

U.S. Department of the Interior

National Park Service

American Peregrine Falcon Monitoring Protocol for

Yukon-Charley Rivers National Preserve

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Important Note: The American Peregrine Falcon Monitoring Protocol consists of this Protocol Narrative and the following Standard Operating Procedures (SOPs):

- SOP 1: Before the Field Season
- SOP 2: Training Observers
- SOP 3: Using Global Positioning System (GPS) Units
- SOP 4: Documenting Territory and Nest Site Location
- SOP 5: Conducting the Peregrine Falcon Survey
- SOP 6: Contaminant Monitoring
- SOP 7: Monitoring Adult Survivorship
- SOP 8: Data Management
- SOP 9: Analysis and Reporting
- SOP10: After the Field Season
- SOP11: Revising the Protocol Narrative and SOPs

Within the narrative we explain the rationale for monitoring falcons and the specific objectives to be met by the monitoring program. The SOPs will include specific instructions for conducting the Peregrine Falcon monitoring.

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I. Background and Objectives

Issues being Addressed and Rationale for Monitoring Peregrine Falcons

The Central Alaska Network (CAKN) has adopted a holistic view of network ecosystems and will track the major physical drivers of ecosystem change and responses of the two major components of the biota: plants and animals. Thus, the CAKN has identified *Fauna Distribution and Abundance* as one of its top three Vital Signs. In general, the CAKN wants to know how fauna are distributed across the landscape and to track changes in both their distribution and abundance. The *Fauna Distribution and Abundance* Vital Sign comprises monitoring efforts for a suite of vertebrate species spanning the elevation gradient found in CAKN parks, and also includes species of specific interest within each park.

Raptors, specifically Peregrine Falcons in Yukon-Charley Rivers National Preserve (YUCH), have been identified as a vital sign within this context because they are top trophic level predators that are indicators of bioaccumulative contaminants that persist in our ecosystems. Additionally, the CAKN will monitor Golden Eagles in Denali and Bald Eagles in Wrangell-St. Elias. The CAKN scoping workshop (2002) identified these raptors as important vital signs under *Fauna Distribution and Abundance*.

Protection of peregrine falcons and their habitat was one of the primary reasons for establishing Yukon-Charley Rivers National Preserve in 1980. YUCH's enabling legislation, Alaska National Interest Lands Conservation Act (U.S. Congress, 1980), states that:

“the preserve shall be managed for the following purposes... to protect habitat for, and populations of, fish and wildlife, including but not limited to peregrine falcons and other raptorial birds, ...”

The peregrine falcon population breeding within YUCH is believed to be one of the densest populations in North America, and the 30 year dataset we currently have is one of the longest and most complete peregrine datasets recorded. The peregrine falcon population within YUCH was identified in the *Peregrine Falcon Recovery Plan, Alaska Population* (U.S. Fish and Wildlife Service 1982), and more recently in the *National Monitoring Plan for the American Peregrine Falcon* (U.S. Fish and Wildlife Service, 2003) as 1 of 2 index study areas for Alaska.

Extensive population declines caused by the eggshell thinning effects of DDT metabolites led to the listing of the American peregrine falcon under the Endangered Species Act of 1973. Recovery efforts, including the banning of DDT, as well as captive breeding and release, resulted in its formal delisting in August of 1999 (Mesta 1999). Recent contaminants analyses of Peregrine Falcon eggs from YUCH suggest that mercury, a persistent compound which bioaccumulates at high trophic levels causing toxic effects (similar to DDT), is currently at levels that may affect reproduction, and trends suggest that mercury levels may be increasing (Ambrose et al. 2000). High levels of mercury are made biologically available through industrial processes such as mining and waste incineration, and will likely increase with global industrialization. Additionally, DDT and other pesticides are still being used in wintering grounds, which may cause continued risk to the population. Continued monitoring of

contaminants concentrations in egg shells and nestling feathers will allow us to track these toxic compounds at wintering grounds and along migration routes, and at breeding grounds, respectively. Peregrine monitoring information is not only critical in determining population health, but their long distance migrations and their top predator position in the food web make them sensitive indicators to persistent and bioaccumulative contaminants in distant and local ecosystems.

