AMERICAN PEREGRINE FALCON
STATUS OF SPECIES
COLUMBIA RIVER BASIN

Prepared by

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American Peregrine Falcon
Fakco peregrinus anatum

Status of species-Columbia River Basin

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Abstract

Peregrine falcons within the Columbia Basin are slowly increasing in numbers. Population augmentation has been responsible for much of the increase, with at least 1,062 peregrines released in the region since 1981. Wild productivity has accounted for 218 birds produced from at least 47 known nest sites that have become active since 1979. Eggshell thinning at most nest sites is still occurring, and at levels that warrant concern within the western portion of the basin.

Management and monitoring of active nest sites continues sporadically throughout the region, but program emphasis for those activities appear to be declining commensurate with the' reduction of the augmentation'effort.

Status of species-Overview

History

Due to a severe and rapid population decline, American peregrine falcons (Falco peregrinus anatum) were listed as an endangered species in 1970 under the Endangered Species Conservation Act (Pub. L. Number 91-135, 83 Stat. 275). In 1973, the peregrine falcon was transferred to the authority and protection of the Endangered Species Act (Anon 1973 et seq.), where it remains listed as endangered. A recovery'plan for the species was approved in 1982 for the Pacific States population (OR, CA, WA, and NV) (US Fish and Wildlife Service 1982) and the final version of the recovery plan for the Rocky Mountain/Southwest populations (ID, MT, UT and WY) was approved in.1984 (US Fish and Wildlife Service 1984). Within the Pacific States recovery plan, management units were created. Specifically within the Columbia River Basin in OR and WA, eight management units were delineated (US Fish and Wildlife Service 1982:34). The Rocky Mountain/Southwest recovery team used state boundaries for

some recovery downlisting goals. Specific state recovery goals are difficult to address in a status report founded on watershed boundaries.

Populations of peregrine falcons were extirpated or extremely close to extinction globally during a period between 1946 and 1975 (Hickey 1969, Cade et al. 1988). The decline has been attributed to the pesticides DDT and its metabolite DDE, and dieldrin. These compounds bioaccumulated in peregrine falcons and their prey. Mechanisms of DDT induced eggshell thinning were found to be as follows. Lipophilic metabolites (DDE) were re-released into the blood stream when adipose was used for energy during reproduction or from circulating levels of metabolites obtained via recent prey. While in the uterus, DDE inhibited the enzymes carbonic anhydrase and calcium ATP-ase. This enzyme disruption caused partial blockage of the layering of calcium and carbonate on the eggshell which induced eggshell thinning and disruption of embryo gas transpiration. This, in turn, facilitated eggshell breakage, embryotoxicity and the resulting population crash of the peregrine falcon and other species (Bitman et a. 1970, Peakall 1970, Blus et al. 1972, Peakall 1975, Miller et al. 1976). Page1 and Jarman (1991) have provided an overview of the contaminant problems in the Pacific Northwest.

Peregrine falcons have been endemic to the Columbia Basin since at least the Pleistocene epoch (Brodkorb 1963). Historic records of peregrine falcons within the Columbia River Basin collected beginning in 1836 (Townsend 1837) suggest at least 60 known peregrine nest sites or sightings indicative of a nest site (Merrill 1888, Saunders 1911, Bailey 1930, Levy 1950, Nelson 1969, Enderson 1969, Fenske per corn.). Surveys in the 1960's and 70's found few peregrine falcons at historic sites in the region (Enderson 1965, 1969, Nelson 1969, Enderson and Craig 1974, Fyfe et al. 1976, Henny and Nelson 1981).

Present numbers suggest a slowly increasing regional population which has benefited from captive breeding and the removal of DDT from use (Table 1 & 2). For many reasons, (remoteness of sites, inexperience of observers, inadequate documentation by observers or egg collectors, lack of funds for rigorous surveys,. . .) the true numbers of historic sites or "wild" peregrine falcons surviving during the population crash may never be known. Peregrines show high fidelity to established and historic nest sites (Hickey and Anderson 1969, Ratcliffe 1980) which has eased nest site management efforts and subsequent year's nest search procedures. Alternate ledges on the same cliff or nearby

cliff complexes have often been used during re-nesting (recycle) attempts or successive year's nesting.

Habitat within the Columbia River basin has the potential to support more than the number of known historic nest sites. Since 1979, at least 47 new or recolinized nest sites have been found within the Columbia Basin. Personal communication with E. Levine, R. Oakleaf, A. Dudd, 'and D. Fenske suggest that the number of actual nests is probably higher. The author has found instances where "new" nest sites in OR and WA contain peregrine falcon eggshell fragments from previous year's nesting attempts (Page1 notes), which suggests, that there is often a lag between the time the sites were occupied and discovered.

