

STATE WILDLIFE GRANT PROPOSAL (SWG '05)

PROJECT TITLE: EVALUATION OF POTENTIAL HABITAT FOR PEREGRINE FALCON REINTRODUCTION IN SOUTHERN ILLINOIS.

PROJECT NUMBER: T-30 P-1

PURPOSE: This project will determine whether sufficient, suitable habitat for peregrine falcons exists to support a population in southern Illinois. Various reintroduction scenarios will be modeled to determine methods that maximize the probability of success, should reintroductions be pursued by the state.

NEED: Declines of peregrine falcon populations in the mid 1900s were associated with the use of DDT pesticide and the consequent eggshell thinning among birds of prey. In response, peregrines were listed as federally endangered in 1970. Broad-sweeping bans of DDT in the U.S. in 1972, in combination with successful reintroduction programs coordinated by federal, state, and independent biologists, culminated in the federal delisting of peregrine falcons in 1999. However, in Illinois peregrines remain state threatened (Endangered and Threatened Species Protection Board, IDNR 2004).

Peregrine falcons are among the “species in greatest need of conservation concern” in Illinois (IDNR 2005). The peregrine falcon population is generally limited to the Chicago metropolitan area, with 10 pairs fledging young from buildings and bridges in 2003 (Tordoff et al. 2003). This population was established as a result of successful reintroductions. A few isolated, but unsuccessful nesting attempts have also been reported in other urban locations (Peoria, Springfield, near St. Louis, Quad Cities; Kleen et al. 2004, IDNR 2000).

Peregrine falcon reintroductions are often successful in urban settings because the great horned owl, a predator of peregrines, is absent (IDNR 2000). However, peregrines did not inhabit urban areas historically (White et al. 2002); rather, they nested in diverse habitats with cliffs and bluffs, open areas, and water. Several potential risks associated with maintaining exclusively urban populations must be considered for the long-term persistence of peregrines in Illinois. Such risks include shifting public perceptions, air traffic, rising urban temperatures, pollution, and additional mortality sources, like collisions with buildings (32% mortalities) and vehicles (21% mortalities, Tordoff et al. 2003). Establishment of populations in more natural settings would not only guard against emerging problems associated with cities, but would also provide further stability to existing populations, especially since peregrines occur naturally at low densities.

The Shawnee National Forest (SNF) and surrounding areas contain many bluffs and cliffs, are juxtaposed with open agricultural areas, and are adjacent to several lakes and rivers. Indeed, the last report of peregrines nesting in Illinois, prior to reintroductions in Chicago, was from Jackson Co. in 1951 (George 1968). Although great horned owls are present in some parts of SNF, presence has not been confirmed in many areas,

including Jackson Co. (Kleen et al. 2004). Not only would peregrine falcons likely thrive in southern Illinois, but such a population may provide connectivity with a new population in St. Louis, MO, and reduce metapopulation extinction risk. Suitable habitat within SNF has yet to be identified and reintroduction potential remains to be explored.

This project will assess the potential for reintroduction of peregrine falcons in southern Illinois. Recovery of peregrine falcons is congruent with the Illinois Comprehensive Wildlife Conservation Plan (CWCP, IDNR 2005). The long term stability of peregrine falcons in Illinois will require monitoring the existing population and establishing new populations. This project will identify areas containing suitable habitat for peregrines, which is required element (ii) of CWCPs. This project will also survey and identify factors helpful to restoration of peregrines, as described in required element (iii). Such information is needed for restoration and eventual state delisting of the species. Funding this project will constitute a first step towards recovery of peregrine falcons in Illinois.

OBJECTIVES:

- 1- Identify areas possessing habitat features necessary for peregrine falcons.
- 2- Identify potential reintroduction sites from among suitable areas.
- 3- Determine the optimal number and composition of peregrine falcons for release.

Objective 1 will be completed the first year of the project. Objectives 2 and 3 will be initiated in year 1, but not completed until the second year. The first annual report will detail results for the first objective and progress on the second and third objectives. The final report will address results of all 3 objectives, with specific recommendations for future management.

These objectives are in agreement with goals, policies, and philosophies of the Illinois Department of Natural Resources and Wildlife and Sport Fish Restoration Programs. When accomplished, this project will represent significant progress towards the eventual goal of peregrine falcon recovery in Illinois. Products resulting from these objectives will inform managers of the location of suitable habitat for peregrine falcons in southern Illinois, identify suitable release sites, as well as make specific recommendations for the demographic composition of reintroduced animals.