Though peregrines are still accumulating contaminants, levels are currently low enough for successful reproduction and subsequent population expansion. Continued monitoring of the increasing Peregrine Falcon population in YUCH will give us a unique opportunity to make a valuable contribution about the population response of peregrines to increased densities. It is critical that the NPS in Alaska takes a leading role in providing such baseline information given the selection of the YUCH study area as an important index area for the state, and our unique NPS mission to manage for intact ecosystems. It is also important to have multiple parameter measurements of a population because various stressors will manifest themselves differently. For example, as a population grows beyond the carrying capacity for a given area, productivity may decline; or high levels of mercury contamination may elicit a rapid decline in adult survivorship.

Due to their near extinction, and subsequent recovery following the ban of DDT throughout their breeding range, Peregrine falcons have become a public symbol for conservation, and specifically for Yukon-Charley Rivers National Preserve. Nesting peregrine falcons are one of the top visitor attractions in YUCH, and there is strong public support for their protection and the monitoring program. Through the love and interest in peregrine falcons, YUCH and CAKN gain support to protect the entire system of which they are a part. It is important that we continue to work for this support by providing species information throughout the preserve, as well as educational programs to support their conservation.

Historical Development of Peregrine Falcon Monitoring in YUCH

American peregrine falcons along the upper Yukon River, Alaska, have been monitored almost continuously since the listing of the species in 1973. This stretch of the river from the Alaska-Yukon Territory border to Circle, Alaska (Figure 1) was identified as an “index study area” for Alaska in the *Peregrine Falcon Recovery Plan, Alaska Population* (U.S. Fish and Wildlife Service 1982), and more recently within the *National Monitoring Plan for the American Peregrine Falcon* (U.S. Fish and Wildlife Service 2003); this index area is located almost entirely within YUCH. A standard monitoring protocol was developed by the cooperating agencies (U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, and Alaska Department of Fish and Game) involved in writing the *Peregrine Falcon Recovery Plan, Alaska Population* (1982); these protocols have been consistently used within and around YUCH since 1982.

The upper Yukon River population declined to a low of 11 pairs in 1973 (Ritchie 1976). By the mid-1970s the population began increasing, and has continued to increase to 52 pairs in 2004 (Figure 2) (Ambrose and Florian 2003, Ambrose and Florian 2002, Ambrose, pers. com.). Breeding success and productivity began to decline in the early 1990s, which may indicate that the population is stabilizing due to density dependent factors (Figure 2) (Ambrose and Florian

2003, Ambrose and Florian 2002). Further monitoring is necessary to understand the natural variation of a “healthy” peregrine falcon population.

Role of Monitoring at YUCH in the National USFWS Monitoring Plan for the American Peregrine Falcon

Section 4(g)(1) of the Endangered Species Act requires a post-delisting monitoring period of at least 5 years for species removed from the list. The U.S. Fish and Wildlife Service (USFWS) released in 2003 its peer reviewed National plan for fulfilling this requirement, titled, *Monitoring Plan for the American Peregrine Falcon* (U.S. Fish and Wildlife Service, 2003). The document outlines a long-term monitoring plan that includes and extends beyond the 5-year period. The USFWS Monitoring Plan for the American Peregrine Falcon (hereafter, the USFWS Plan) requires, in most regions, the monitoring of a randomly selected sample of territories every three years. For the Alaska region, the USFWS Plan calls for monitoring the two index study areas identified in the Recovery Plan every three years. Regional results will be used to infer nation-wide trends and to compare against criteria identified in the USFWS Plan. The primary objective of the USFWS Plan is to detect changes in 3 parameters: territory occupancy, nest success, and productivity. A contaminant monitoring component is included in the USFWS Plan, and YUCH is one of the units selected for contaminant monitoring.