Peregrine falcons serve as an obligate "umbrella" species in habitats where specific management and protection guidelines are prescribed to benefit nesting or foraging falcons. As a predator, peregrine falcons place selective pressure on prey species at breeding and wintering locations. They also compete with other raptors and corvids for nesting locations on cliffs. Peregrine falcons have been used as an-ecotoxicolgical indicator species; bellwhethers used to guage levels of contaminants in the local or regional area. Additionally, they serve as international contaminant samplers via their own migration, and/or that of their prey.

The peregrine falcon is a top-order predator which uses high speed and aerial agility to feed opportunistically on a wide variety of birds (90 - 95% of total diet) and to a lesser degree on mammals and rarely reptiles (Page1 notes). Documentation of fish obtained via kleptoparasitic interactions have been noted by Levine (per. corn.) and Page1 (notes), but are believed to be rare.

Current "health"

Estimation of the "health" of the species has been determined by documenting reproductive success at known nest sites, measuring eggshell thinning from active and failed nest sites, and by noting the recovery of the species through the re-occupation of historic sites, or the colonization of previously unknown nest locations. Reproductive success of peregrine falcons within the Columbia Basin has been fair to good, although sites with higher rates of productivity appear to be clumped in the ID portion of the basin (Table 1).

Nest sites of the basin have averaged 1.15 young (X = 218) per known nest site year (X = 190)(Table 3). This, contrasted to the Rocky Mountain/Southwest Recovery Plan goals (1.25 young/total pair/year sustained for 5 successive years) appears to be marginally acceptable; although below the Pacific States Recovery Plan goals (1.5 young/total pair/year sustained for 5 successive years) and that which Wooten and Bell (1992) (1.76/total pair/year) had suggested as necessary for stable or increasing populations. Data used to gauge long-term population trends and life table calculations such as adult survivorship, juvenile mortality, and immigration and emigration from the region are presently unknown or unavailable. No population models have been put forward specifically for the Columbia Basin "population," but other models may be applicable such as Grier and Barclay (1988), and Wooten and Bell (1992).

Additionally, some nest sites within the region appear to have recruitment characteristics indicative of a source/sink population (Table 1) (Pulliam 1988). This suggests that consistently successful nest sites may be commensurably more important for overall population stability. Nest site success is extremely difficult to predict, although identification of source-sink population regulation and underlying demographic sub-structure should be an important goal to determine efficacy of habitat conservation strategies.

Wooten and Bell (1992) have suggested that the cessation of CA population augmentation while poor reproductive success at wild nest sites continues may synergystically inhibit or reverse the peregrine falcon "recovery" in CA. The final year of population augmentation in the Columbia Basin is slated to be 1995. Whether the population will continue to increase, stabilize, or eventually decline remains to be seen.

Complete analysis of productivity per active nest site for all states was not possible for this status report. Oregon peregrine falcons have shown among the lowest natural reproductive success within the basin, albeit the sample size is small with 0.9 young (X = 37) per known nest site year (X = 38) or 1.25 young per active nest site (X = 28 attempts) (Table 1 and 3). Although below the goals of the Pacific Recovery Plan (1.5 fledged young/active pair/year for a 5 year period), the eastern OR productivity is much better than the poor reproductive success of nest sites in southwest OR and northern CA from 1984 to the present (Page1 in prep. a., Page1 et al. in prep.). Washington has shown

2.2 young (X = 31) per active nest site (X = 14 attempts), but 7 nest years of no survey make this statistic nebulous. The Montana reproductive success (0.8 young (X = 6) per nest site year (X = 4) cannot be gauged with any precision, as the sample size is clearly too small (Table 1 and 3).

Few fragment samples within the basin have been collected other than those gathered by Levine (per. corn.), Dolber (per corn.), and Page1 (Page1 and Kiff in prep.). Inferences and observations of nest site failures attributed to eggshell'thinning seem to be restricted to OR sites. The Rocky Mountain/Southwest Recovery Plan (1984) and others (Zenone per. corn.) have suggested that neotropical migratory birds have been the source of much of the DDT/DDE contamination. Indeed, Henny et al. (1982, 1988) and Fyfe et al. (1991) have discussed potential contamination of peregrine falcons by pesticide application in Latin American countries. Page1 and Jarman (1991) and Henny (1992) have suggested that the source of DDT/DDE contamination in OR may be residues from forest "treatments" by Bureau of Land Management, Forest Service, and private industry during the 1940-1970's period (see Henny 1977, 1981, 1992 and Herman and Berger 1979). This hypothesis for OR nest sites, although not tested, is supported by data on year-round residency of peregrine falcons at their nest sites, prey availability for peregrines during the fall, winter and spring, and corresponding eggshell thicknesses and addled egg content data for low, medium and upper elevation nest sites (Page1 notes).

