. Finally, the combination of an investment in wildlife and fisheries inventories, combined with carefully directed scientific research projects to answer specific management questions, provide two sides to an integrated “resource management triangle” that, if followed, will best protect the refuge ecosystems. If a refuge unit cannot provide defensible data concerning the health of its ecosystems, the basic ANILCA mandate has been compromised.

**Moose - Information needs:** Because moose are the most important subsistence and sport hunting species, we have to answer questions on the status and health of populations on the Refuge. Annual information on bull/cow ratios, calf/cow ratios, recruitment, harvest patterns, and predation are collected and provided to the Subsistence Division, ADF&G advisory committees, Native groups, the Regional Office, and the public.

**Refuge response:** Aerial surveys of standardized trend areas are flown every year during November (post-hunt/rut). Areas of lesser importance are designated as secondary trend areas and are surveyed when funding permits. Large scale population estimates are obtained for significant portions of the Complex every 5–10 years. The plan includes specific criteria on age and sex ratios obtained from trend counts that trigger concern for a population, and at which point more data and possible regulatory proposals are warranted. Hunter check stations are operated on both the Nowitna and Koyukuk rivers to obtain accurate and immediate harvest totals in the most intensely hunted areas.

**Caribou - Information needs:** The Galena Mountain caribou herd has fluctuated from 100 to 300 animals and is currently estimated at 150–200 animals. The fall hunting season has been closed for this herd. In some years, portions of the Western Arctic caribou herd (WAH) winter north of Galena on the Koyukuk National Wildlife Refuge, where these large numbers of caribou overlap on the winter range of a much smaller Galena Mountain herd (GMH). When dilution rates are adequate, hunting is opened by special action.

**Refuge response:** The wildlife inventory plan calls for simple distribution and abundance surveys in the overlap area once per winter, and twice per winter for the larger WAH area. Specific guidelines are given as to the acceptable level of dilution of GMH caribou among WAH caribou (in percent) at which hunting opportunity will be provided. In conjunction with a cooperative ADF&G and Bureau of Land Management (BLM) caribou study, radio telemetry and the secondary procedures described in the plan attempt to address productivity, genetic identity, and seasonal range use.

**Wolves - Information needs:** Wolf density and predation rate information, in combination with moose density data, are required to estimate sustainable harvests of ungulates. The Service must be able to make supportable comments to sport and subsistence hunting regulation proposals.

**Refuge response:** Standardized aerial surveys using the ADF&G sample unit probability estimator (SUPE) method have been implemented on the Nowitna, Northern Innoko (Kaiyuh), and Koyukuk refuges. Surveys will be repeated every 5–10 years and perhaps more often if dictated by resource problems or controversies, such as upcoming wolf management on or near all three refuge units. The SUPE method relies on aerial snow track surveys and the probability of track encounter and will be supplemented with an annual incidental wolf pack observation record.

**Furbearers - Information needs:** Trapping has traditionally been one of the more important subsistence activities on the Complex. Past furbearer trend information utilized index information available from track counts and harvest surveys.

**Refuge response:** In the mid 1990s, a combination of low fur prices and a more steady year-round income in the villages led to a decrease in trapper activity on the Complex. Currently, the furbearer inventory plan is suspended indefinitely due to a lack of trapper activity.

**Duck production - Information needs:** Despite 10 years of statistically accurate baseline production and summering adult population studies on the Complex, the annual Migratory Bird Management (MBM) breeding pair indices are more cost effective and adequate enough to make population management decisions on a refuge and flyway basis. We know that the Koyukuk basin is the second most valuable production area in the Interior (just behind Yukon Flats).

**Refuge response:** The duck production inventory plan has been suspended indefinitely due to high variability and high cost.

**Goose production - Information needs:** We are unable at this time to estimate the total number of nesting and summering white-fronted and Canada Geese on the Refuge, although good production and molting trend information is in place. The White-fronted Goose population appears to be recovering gradually from the marked decline observed in the early 1990s.

**Refuge response:** The WIP provides for continued production trend surveys along three rivers that are known production areas. With the addition of the aerial molting survey, we can also index total adults; breeding pairs; and young, molting non-breeding adults; and estimate minimum total numbers present.

**Swan production - Information needs:** On the Koyukuk Refuge, the non-hunted population of Trumpeter Swans and the hunted population of Tundra Swans overlap. A study conducted from 2004–2006 showed an even distribution of 50 percent for both species nesting on the Koyukuk Refuge, an 80 percent Trumpeter and 20 percent Tundra Swan overlap on the Northern Unit Innoko, and 100 percent Trumpeters on the Nowitna Refuge. Previously, population counts were presented as simply “swans” without knowing the proportion of each species. Continued annual trend surveys and follow-up distribution studies should be conducted at or near the five-year MBM statewide Trumpeter Swan censuses to better enumerate population changes for each species on the Refuge.

**Refuge response:** Due to their high sightability in aerial surveys, and past statewide censuses, we are perhaps in the position of having in place the best quality baseline resource information than for any other species. The WIP identifies a minimal number of trend maps to be surveyed aerially every year. A refuge-wide survey that is part of the statewide cooperative survey is planned for every fifth year.

**Passerine birds - Information needs:** The recent emphasis on neotropical migrants highlights the importance of Alaska's contribution to larger nationwide and continent-wide databases. This station has been a contributor to the Breeding Bird Survey (BBS) since 1985 and the Christmas Bird Count (CBC) since 1982.

**Refuge response:** Continued contribution to the BBS and CBC using at minimal cost are planned. Recommended passerine bird census techniques are contained in the WIP to assist in planning future studies such as off-road point counts and bird use on post-fire seres.

**Raptors - Information needs:** Raptors are very sensitive to disturbance and hence serve as “indicator” species. Peregrine falcons and Harlan's and Rough-legged hawks nest on cliff habitats

along the Koyukuk and Yukon rivers. Ready access in these areas provides for ease of inventory but also allows for possible frequent disturbance by anyone interested in taking raptor chicks; therefore, continued minimal monitoring is warranted.

Refuge response: A standardized survey route along the Yukon River has been surveyed since 1979 by the Service Endangered Species office in Fairbanks and in cooperation with refuge staff since 1991, with an abbreviated version in place since 1995. When the Peregrine falcon was delisted from endangered status, the survey became the sole responsibility of the Complex. Continued monitoring of the route would be at minimal expense because experienced volunteers are frequently used.

**Beavers - Information needs:** Beavers have a significant impact on wetland regimes on the Complex. Trapping historically held beaver numbers much lower than present levels.

Refuge response: The WIP identifies a minimal number of trend maps to be surveyed aerially, rotating annually between the Koyukuk/Northern Unit Innoko and the Nowitna refuges.

**Small mammals - Information needs:** Small mammals are important prey items for raptors and furbearers. Cycles in distribution and abundance of small mammals, particularly as tied to fire succession, may be the only reliable predictor of marten abundance. Because of their importance to the fire/furbearer relationship, considerable baseline data were gathered on the Koyukuk and Nowitna refuges in the early and mid-1990s.

Refuge response: During the fire/furbearer study, a major effort was made to standardize the methods for snap-trap grids, and these are presented in the WIP for future use. It is recommended that initial inventory work to determine species status and distribution be accomplished on the Koyukuk and Kaiyuh and the same grids resurveyed every five years.