Both index study areas identified in the Alaska peregrine falcon recovery plan, the upper Yukon (contained almost entirely within YUCH) and upper Tanana rivers, were selected for population monitoring by the USFWS Plan. There are currently 45 to 50 occupied territories in each of these study areas. The USFWS protocol for monitoring the above mentioned parameters (territory occupancy, nest success, and productivity) in Alaska are consistent with past monitoring efforts of the species as identified in the *Alaska Peregrine Falcon Recovery Plan* (1982) with two exceptions. First, the USFWS Plan departs from standard protocol in terms of the age at which nestlings are counted in determining nest productivity. The USFWS Plan calls for counting nestlings at 28 days, whereas standard raptor monitoring protocol counts nestlings at 80% of fledging age (34 days) (Pendleton et al. 1987). Second, the USFWS Plan calls for monitoring selected nests every three years for 15 years. This survey effort best accommodates the national plan, however, annual surveys will best achieve the CAKN objectives. Past survey efforts in Alaska have conducted annual surveys as recommended in the Alaska peregrine falcon recovery plan.

The USFWS Plan encourages continued monitoring of peregrine falcons in Alaska in between years of the official triennial sample, and will actively seek these data to incorporate into its national trend analysis. The CAKN monitoring protocol will collect more detailed and frequently collected (annually) information in YUCH than recommended by the USFWS plan. The primary benefit of annual monitoring rather than every three years is that changes in important population parameters can be detected much more quickly. Historical data from the Colville River in northern Alaska show that local populations can decline by more than 75 percent in a 3-year period (Ambrose et al. 1988). It is essential that surveys be frequent enough to insure that such declines are detected immediately.

This NPS protocol will provide data required by the USFWS monitoring plan for the YUCH study area, and will also provide more detailed information on peregrine falcons in YUCH. As such, it expands significantly from the USFWS monitoring plan and continues to use survey protocols developed and used historically in Alaska (and in the Northern Colorado Plateau Network).

Measurable Objectives

The three primary objectives for the peregrine falcon monitoring program in YUCH are as follows:

1. To monitor temporal trends in the breeding performance of peregrine falcons within YUCH. This includes annual measures of territory occupancy, nest success and productivity. Monitoring of breeding performance in YUCH will contribute to an assessment of the status of the continental population which is designed to achieve 80% probability ($\beta = 0.20$) of detecting a decline of 12.5 % over 3 years ($\alpha = 0.10$) (U.S. Fish and Wildlife Service 2003).
2. To monitor adult survivorship of breeding peregrine falcons within YUCH as an indicator of population health.
3. To monitor levels of contaminants in eggs produced by peregrine falcons breeding in YUCH. This includes repeated analyses of eggs for persistent organic pollutants (e.g. DDT and polychlorinated biphenyls (PCBs)) and heavy metals (e.g. mercury and cadmium); contaminants found in eggs reflect contaminants that the birds were exposed to at wintering grounds and along migration routes.
4. To monitor levels of contaminants accumulated in feathers of nestling peregrine falcons on the breeding grounds within YUCH. This includes repeated analyses of nestling feathers for heavy metals (e.g. mercury and cadmium); contaminants found in nestling feathers reflect natal area contaminants exposure.

II. Sampling Design

The CAKN survey protocol will follow those generally used in prior Alaska surveys, which focus on index study areas rather than looking only at territories known to have been used in the past (as recommended for other regions in the USFWS Plan). Index study areas in interior Alaska included a specific section of river (upper Yukon or upper Tanana rivers). All known and potential territories within 1.0 km of the centerline of the river will be surveyed annually within these areas.