Levels of eggshell thinning are approximately 11 % for Yellowstone, 12 % for Idaho sites (Levine per corn.) and 16 % (N = 15) (includes'laboratory assisted hatching and addled eggs) for OR Columbia Basin sites (Kiff per corn., Page1 data). Montana and Washington eggshell data for the Columbia Basin was unavailable. Peakall and Kiff (1988) have noted that mean levels of eggshell thinning exceeding 17.0% thin for populations were found in "declining or extirpated" populations. This suggests that the eggshell thinning levels for the Columbia Basin nest sites (except OR) may not be at a level which would cause population declines or significant levels of eggshell breakage, but should not be completely discounted.

Meta-population augmentation has been credited with much of the "recovery" within the upper Columbia Basin. Over 1,062 peregrine falcons have been "successfully" hacked between 1980 and 1994 in the five state area (Table 2). "Successful" denotes released birds who have reached "independence", or have

disappeared from the hack site during the period when independence could be suspected.

Turnover of peregrine falcons at nest sites in the Columbia Basin has been rarely documented due partially to lack of suitable individual visual identification indices. Information available was unquantifiable for the purpose of this status assessment.

Monitoring of ID wild sites has indicated that 67% of the nests have one or both birds originally produced through the captive breeding program (Levine and Melquist 1994). OR Columbia Basin information suggests that 40 % (N-2) of peregrine falcons where both legs were clearly visible (N-5) were' captive-released birds (Santa Cruz Predatory Bird Research Group and Peregrine Fund, Boise releases). Numbers for other areas were unavailable. Nest site entry to band young and resident birds has been sporadic, except at accessible sites in OR and tower sites in ID (Page1 notes, Levine per corn.). Attempts at nest sites to view and document band or visual identification markers on peregrine falcons has not been regularily conducted. Thus, it is difficult to discern the extent that wild productivity has contributed to the recent (1975 to present) population increase contrasted to augmentation efforts.

Systematics

The peregrine falcon is a pandemic raptor (excluding Antarctica) that has 19 - 21 recognized subspecies (White 1968, 1987, Cade 1982). Three subspecies are found in North America. These include the tundra (F.p. tundrius), Peale's (F.p. pealei) and American (F.p. anatum) peregrine falcons. All nesting, and most wintering peregrine falcons which use the Columbia basin (source to mouth) are of the American subspecies, although Peale's have been found using habitat near Astoria at the mouth of the Columbia River, and have been suspected as winter vagrants further up on the Columbia River. Tundra subspecies have been observed during migration periods (Fixx per corn.).

The F.p. anatum subspecies is among the larger and darker of the world's peregrines. "Reversed" sexual size dimorphism, common with most raptors, is expressed in the peregrine falcon by the male being 1/3 smaller than the female'. Chromatically, the subspecies present in the Columbia Basin appears more rufous than it's extirpated eastern North American counterparts (White

1968). Slight color variations from light to cream/rufous colored breasts have been observed at least in OR and WA (Page1 notes), and probably in other areas.

Hybridization with prairie falcons has occurred in the wild involving released birds of both species (Palmer 1988), but crosses are not considered normal.

An overview of behavior, habitat, and reproductive problems can be found in Nelson 1969, Ratcliffe 1980, Cade 1982, Sherrod 1983 and Palmer 1988.

Habitat

The species, although somewhat plastic in its specific habitat requirements, generally uses the following for nesting:

1) Cliffs (rock wall or outcrop which exceeds 30 m in height) and cliff complexes are within.400 to 1,000 meters of perennial or ephemeral water. Cliffs should have ledges, potholes or crevices inaccessible to mammalian predators. Nest ledges are often found between 40 - 80 % of total cliff height above the treetops (Page1 notes).

2) Habitat which affords an avian prey base available in numbers sufficient for the foraging capabilities of the peregrine falcon. Prey may be any bird from the size of a hummingbird to a western gull/Aleutian Canada goose (Page1 notes).

3) Nesting territory free from irregular, overt human disturbance during courtship, incubation, post hatch and fledging periods are thought to be preferred. Individual reaction to disturbance generally varies with the site, exposure/threat of the activity, vegetative cover camouflaging the threat, and time during the breeding season (Olendorff 1971).

4) Cliffs near forested habitat are thought to be preferred over sage-steppe as noted by the present and historic distribution of peregrine falcon nests. Nest sites in sage-steppe habitat have been proximal to concentrations of avifauna (e.g. migratory bird refuge).

