Peregrine Falcon Recovery in the Southwest: The Administrative Necessity for a Survey Protocol and the Ecological Importance of the Grand Canyon

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Abstract. Peregrine falcons (*Falco peregrinus*), although listed as an endangered species, bred at 179 sites in Arizona in 1992. The population exceeds the 1984 recovery goal of 46 breeding sites in Arizona. Of the 179 known sites, 71 are in the Grand Canyon National Park. Ecologically, the park provides ideal peregrine nesting habitat. When combined with other similar habitats of dramatic topographic relief, the Colorado Plateau probably provides the recruitment for population increases throughout the Southwest. Locating peregrine falcon breeding sites and monitoring reproduction are the main recovery actions for documenting population expansion—the essential element for delisting. A survey protocol used since 1987 throughout Arizona to document the occurrence of breeding peregrines was used in the Grand Canyon in 1988 and 1989. The protocol was not in place at the onset of surveys in 1975, and the pattern of breeding site reoccupancy is unavailable to assist in identifying and managing the ecological needs of nesting peregrines in Arizona and the Southwest.

Key words: Arizona, canyon, *Falco peregrinus*, Grand Canyon, nesting, peregrine falcon.

The American peregrine falcon (*Falco peregrinus anatum*) was listed in 1973 as an endangered species throughout North America. Egg collectors and falconers provided a relatively detailed history of peregrine occupancy at many eastern eyries, some dating back to the late 1800's (Herbert and Herbert 1969). The population status of peregrines in the western United States, however, was known only locally at that time (Enderson 1969). A revised Recovery Plan (U. S. Fish and Wildlife Service 1984) was written to document more completely the status of western peregrines and to present a strategy to allow recovery of the population to healthy numbers. Peregrines residing in the North American Southwest were included in the Recovery Plan. Based on the best information available to biologists, the 1984 Recovery Plan established the recovery goal at 46 nesting pairs for Arizona, including the Grand Canyon.

My purpose is to highlight the value of the Grand Canyon relative to the recovery of peregrines in the Southwest and to point out how administration of an endangered species recovery program relies on rigorous procedures for assessing populations.

Peregrine Falcons in Arizona and the Grand Canyon

As defined by Brown (1982), the Southwest in the United States includes southeastern California, southern Nevada, southern Utah, southern Colorado, western Texas, and all of New Mexico and Arizona. Pre-1940 observations of breeding peregrines varied in intensity (Kiff 1988) in the Southwest and in other areas of the peregrine range.

In Arizona—including the Grand Canyon—only minimal assessments of peregrine status were available in 1975 (Ellis 1988; Skaggs et al. 1988). Only four historical breeding areas were known in Arizona before 1975 (Ellis and Monson 1989). Peregrine falcon nesting records in the Grand Canyon were relatively rare in the early 1980's (Brown et al. 1987), and only 45 breeding sites were known or suspected in the entire Colorado Plateau of northern Arizona (Ellis and Glinski 1988). From 1976 to 1985, Ellis (1988) recorded 59 breeding sites and another 31 likely breeding areas. Ellis (unpublished report to Grand Canyon National Park) reported 112 locations in the Grand Canyon where peregrine pairs and singles were seen or reported. Of these, only 16 breeding sites were later recognized with certainty (Ellis 1988).

In the mid-1980's, managers at the Grand Canyon National Park needed to determine the effect of commercial tourist overflights on peregrines nesting in the Grand Canyon. In 1987, the managers hired a private consultant (SWCA, Inc.) to perform peregrine falcon surveys in the park. Peregrine falcon breeding areas (71) were discovered in the Grand Canyon from 1988 through 1990. The presence of an additional 25 pairs was suspected, based on observations of lone individuals and available habitat (Brown et al. 1992). Using the density of known pairs and the availability of yet-unsurveyed areas, I suspect that the population in the park exceeds 150 pairs.