Rationale for Selecting This Sampling Design

The approach of surveying index areas rather than specific territories in CAKN units is favored by NPS for several reasons. By completely re-surveying an established study area annually, new territories will be discovered and this will provide information about the

continuing (or lack of) recovery of peregrine falcons (although the species was delisted in 1999, the species was not fully recovered but rather no longer in danger of extinction). Thorough surveys of index study areas do not have this bias in that all potential territories, both good and bad, are surveyed annually. This is important because low quality, seldom-used territories are the ones most likely to be vacated as a result of population decline, thus changes in population parameters may be detected sooner when surveying a given area rather than only known territories. Additionally, pairs which move to a new cliff will more likely be found by a complete survey of a study area than by visits to a historically-used location, thus improving estimates of percent occupancy. Finally, since researchers are able to spend more time in one study area (rather than traveling to several widely dispersed nest territories), they are able to collect more detailed information on the local population in the index area. This sampling design also allows for direct comparisons with the previous 30+ years of monitoring data, and has proven to be monetarily and operationally efficient.

In addition to the valuable information gained by monitoring peregrine falcons within a fixed study area, it is likely that these index areas are consistent with trends observed across interior Alaska. Using “index areas” as representative of a larger area or larger local population was proposed in the Peregrine Falcon Recovery Plan, Alaska Population, and has proven effective in Alaska. Dr. Dave Payer reviewed 10 to 15 years of survey data for six rivers in interior Alaska (Payer 2001, Skip Ambrose, pers. comm., 2002). Survey data from either of the two rivers selected by the Peregrine Falcon Recovery Plan, Alaska Population, as “index” study areas (the upper Yukon and upper Tanana rivers) were shown to accurately represent survey data from all of the other rivers. Hence, for this species, the use of index areas to represent a larger area is a viable survey approach which helps to reduce overall survey effort and travel costs.

Site Selection

The index study area for CAKN is that specified in the Alaska peregrine falcon recovery plan; the area includes the upper Yukon River in and near YUCH (Figure 1). Surveys will not be limited to known nesting territories; rather, all potential nesting territories in the study area will be surveyed. This method incorporates an element of inventory into the monitoring plan in that investigators will stop every mile within suitable habitat and spend a minimum of 4 hours searching for evidence of occupancy by peregrine falcons.

Population being Monitored

Both the USFWS Plan and the CAKN protocol call for monitoring peregrine falcons nesting in YUCH along the Yukon River. Peregrine falcons do not winter in interior Alaska; hence these are limited to peregrine falcons nesting in CAKN Park units.

Sampling Frequency and Replication

This CAKN protocol follows the USFWS Plan for monitoring peregrine falcons in interior Alaska (with exceptions mentioned earlier) but differs from the USFWS Plan for regions outside Alaska. This protocol, developed in conjunction with network biologists from the Northern Colorado Plateau Network for peregrine falcons, recommends annual surveys, with a

minimum of two to three visits per study area. Annual surveys provide more accurate data than the triennial surveys required by the USFWS.

III. Field Methods

Field Season Preparations, Field Schedule and Equipment Setup

Before beginning the field season, observers should review this entire protocol, including all of the SOPs, American Peregrine Falcon Recovery Plan, Alaska Population (1982), USFWS Plan (Appendix A), Colorado Division of Wildlife Field Protocol (Appendix 4 of Craig and Enderson 2004), and other recommended references listed at the end of this document. The observer should pay special attention to the tasks described in SOP #1 “Before the Field Season” and SOP #2 “Training Observers.” Equipment and supplies listed in SOP #1 should be organized and made ready for the field season, and copies of the field data forms in SOP #5 “Conducting the Peregrine Falcon Survey” should be made (on acid-free, water-proof paper).

General sampling times and logistics should be organized prior to the start of each field season. However, flexibility is needed in scheduling sampling trips because of unpredictable weather.

Conducting the Survey

Surveys usually involve 2-4 visits to potential habitat or a known territory during the breeding season to ascertain territory status and determine productivity of active nests. Each visit may require up to 4 hours of observation to determine status of the territory. In most cases, activity such as a nest exchange, feeding, hunting, or flight will occur during a four-hour period. No loud, explosive devices shall be used to flush birds from nests or perches; recorded vocalizations may be used to elicit responses from territorial birds. Surveys are conducted in appropriate weather such that accurate survey data can be obtained (wind or rain may hamper survey efforts).