Peregrine falcons in the PNW, and more specifically the Columbia River Basin have historically been obligate cliff nesters (Bond 1946, Hickey 1969, Nelson 1969). Cliff sites have traditionally been 30 - 400 meters in height, (Anderson, Dudd, Levine and Oakleaf per corn., Page1 notes) although Levine (per corn.) has reported one nest on a 20 meter cliff. Page1 (in prep. b.) has found an approximate mean cliff height of 35 - 50 meters (range = 23 - 420 meters) in northern CA, OR, and WA. Ledge sizes suggested by Ratcliffe (1980) as suitable for nesting (2,500 sq cm) appear to be similar within the Columbia Basin but not yet quantified.

Cliffs in OR, ID and WA were usually within 400 - 900 meters of water (e.g., laucustrine or riparian habitat). Three nest sites 'in ID were previously used hack towers, and one nest in ID was on a structure.

Habitat "structure" (vegetation types/stages, topography) choices by peregrine falcons vary dramatically within the Columbia Basin. Nesting territories with old growth, second growth, sage-steppe, and urban habitat components have been found as the present range of selected nesting habitat. Habitat types (Kuchler 1966) adjacent to 1994 nest sites included fir-hemlock forest, western ponderosa forest, Douglas fir forest, grand/Douglas fir forest, Oregon oakwoods, wheatgrass-bluegrass and sagebrush steppe. Peregrine falcons'have been released in urban environments in the Columbia Basin (e.g. Spokane), but nesting within urban areas has been limited to a single nest in Idaho. Elevation ranges of nest sites were from approximately 150 to over 2,750 meters above sea level.

In 1994, peregrine falcons were found predominantly on federal lands (72.3%) (Tribal lands included) within the Columbia Basin, and was probably a result of two main factors, e.g. available habitat and search effort. In 1994, the US Forest Service managed lands around 25 (53.2 %) of the 47 known nest sites within the region (Table 4).

Population size, abundance and trend

At present, there are at least 47 known nest sites within the Columbia River Basin east of the Cascades (Table 1). This is less than historic numbers, but suggests a slow and gradual increase. Indeed, peregrine falcons within the

Columbia River Basin have been, and probably always will be a rare sight due to their position on the regional food "pyramid."

Little information exists regarding the non-breeding or "floating" population within the Columbia River Basin. Some nest sites have sub-adults paired with adults, which also suggests a non-stable population.

Potential threats to the species

Peregrine falcons face several ecological and human generated factors that have historically, or could presently limit or impede population recovery and stability. For the purposes of this status report, these threats are categorized as major and minor. Major threats continue to be a concern to the short and long term viability of the population. Minor threats should be considered as potential problems, but at present do not appear to be limiting the population recovery. Vigilance maintained by assertive management and research regarding both major and minor threats should continue.

1) Contaminants

The population decline and near extinction of peregrine falcons was caused primarily by organochlorine contaminants including DDT and dieldrin. Eggshell thinning induced by DDT/DDE continues to adversely affect reproductive outcomes in the PNW/Columbia basin. Additionally, seven dioxin congeners and dioxin-like (10 furan, and 13 PCB congeners) compounds may have lethal and/sub-lethal effects on embryos or developing young (Colbum et al. 1993, Page1 1994).

2) Disturbance

Peregrine falcons are disturbed by "random" human generated activities near their nest sites during reproductive attempts. Nest sites have failed or have been. deserted in the five state area due to human disturbance. Biologists, foresters and the public (hikers, climbers, hang gliders, etc.) have disturbed nesting birds from the ground or with aircraft unknowingly or via surveys, and have affected nesting outcomes (Page1 notes). Peregrine falcons that have thin'eggs, or are on small or debris filled ledges, or both, can cause eggshell breakage or chick displacement via

"bolting" from the nest site when human disturbance occurs suddenly. Chilling or overheating of eggs and young, and the diversion of "energy" to territorial defense can also affect nesting outcomes (Fyfe and Olendorff 1976, Olsen and Olsen 1978, Grier and Fyfe 1987).

Minor

3) Weather

Peregrine falcons can be affected by adverse weather conditions (Palmer 1988, Page1 notes). Late spring storms can chill chicks and eggs, flush them from nesting substrates and add to the energy requirements of incubating birds. Weather can also affect the availability of prey and foraging conditions for the peregrines. Of course weather conditions have influenced nesting success through the course of evolution. But, thin-shelled eggs and small colonizing populations. may show exacerbated effects of weather. It is plausible that enhancement of nest ledges to improve substrate conditions could increase the potential for reproductive success (Page1 in prep. c.).

4) Predation/Competition

Predation of young by great homed owls and golden eagles at hack sites has been noted (Aulman per corn., Norton per corn., Walton per corn.). Predation of young in the nest ledge by golden eagles (Palmer 1988), Cooper's hawks (Page1 notes) and great homed owls (Milestone per corn.) at wild nest sites has also been documented in the Pacific Northwest. Predation of.eggs or young by other species such as ringtails (White and Lloyd 1962), and corvids (Beebe 1960) are certainly possible.