Necessity of a Protocol for Peregrine Surveys in Arizona

Searches for breeding peregrines took place in Arizona, in the Grand Canyon, and elsewhere with only limited knowledge of what cliffs were historically used by peregrines. Ellis (1982) provided an assessment of peregrine habitat requirements that offered a search image for later surveys, but his model was limited by the paucity of information on the pre-DDT distribution of peregrines. It is, however, as solid a foundation as might be expected, considering the rugged topography of Arizona and the lofty and inaccessible peregrines.

The 1988–89 surveys in the park used the same survey protocol used to document peregrine occupancy in other areas throughout Arizona by the Arizona Game and Fish Department. The complex topographic relief of the Colorado Plateau region poses logistical problems unlike other areas in the United States in performing surveys for cliff-nesting birds such as the peregrine. In the Grand Canyon, where a surveyor can become overwhelmed by the sheer area of massive cliffs, a protocol for identifying distinct survey areas is imperative.

The objective of the survey is to document presence or absence of falcons. Observations are performed at specific, mapped observation points that can be revisited to duplicate the observations at a later date and thereby assess long-term occupancy by falcons. All completed survey forms, descriptions of conditions and findings, and maps that describe survey locations are filed with the appropriate land and wildlife management agencies for future use.

The wildlife component of many land management plans in the 1980's included peregrine surveys. Many surveys were performed by individuals unfamiliar with falcons and who tried to cover too much area from roving vantage points. Frequently, these survey efforts failed to provide adequate documentation of the exact cliffs examined. Also, some management recommendations (e.g., Ellis 1982) placed an emphasis on secrecy in dealing with falcon breeding areas. Secrecy was appropriate when the population was small and when every breeding site needed maximum protection.

Importance of the Colorado Plateau to Peregrine Recovery in the Southwest

The other national parks on the Colorado Plateau share similar topographic expanses and peregrine abundance. In 1992, 115 occupied peregrine breeding sites were known to exist on National Park Service lands on the Colorado Plateau outside the Grand Canyon (M. Britten, National Park Service, Denver, Colorado, personal communication): Glen Canyon National Recreation Area—65; Dinosaur National Monument—13; Zion National Park—12; Capitol Reef National Park—6; Canyonlands National Park—6; Bryce Canyon National Park—4; Colorado National Monument—2; Black Canyon of the Gunnison National Monument—2; Mesa Verde National Monument—2; Arches National Park—1; Walnut Canyon National Monument—1; and Curecanti National Recreation Area—1.

The growth rate, both temporally and spatially, is difficult to delineate because surveys before 1985 were neither systematic nor documented with accessible data. However, peregrine populations have dramatically increased in the last 15 years in Arizona. Data from Ellis (1988) suggested that population recovery was under way; I support his view. I (fruitlessly) searched

several areas in southern and central Arizona for peregrines in the early 1970's that are now occupied by breeding pairs. I participated in many of the aerial and ground searches for breeding sites between 1975 and 1985 and found either prairie falcons or nothing on many promising cliffs. In 1984, I began to get reports from rock climbers and birdwatchers who encountered peregrines during trips afield in spring and summer. Four nesting sites were discovered near Hoover Dam (Glinski and Garrison 1992). Biologists performing peregrine surveys for the Arizona Game and Fish Department documented 179 falcon territories by 1992 (Ward 1993). The Grand Canyon and other areas of the Colorado Plateau provide such abundant, ideal peregrine nesting habitat that this region could readily be the recruitment center for population increases throughout the Southwest. Of the 179 known sites that the Arizona Game and Fish Department recorded in 1992 in Arizona, 111 (62%) are on the Colorado Plateau. Of these, 71 are in the park, 4 in the Lake Mead National Recreation Area, 8 in Glen Canyon National Recreation Area, 17 on the Arizona Strip District of the Bureau of Land Management, and 11 on the Kaibab National Forest (Ward 1993). The importance of the Colorado Plateau as a recruitment source for repopulation of areas away from the Colorado Plateau is uncertain—the northern Rocky Mountain area, for instance, is still depressed despite years of augmenting recruitment with captive breeding (Burnham et al. 1988). Since 1980, 830 peregrines have been released in Wyoming, Montana, and Idaho, where there were only 40 known pairs in 1992 (Burnham 1992). Captive-bred falcons have never been released in Arizona, so recruitment has been from natural sources. Because only limited studies of peregrine movements have been conducted in the Southwest (Johnson 1988; Glinski and Garrison 1992), dispersal patterns and potential recruitment sources are unknown.