Peregrine falcon surveys can be accomplished with either one or two observers. Two observers are recommended, as two observers can follow two different birds, one of which might go to the eyrie. All observers shall review appropriate literature on peregrine falcons, their behavior during the nesting season, and survey techniques.

Field notes and data forms are used during each visit to record falcon activity, which result in a season summary of the status of the territory. In addition, photographs or sketches of the nest ledge are collected, coordinates of the territory are determined, and maps may be used to mark the location of important features of the site. Refer to SOP#5, “Conducting the Peregrine Falcon Survey” for detailed instructions on conducting the survey.

IV. Data Management

Peregrine falcon survey data will be entered into a standardized database designed to accommodate the Raptor Observation Record Card and the Raptor Eyrie Record Card (Appendix x). YUCH should maintain this database and provide survey data to the CAKN Data Manager in

order to insure data match NPS Inventory and Monitoring standards and also as a means to provide back up storage location for survey data. NPS Inventory and Monitoring standards for data management are currently in development. These standards will include:

Overview of database design

Data entry, verification and editing

Metadata procedures

Data archival procedures

CAKN Inventory and Monitoring Data Manager

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Data fields in the NPS database include monitoring data as required in the national USFWS monitoring plan, and these data will be provided to the USFWS. Data from the Raptor Observation Record Cards for all territories will be sent to appropriate individuals as identified in the USFWS Plan. See SOP # 8 for more detailed data management protocols.

V. Analysis and Reporting

CAKN Park Unit Analysis and Reporting:

A. Reports

Standard survey parameters shall be reported following each field season. A report in standard NPS scientific format, described in SOP #8 shall be prepared, and shall include, at a minimum:

1. Number of occupied territories;
2. Number of successful pairs;
3. Number of fledglings per total pair; and
4. Number of fledglings per successful pair.

We will use the following sections of the USFWS Plan for parameter definitions, or as guidelines for the type of information to report:

USFWS Plan, **Methods Section A. Parameters and Definitions**

USFWS Plan, **Methods Section E. Analyses**

USFWS Plan, **Appendix F: Calculating Territory Occupancy and Nest Success**

An electronic copy (on a CD) of the survey data, including territory summaries, digitized maps, photographs or sketches of nest sites should be included with annual reports.

B. Data Analysis

The Principle Investigator of the Peregrine Falcon monitoring program will analyze, or arrange for the analysis, of population trends. See SOP # 9.

USFWS Plan Analysis and Reporting:

Under this protocol, CAKN is required to provide monitoring data to the national USFWS monitoring program for Nation-wide data analysis. Triennial reports will be issued by the USFWS after each monitoring season. These triennial reports will include data summaries and analyses, suggestions for improvement of the sampling protocol or the Plan, and an assessment of the need for possible relisting. Reports will be posted on the World Wide Web, and available in printed form, by March of the year following surveys. Reports may also be produced between official sampling years.

VI. Personnel Requirements and Training

Project Implementation

NPS – Principal Investigator

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The PI will be responsible for implementing this monitoring protocol, and will interface with the CAKN Program Coordinator and USFWS Regional Peregrine Falcon monitoring coordinator to insure protocols are followed and survey data are managed appropriately. The PI will also lead the fieldwork and act as the primary observer.

NPS – Observer

This project requires 1 NPS observer to assist with field work, data entry, data management, analysis and report writing.

USFWS - National and Regional Coordinators

USFWS Region 7 Coordinator

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The role of the USFWS coordinators is outlined in the Implementation Section of the USFWS Plan.

Qualifications and Training

All project observers shall have a minimum of two years of experience surveying peregrine falcons. Refer to SOP #2 “Training Observers”.