EXPECTED RESULTS OR BENEFITS: This project constitutes first steps towards peregrine falcon recovery in Illinois. The peregrine falcon is unusual among endangered and threatened species in that earlier population declines were not due to habitat loss, but rather pesticide uses that have since been eliminated. Therefore, the potential for full recovery is high.

Recovery requires a clear evaluation of available habitat and the capacity of this habitat to support viable populations. Once suitable habitat has been identified, a scientifically based program for reintroduction will be necessary. This proposal addresses both of these needs. Completion of work described in this proposal will

provide recommendations and outline steps necessary to maximize the probability of successful peregrine falcon recovery. These recommendations will allow an assessment of the financial costs and staff requirements necessary to implement a reintroduction effort in Illinois. If the Illinois Department of Natural Resources decides to pursue reintroductions, recovery will have many additional benefits.

Establishing a second population in southern Illinois would provide more stability to peregrine falcons in the state. Small populations are at risk of extinction from stochastic events (Shaffer 1981, 1987). For example, peregrine falcons might be vulnerable to West Nile virus outbreaks (USFWS 2003). Therefore, more, large populations are imperative to persistence. A population in southern Illinois could also provide connectivity with a population in St. Louis, stabilizing regional populations of peregrine falcons.

Eventual return of peregrines will also restore an important predator to ecosystems. Peregrine falcons may have important effects on biodiversity by influencing interspecific competition among prey species. Such potential benefits may not be immediate and remain to be seen, but are certainly not possible without the peregrine.

Peregrine falcons are symbolic of hope, speed, and power to many people. They are appreciated by birdwatchers, falconers, naturalists, among other nonconsumptive resource users. Peregrine falcons are also a success story for endangered species recovery in the U. S (USFWS 2003). Such successes help promote public support for state and federal conservation efforts.

The benefits described herein are likely to have long term effects for peregrine falcons, ecosystems, constituents, and state and federal conservation efforts. Benefits are likely to affect not just southern Illinois and the larger state of Illinois, but also the region including Missouri, Kentucky, and Indiana. A new population of peregrines will help stabilize populations in the region as a whole.

APPROACH: Peregrine falcons utilize large areas and are territorial, with densities of 1 pair/10-20km² under favorable conditions (Ratcliffe 1993). As a result, multiple reintroduction sites will be necessary to ensure that breeding pairs have sufficient area. A multilevel screening process will be conducted to identify optimal release sites. In the first year, land cover maps (IDNR 1996), digital aerial photographs (Illinois Natural Resources, Geospatial Data Clearinghouse), and Digital Orthophoto Quarter Quadrangles (USGS 2000), and U.S.G. S. topographic maps will be used to identify areas of publicly-owned land that contain gross habitat features necessary for peregrine falcons in southern Illinois. In particular, areas of steep topography (indicative of cliffs and bluffs) juxtaposed with open areas will be identified for site inspection. After contacting site managers, areas will be visited and surveyed to assess suitability of local habitat conditions. During surveys, cliff dimensions will be measured and any ledges for nesting will be noted, including potholes, overhangs, ledges that are exposed, and abandoned nests of other large birds. Cliff sites will be ranked by dimensions and prominence in a

manner similar to that used by Hickey (1942), Hagar (1969), Rice (1969), and Craig and Enderson (2004).

We will model the optimal number and demographic composition of falcons to be released using population viability analysis (Soulé 1987, Shaffer 1990, Boyce 1992). Population viability analysis allows different introduction scenarios to be modeled. In this way, population growth rates and extinction probabilities can be examined on hypothetical populations using realistic life-history parameters. To this end, fecundity and survival of peregrine falcons in natural settings will be obtained from historical records and recent reintroductions (i.e. Tordoff and Redig 1997). Population viability analysis will be conducted in RAMAS GIS (Akçakaya 1997). This software uses landscape information from GIS in population viability analysis and assesses extinction risk. Reintroduction scenarios that maximize the probability of population establishment and persistence will be examined in more detail. Cost and feasibility of such scenarios will be included in the project final report.

Project objectives will be accomplished in 2 years by a graduate student in partial fulfillment of the requirements for a Master's degree at Southern Illinois University Carbondale (SIUC). Technical support and expertise will be provided to the student by Dr. Charlotte Roy Nielsen, Dr. Eric Hellgren, and members of the Cooperative Wildlife Research Laboratory (CWRL) at SIUC. Student progress will be evaluated by Dr. Roy Nielsen and Dr. Hellgren at least semi-annually, with an annual report submitted to the Illinois Department of Natural Resources. Objective 1 will be completed year 1. Objectives 2 and 3 will be completed in year 2. The end product will be a thesis and final report providing guidelines to maximize the probability of peregrine reintroduction success.