Administering Conservation of Peregrine Falcons

The known existence of 179 peregrine falcon breeding areas in Arizona in 1992 exceeds the 1984 recovery goal of 46. The recovery goal of Utah (21) was exceeded by the 132 occupied sites (Utah Division of Wildlife, Salt Lake City, unpublished data), and Colorado's goal of 31 pairs was nearly doubled by the 60 known occupied sites (J. Craig, Colorado Division of Wildlife, Fort Collins, personal communication).

Of the 179 known Arizona sites, 71 are in the park. In 1992, about 96 of the 143 breeding areas in Utah were on lands managed by the National Park Service, especially those lands on the Colorado Plateau of southern Utah. By adding the peregrine sites of Lake Powell in the Glen Canyon National Recreation Area, it is obvious that lands administered by the National Park Service are of critical importance to the conservation of the peregrine falcon in the United States. The problems of pesticides still exist in this area

(DeWeese et al. 1986; Ellis et al. 1989), but the integrity of the massive cliffs against which peregrines pursue prey will likely always remain intact.

Our ecological knowledge about the population, distribution, and diet of peregrines in the Southwest is well developed now. However, because many early surveys were performed without a protocol that readily allowed survey duplication, we were not able to systematically resurvey areas where peregrines were known to be absent. Observations at these sites would have been most instructive in defining recovery in terms of time and space. Knowing when certain areas became occupied by breeding pairs might have allowed delineation of preferred habitats, and perhaps highlighted some of the limiting factors faced by peregrines in the Southwest.

In the absence of historical information on the status of peregrines in Arizona, only a hypothetical scenario of peregrine decline and recovery pattern is possible. I hypothesize that marginal areas became vacant first, more suitable habitats became vacant next and, finally, only the best areas remained occupied. The reverse is likely to have happened as the population increased. This mechanism for a population decline and recovery is reflected in the peregrine population decline reported by Herbert and Herbert (1969) and in the population regulation model offered by Hunt (1988).

The timing and locations of occupancy patterns during predecline, decline, and recovery are unknown in the Southwest because the population and distribution were unknown. The loss of information concerning habitat selection by peregrines and data on the temporal and spatial pattern of population recovery leaves a data gap in understanding the more subtle habitat requirements of peregrines. We need better information to construct habitat models for peregrines to identify critical habitat management areas. Continued monitoring now might facilitate depiction of the first sites to be abandoned in a declining population.

Perhaps the best lesson to carry forward for conservation of the peregrine falcon is that there is a great need to administer the details of recovery programs and plans. This involves ambitious planning of recovery actions and regularly reviewing their effectiveness—not surveying or other field work. Acts of omission, not commission, are at the heart of the problem. Developing and following a survey protocol that would document the absence of peregrines and readily afford information for future surveys of these areas was an important oversight. Future challenges include developing a monitoring protocol that is sensitive to significant changes in peregrine numbers. This administrative challenge is not unique to the peregrine but, if designed and used for peregrines, the protocol could serve as a model for other important species and provide additional time to attend the needs of organisms presently more endangered than the peregrine falcon. I hope the final administrative matter of a status review and reclassification of the peregrine falcon in North America will be forthcoming and bring to a successful close this small chapter of wildlife conservation.

Acknowledgments

I dedicate this paper to those individuals who have, like pioneers, searched across Arizona's wilds for peregrine eyries and scrambled in Her natural resource bureaucracies for process.

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