VII. Operational Requirements

Annual Workload and Field Schedule

Peregrine falcon surveys in YUCH will begin in late April or early May and extend to the last week in July, a period that coincides with the peak-breeding activity of the species in this area. Inclement weather and personnel workloads will preclude the scheduling of site visits to specific annual dates. Monitoring efforts may require 2-4 visits/territory in a season (up to four hours per visit). Two observers are recommended to add efficiency (Craig and Enderson, 2004). Time required at each site per season can vary tremendously, depending on activity of the birds, from a few hours to a few days.

Facility and Equipment Needs

Office space with a computer will be needed, as well as equipment storage space. Table 1.01.1 in SOP #1 “Before the Field Season” is a list of field equipment needs for a single observer. If two or more observers work simultaneously, equipment requirements will increase accordingly.

Startup Costs and Budget

Personnel expenses for field work are based on a seasonal biological science technician, surveying an established study area with multiple territories. The decision about whether to survey in pairs or singly will depend on personnel and funding available. The cost of the survey will depend on the number of potential territories in the study area. Generally, one can expect to spend .5 days per season per potential territory. This estimate does not include any pre-season preparation, data analysis, data management, or report-writing time commitments. Because peregrine falcon monitoring has been ongoing in YUCH, startup cost for equipment will be minimal; the purchase of equipment and supplies is listed in SOP#1, Table 1.01.1, as well as maintenance and or replacement of equipment shared among multiple projects (e.g. GPS units, cameras).

Estimated Costs	Annual
PI salary*	0
Observer salary (assume GS-7 or 9)	7000
Contaminants analysis	1000
Field Work (Travel)	2500
Data Management/Reporting (Salary)	4000
Startup Equipment Costs**	1500
Annual equipment/supplies (boat maintenance, climbing gear, optics, camping gear, etc.)	2000
Total	\$18,000

* PI salary will be covered by YUCH base (\$7,000)

** Startup equipment costs are minimal and include items needed for examining adult survivorship (scope camera).

Procedure for Revising the Protocol and Archiving Previous Versions of the Protocol

A thorough treatment of this component of NPS Protocols is found in Peitz et al. (2002). Their text follows:

“Over time, revisions to both the Protocol Narrative and to specific Standard Operating Procedures (SOPs) are to be expected. Careful documentation of changes to the protocol, and a library of previous protocol versions are essential for maintaining consistency in data collection, and for appropriate treatment of the data during data summary and analysis. The MS Access database for each monitoring component contains a field that identifies which version of the protocol was being used when the data were collected.

The rationale for dividing a sampling protocol into a Protocol Narrative with supporting SOPs is based on the following:

- The Protocol Narrative is a general overview of the protocol that gives the history and justification for doing the work and an overview of the sampling methods, but that does not provide all of the methodological details. The Protocol Narrative will only be revised if major changes are made to the protocol.
- The SOPs, in contrast, are very specific step-by-step instructions for performing a given task. They are expected to be revised more frequently than the protocol narrative.
- When a SOP is revised, in most cases, it is not necessary to revise the Protocol Narrative to reflect the specific changes made to the SOP.
- All versions of the Protocol Narrative and SOPs will be archived in a Protocol Library.

The steps for changing the protocol (either the Protocol Narrative or the SOPs) are outlined in SOP #10, “Revising the Protocol”. Each SOP contains a Revision History Log that should be filled out each time a SOP is revised to explain why the change was made, and to assign a new Version Number to the revised SOP. The new version of the

SOP and/or Protocol Narrative should then be archived in the CAKN Protocol Library under the appropriate folder.”

VIII. References

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- U.S. Fish and Wildlife Service. 1984. The American Peregrine Falcon Recovery Plan [Rocky Mountain/Southwest Population]. Prepared in cooperation with the American peregrine falcon recovery team. U.S. Fish and Wildlife Service, Denver, CO.
- U.S. Fish and Wildlife Service. 2003. Monitoring Plan for the American Peregrine Falcon, A Species Recovered Under the Endangered Species Act. U.S. Fish and Wildlife Service, Divisions of Endangered Species and Migratory Birds and State Programs, Pacific Region, Portland, OR. 53 pp.