Peregrine falcons may "compete" for nest sites, but seem to simply "take-over" the nest cliff. Peregrine falcons have been noted on former raven, golden eagle, red-tailed hawk and prairie falcon nest sites in the Columbia River Basin. Prairie falcons have occupied several historic peregrine falcon nest sites, and it is unknown whether peregrine falcons will eventually re-occupy those nests. Inter-specific competition for nest sites does not seem to be a limiting factor in peregrine falcon breeding success.

Intra-specific competition appears to warrant little concern. Natural selection for mates is expected, and density dependent. factors which may affect reproductive success do not appear to occur throughout the Columbia River Basin due to the present low density of peregrine falcons and unoccupied historic nest sites.

5) Disease

Little is known about the effect of disease or parasites on peregrine falcons in the Columbia River Basin. Trainer (1969) listed 10 bacterial, seven viral, and 12 parasitic agents that could adversely affect raptors, and also summarized 10 specific 'diseases' that have been observed in wild peregrine falcons. White (1963) noted specific mortalities to falcons (peregrine and prairie) caused by miasis and botulism. Levine (per corn.) and dakleaf (per corn.) have'documented blackfly infestations which have caused young peregrine falcons to fledge earlier than expected, or have affected productivity and behavior at nest sites.

Colborn (1993) and Grossman (1984) suggest that chronic and low levels of certain chemicals could disrupt endocrine processes and effect the immune system of organisms exposed to those contaminants. Page1 (1994) has listed concerns regarding the release of dioxin and dioxin-like compounds into the Columbia River, and their potential effects on peregrine falcons. The extent of lethal and sub-lethal effects of organochlorines (i.e. immune system suppression) on peregrine falcons is little known. Disease is undoubtably a factor in peregrine falcon population dynamics, but the role that it plays in causing mortality or nest site turn-over is unknown.

6) Accidents

The flight style of peregrine falcons makes them subject to accidents. Unfortunately, most mortalities go undocumented and the few injured or dead birds recovered tend to portray certain types of accidents as more important than they might be. Wild peregrine falcons in the Pacific Northwest and Columbia River basin have died or become seriously injured

due to collisions (buildings, vehicles, power lines, fences, 'and trees (Page1 in prep. d.) and falling from nests (Siipola per corn., Page1 notes).

7) Falconry/shooting

Shooting of peregrine falcons by "hunters" and others has been a cause of peregrine falcon mortality. Since the activity'is illegal, numbers of peregrine falcons killed in this manner are rarely documented. Wildlife rehabilitation centers throughout the region regularily receive 'raptors which have been shot.

Removal of wild-hatched peregrine falcons from their nest sites for falconry is illegal. It is unknown if peregrine falcon nest sites within the Columbia River Basin have been entered for the collection of eggs or young. This is plausible, but unlikely. Vigilance around nest sites by observers, and the release of nest site information to only those that "need to know" are effective and necessary ways to protect peregrine falcons.

8) Prey population decline

Certain species of neotropical migratory birds appear to be declining in population due to multiple factors [habitat fragmentation on winter and breeding grounds, deforestation of winter and summer habitat, mono-cultural revegetation or reduced endemic biodiversity of re-forested habitat, pesticides, exotic species introductions, native brood parasites... (see Hagan and Johnston 1992 and Wilson 1988 for an overview.] The effect that alterations of prey species density could have on peregrine falcons is unknown, although peregrine falcons are indeed catholic in their diet.

Habitat management objectives

Direct habitat management at peregrine falcon nest sites have had 3 primary objectives. These concepts have included;

1) prevention of human generated disturbance during critical life periods,

2) protection of habitat necessary for the peregrine falcon, their prey, and the food chain that their prey depends upon,

3) long-term monitoring of productivity and conservative adaptive management based on information collected through nest site observation.

Annual monitoring of peregrine falcon nest sites is a crucial aspect to spatially and temporally protect/manage active nest sites. Site specific observations (Page1 1992) are used to instigate-or support (if necessary) withdrawal or modification of management direction/intent of proximal habitat and to determine the chronology'of seasonal restrictions (Call 1979, Milsap et al. 1987, Page1 1991, Wahl and Page1 1992).

Wahl and Page1 (1992) (listed below) have summarized restriction period for human generated activities which have been used at peregrine falcon nest sites in northern California and Oregon. Modifications to the start of the restriction period for mid and high elevations sites by 15 days has become necessary due to additional monitoring information (Page1 notes).