LOCATION: Headquarters at the Cooperative Wildlife Research Laboratory at Southern Illinois University Carbondale. Field research will be conducted in southern Illinois at sites to be determined.

PERSONNEL: Dr. Charlotte Roy Nielsen and the Director of the Cooperative Wildlife Research Lab (formerly Dr. William Muhlach, presently Dr. Eric Hellgren), Cooperative Wildlife Research Laboratory, Southern Illinois University Carbondale; graduate student to be named. DNR project manager: Jody Shimp, Natural Heritage, Region 5, 11731 State Highway 37, Benton, IL 62812, 618/435-8138; email:jshimp@dnrmail.state.il.us.

STUDY 1.

Problem: Peregrine falcons remain state threatened in Illinois, yet suitable, unoccupied habitat may exist in the southern portion of the state. Furthermore, factors contributing to the decline of peregrine falcons (i.e. DDT) have been addressed, so potential for full recovery in Illinois is high. This study will assess habitat availability in southern Illinois. Various reintroduction scenarios will be explored and specific recommendations will be made to the state.

Objectives:

1. Identify and survey areas potentially suitable for peregrine falcons.
2. Model the viability of populations under various reintroduction scenarios.
3. Provide specific recommendations for the recovery of peregrine falcon populations in southern Illinois.

Justification: Recovery of peregrine falcon populations in Illinois is compatible with the Illinois Comprehensive Wildlife Conservation Plan (IDNR 2005). A peregrine falcon population in southern Illinois would provide stability to other populations in the region and return a predator to the ecosystem. Furthermore, peregrine falcons are appreciated by Illinois constituents, as well as the populace of neighboring states in the region. Completion of this study will constitute significant progress towards peregrine falcon recovery.

Job 1.1: Identification and survey of sites potentially suitable for peregrine falcons.

Objective: Identify sites with habitat features required by peregrine falcons and verify their suitability with site visits.

Schedule: Potential sites will be identified during July 2006 - December 2006. Sites will be visited during December 2006 - June 2007.

Job Description: Sites possessing cliffs and bluffs, open areas, and in proximity to water will be identified from land cover maps (IDNR 1996), digital aerial photographs (Illinois Natural Resources, Geospatial Data Clearinghouse), Digital Orthophoto Quarter Quadrangles (USGS 2000), and U.S.G.S. topographic maps. These sites will then be visited to assess suitability for peregrine falcons. Features of cliffs and surrounding areas will be noted and characterized.

Job 1.2: Population Viability Analysis

Objective: Determine the viability of theoretical peregrine falcon populations under different reintroduction scenarios, based on availability of suitable habitat in southern Illinois.

Schedule: Population Viability Analysis will begin after suitable habitat has been confirmed. This job is expected to begin July 2007 and will be completed by June 2008.

Job Description: Population viability analysis will be conducted using RAMAS GIS (Akçakaya 1997). Multiple reintroduction scenarios will be modeled to determine the probability of success under each scenario. Data for fecundity and survival in other reintroduced populations of peregrines in the eastern United States will be used in models.

Job 1.3: Recommendations and Report

Objective: Provide the IDNR with data necessary to evaluate the feasibility and likelihood of successful reintroductions of peregrine falcons to southern Illinois.

Schedule: Reports will be submitted annually and discussed with IDNR staff. A final report, including a M.S. thesis will be submitted at the end of the project. Manuscripts will also be submitted for publication.

Job Description: Based on conclusions from Jobs 1.1 and 1.2, we will make specific recommendations about the feasibility of reintroduction of peregrines in southern Illinois. We will detail the number of individuals, potential reintroduction sites, and the number of reintroduction sites necessary to successfully establish a population of peregrine falcons. Anticipated duration and costs of a reintroduction program will also be described in recommendations.

Personnel: Dr. Charlotte Roy Nielsen and the Director of the Cooperative Wildlife Research Lab (formerly Dr. William Muhlach, presently Dr. Eric Hellgren), Cooperative Wildlife Research Laboratory, Southern Illinois University Carbondale; graduate student to be named. DNR project manager: Jody Shimp, Natural Heritage, Region 5, 11731 State Highway 37, Benton, IL 62812, 618/435-8138; email: jshimp@dnrmail.state.il.us.

Location: Headquarters at Southern Illinois University Carbondale. Field research in southern Illinois, with specific sites identified in Job 1.1.

RELATED PROJECTS: None in progress.

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