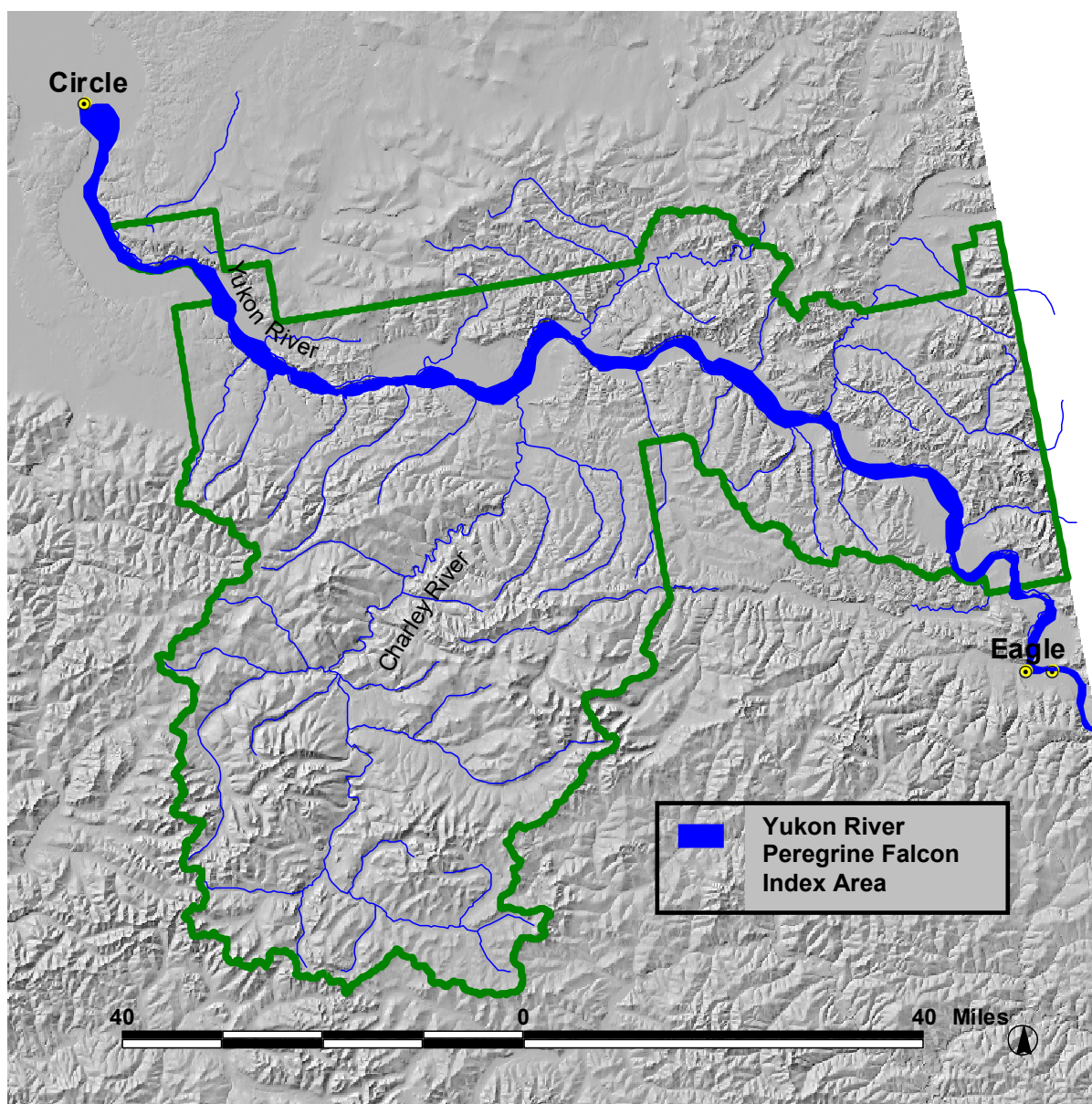


Figure 1. Map of the Peregrine Falcon monitoring index area in and near Yukon-Charley Rivers National Preserve.