Low elevation site = 0 - 610 meters	1 January to 30 June
Mid elevation site = 610 - 1220 meters	15 January to 31 July
High elevation site = 1220 meters plus	1 February to 15 August

These restriction periods, although not tailored to the Columbia Basin, could be used as general guidelines for'potential restrictions surrounding most nest sites in the region. Page1 (notes) has found that these dates have worked with Columbia Basin OR and WA nest sites. Tailoring for the other nest sites in the region may be necessary and is recommended.

Habitat protection has typically (Wahl and Page1 1992) been centered around known nest sites, although in several select instances, historic nest sites have received protection (Page1 notes). Quasi-concentric, topographically based circles of protection have been established around most nest sites through an ecosystem protection planning process on many sites in OR, and elsewhere. Special emphasis on the protection of riparian areas within the circles of protection have been used to maintain and enhance the quality of

forage potential, and food chain of peregrine falcon prey species. Protective areas have been typically as follows;

1) Primary-400 to 800 meter restricted access zone. 'Usually no anthropogenic activity allowed during restriction period, and resource extraction (e.g. road construction, structure placement, logging, mineral extraction) or other permanent (e.g. location of trail or recreation facility), or semi-permanent (e.g. fire-camp, helispot, or skid road) disturbance outside of restriction period.

2) . Secondary-primary boundary up to a 3,320 meter seasonally restricted area. Usually no anthropogenic activity during nesting, and management activities outside of the seasonal restriction are designed to protect and maintain peregrine falcon habitat, with special emphasis on riparian areas.

3) Tertiary-secondary boundary to a 4,830 meter circle of concern. Usually no blasting or large helicopter activities are permitted during restriction period. Most other management activities are allowed, but only after special review by a biologist experienced with peregrine falcon biology/applied habitat management.

Established zonal boundaries of protection areas are variable due to topography, aspect and exposure of the nest site, foraging opportunities surrounding the nest, and eggshell thinning determined through nest site entry (Page1 1991).

USFWS recovery planning effort

The USFWS Service is reviewing comments generated by the Jan. 1991 and June 1993 draft addenda to the Pacific States and Rocky Mountain/Southwest Recovery plans. The review process commenced in August 1993 when comments were due. No immediate date for the completion of that review has been announced.

Stepdown outlines delineated within the recovery plans (US Fish and Wildlife Service 1982, 1984) have had sporadic adherance. Agencies' inclination and/or ability to respond to their responsibilities for assigned research tasks have been limited or non-existant due to changing program emphasis expressed through funding and staff. Select employees, volunteers and private groups have shown

extreme dedication, committment, and professionalism during releases and subsequent surveying for wild sites.

Early peregrine falcon releases (via hacking) received "adequate" levels of funding, staffing and public attention. Recently, the perception of partial recovery has caused.funding and staffing for any efforts related to peregrine' falcons to have been eliminated or drastically reduced. Agencies have not responded to the need for continued emphasis to survey and monitor peregrine falcons. The Forest Service, BLM, USFWS and state agencies specifically have. garnered limited support for monitoring of'potential nest sites and proximal habitat following the successful release of 1,062 peregrine falcons and the fledging of at least 218 wild young in the Columbia River Basin.

Indeed, even if the peregrine falcon is eventually downlisted to a threatened status, cessation or reduction of a field emphasis for monitoring, management, and research may be premature. Stepdown outlines in the Recovery Plans, proposed addendum, and the ESA (Anon 1973) all indicate that monitoring specifically, and management and research implicitly are necessary tasks to complete as a listed species moves towards recovery.

Research/Management Needs

1) Annual or bi-annual survey of high potential and historic locations to locate/protect new nest sites, and assess recovery of the species.

2) Annual monitoring of known traditional nest sites to determine occupancy, reproductive success, and use of sites by released or wild-hatched birds.

3) Development of a sampling scheme to enter known nest sites to collect eggshell fragments, addled eggs, and prey remains of active-successful and failed nest sites.

   a) Analysis of eggshell fragments to determine thickness.

   b) Analysis of addled eggs to determine organochlorine contaminants including DDE, PCB, mirex, furans, and dioxin congeners.

   c) Analysis of prey remains to determine foraging preferences.

4) Entry of known nest sites to band/color band young.

5) Enhancement of nest sites where reproductive failure could be attributed to angular substrate induced eggshell breakage, ledge size or mammalian predator entry.

6) Development of site specific ecosystem protection plans at known nest sites to facilitate credible, pragmatic and realistic long-term "resource" planning efforts, and to eliminate/reduce disturbance potential.

7) Development of multi-state data-base to facilitate standardization of data collection, sample analysis, and habitat management throughout the Columbia River Basin states.