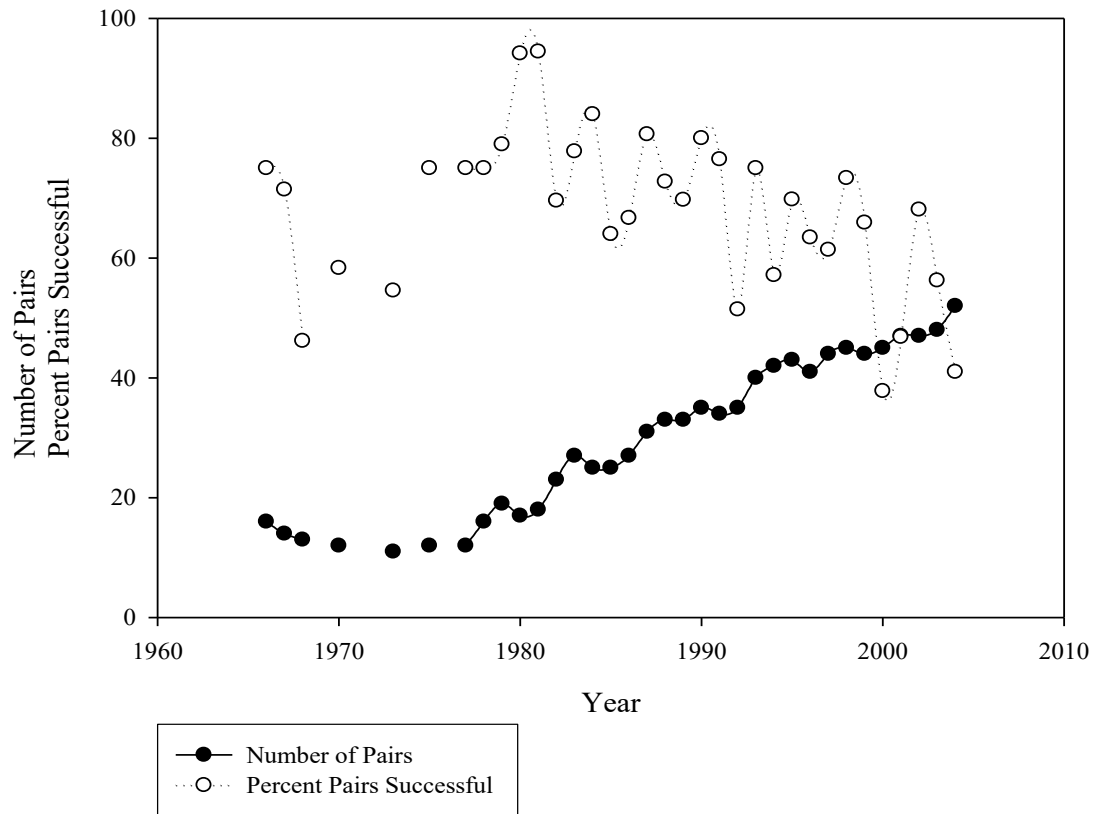


Figure 2. American peregrine falcons, number of pairs and percent pairs successful, Upper Yukon River, Alaska, 1964-2004.

Appendix A. U.S. Fish and Wildlife Service. 2003. Monitoring Plan for the American Peregrine Falcon, A Species Recovered Under the Endangered Species Act. U.S. Fish and Wildlife Service, Division of Endangered Species and Migratory Birds and State Programs, Pacific Region, Portland, OR. 53 pp.

This document can be found on the World Wide Web at:

<http://endangered.fws.gov/recovery/peregrine/plan2003.pdf>