Key Points

a) The peregrine falcon population within the Columbia River Basin has been slowly increasing in numbers due to augmentation and'recent reproductive success at "wild" nest sites.

b) Peregrine falcons are still being affected by DDT/DDE and possibly other contaminants.

c) Peregrine falcons can be adversely affected by human generated activities that are proximal to their nesting habitat, and such disturbance can cause nest failure, nest/site desertion, egg breakage or'chick/egg displacement' from the nest ledge.

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Table 1. Productivity of wild peregrine falcon nest sites in ID, OR, MT, WA and WY from 1979 to 1994.

IDAHO

SITE #	Ownership	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
ID-01	USFS-TARGHEE		2	0	?	U	U	U	U	U	U	U	2
ID-02	USFWS-CAMAS					0	3	3	3	3	3	2	17
ID-03	USFS-TARGHEE					0	0	0	0	U	U	U	0
ID-04	USFS-TARGHEE						0	3	2	4	2	3	14
ID-05	USFS-TARGHEE							3	0	2	4	0	9
ID-06	BLM-ID. FALLS							2	3	2	3	2	12
ID-07	USFS-TARGHEE							0	2	0	0	0	2
ID-09	USFS- NEZ PERCE							3	2	4	4	1	14
ID-10	PRIVATE-BOISE (URBAN)							2	4	4	4	3	17
ID-11	USFS-TARGHEE								OCC	4	4	4	12
ID-12	STATE-ID FALLS									0	0	0	0
ID-13	USFS-TARGHEE										4	?	4
ID-14	STATE-ID. FALLS										0	0	0
ID-15	BLM-RIGGENS										1	0	1
ID-16	USFS-SAWTOOTH										1	2	3
ID-17	USFS-SAWTOOTH											1	1
	YEARLY TOTALS		2	0	0	0	3	16	16	23	30	18	108
	# OCCUPIED SITES/YEAR		1	1	?	2	3	8	9	9	13	13	59
	KNOWN # NEST SITES / YEAR		1	1	1	3	4	9	10	11	15	16	71
	Ave. young/nest site year		2.0	0.0	0.0	0.0	0.8	1.8	1.6	2.1	2.0	1.1	1.5

Table 1. Productivity of wild peregrine falcon nest sites in ID, OR, MT, WA and WY from 1979 to 1994 (continued).

	MONTANA													
SITE #	**Ownership**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**TOTAL**	
MT-09	USFS-BITTERROOT									0	2	2	**4**	
MT-10	USFS-BITTERROOT									OCC	NS	2	**2**	
MT-12	TRIBAL-S-KUTENIE											0	**0**	
MT-13	USFS-FLATHEAD											0	**0**	
	YEARLY TOTALS									**0**	**2**	**4**	**6**	
	# OCCUPIED SITES/YEAR									2	1	4	**7**	
	# NEST SITES / YEAR									2	2	4	**8**	
	ave. young/nest site/year									0.0	1.0	1.0	**0.8**	
	OREGON													
SITE #	**OWNERSHIP**	**1979**	**1980**	**1981**	**1982**	**1983**								
	USNPS-CRATER LAKE	2	0	M-2	M-2	0								
SITE #	**Ownership**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**TOTAL**	
OR-01	USNPS-CRATER LAKE	U	U	OCC	M-1	0	OCC	OCC	3	2	0	2	**9**	
OR-10	PRIVATE-NAT.CONS.						OCC	3	4	3	3	1	**14**	
OR-17	USFS-COL.GORGE NRA							0	0	U	U	U	**0**	
OR-24	STATE- PARK									2	0	0	**2**	
OR-25	USFS-COL.GORGE NRA							OCC	OCC	OCC	U	3	**3**	
OR-27	PRIVATE										0	4	**4**	
OR-29	USFS-FREMONT										0	3	**3**	
OR-34	USFS-H.CANYON NRA										0	0	**0**	
	YEARLY TOTALS	0	0	0	M-1	0	**0**	**3**	**7**	**7**	**3**	**13**	**35**	
	# OCCUPIED SITES/YEAR	0	0	1	1	1	2	4	4	3	6	7	**32**	
	# NEST SITES / YEAR	1	1	1	1	1	2	4	4	4	8	8	**38**	
	ave. young/nest site/year	0	0	0	M-1	0	0.0	0.8	1.8	1.8	0.4	1.6	0.9	

Table 1. Productivity of wild peregrine falcon nest sites in ID, OR, MT, WA and WY from 1979 to 1994 (continued).

	WASHINGTON												
SITE #	**OWNERSHIP**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**TOTAL**
WA-10-1	PRIVATE		OCC	3	NS	NS	NS	NS	1	0	OCC	U	**4**
WA-10-2	STATE-PARK				2	2	4	3	NS	NS	NS	U	**11**
WA-17-1	STATE-DNR					OCC.	OCC.	OCC.	OCC.	2	U	U	**2**
WA-27-1	USFS-CGNSA							OCC.	OCC.	OCC.	U	U	**0**
WA-??	PRIVATE (AC)									OCC	2	OCC	**2**
WA-20-2	PRIVATE									2	1+	2	**5+**
WA-46-1	STATE-PARK											2	**2**
WA-??	USFS-WENATCHEE (D)											3	**3**
WA-??	USFS-WENATCHEE (E)											2	**2**
	YEARLY TOTALS		0	3	2	2	4	3	1	4	3+	9	**31**
	# OCCUPIED SITES/YEAR		1	1	1	2	2	3	3	5	3	5	**26**
	# NEST SITES / YEAR		1	1	2	3	3	4	4	6	6	9	**39**
	average/nest site/year		0	3	1	0.7	1.3	0.8	0.3	0.7	0.5	1	**0.8**
	WYOMING												
SITE #	**OWNERSHIP**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**TOTAL**
WY-03	USNPS-TETON				0	4	0	0	2	0	0	2	**8**
WY-08	USFS-BRIDGER/TETON						3	3	1	3	2	3	**15**
WY-11	USFS-BRIDGER/TETON						2	U	U	U	U	U	**2**
WY-19	USFS-BRIDGER/TETON									0	2	0	**2**
WY-20	USFS-BRIDGER/TETON									0	3	2	**5**
WY-21	USNPS-YELLOWSTONE									2	0	0	**2**
WY-25	USFS-BRIDGER/TETON										0	2	**2**
WY-31	USNPS-YELLOWSTONE											2	**2**
WY-32	USNPS-TETON											0	**0**
WY-35	UNKNOWN-NEW EYRIE											0	**0**
	YEARLY TOTALS				0	4	5	3	3	5	7	11	**38**
	# OCCUPIED SITES/YEAR				1	1	3	2	2	5	6	9	**29**
	# NEST SITES / YEAR				1	1	3	3	3	6	7	10	**34**
	ave. young/nest site year				0.0	4.0	1.7	1.0	1.0	0.8	1.0	1.1	**1.1**

Table 1. Productivity of wild peregrine falcon nest sites in ID, OR, MT, WA, and WY from 1979 to 1994. (continued).

Original ID, MT, and WY data courtesy of B. Mutch, The Peregrine Fund,

Original WA data courtesy of H. Allen and D. Anderson, Washington Department of Fish andWildlife, and J. Pagel (notes).

Original OR data from B. Walton, Santa Cruz Predatory Bird Research Group, M. Nugent, Oregon Department of Fish and Wildlife (notes), C. Stock (notes), and J. Pagel (notes).

Additional WY data from T. McEcany, Yellowstone National Park via R. Oakleaf (per com.).

Review of this data base courtesy of R. Oakleaf (WY), A, Dudd (MT), E. Levine (ID) and D. Anderson (WA).

Table 2. Listing of total number of peregine falcons that have been augmented in Columbia Basin states. Data from Peregrine Fund 1994 Annual Report, via per com. with J. Linthicum, Santa Cruz Predatory Bird Research Group.

STATE	ATT/SUC	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
WA	ATTEMPTED							3	5	5	14	15	21	11	21	11	**106**
	SUCCESSFUL							1	5	5	18	18	13	9	20	5	**94**
OR	ATTEMPTED							4	8	10	16	21	25	19	16	13	**132**
	SUCCESSFUL							3	5	8	14	19	22	18	15	12	**116**
ID	ATTEMPTED			8	12	14	20	9	18	34	38	32	32	22	12	27	**278**
	SUCCESSFUL			8	9	13	15	3	13	29	32	30	29	18	10	23	**232**
MT	ATTEMPTED		4	8	8	12	25	13	23	36	39	36	37	47	64	47	**399**
	SUCCESSFUL		4	6	4	10	22	12	18	32	36	27	32	33	43	36	**315**
WY	ATTEMPTED	11	8	14	19	21	30	21	25	39	30	31	25	32	34	26	**366**
	SUCCESSFUL	9	6	9	18	20	25	12	20	33	22	27	23	26	30	25	**305**
TOTAL	ATTEMPTED	11	12	30	39	47	75	50	79	124	137	135	140	131	147	124	**1281**
	SUCCESSFUL	9	10	23	31	43	62	31	61	107	122	121	119	104	118	101	**1062**

Table 3. Summary table indicating state and regional natural yearly peregrine falcon productivity, number of occupied nest sites, number of known nest sites, and average number of young produced per known nest site from 1979 to 1994.

	PRODUCTIVITY/YEAR	1979-83*	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
ID				2	0	0	0	3	16	16	23	30	18	108
MT											0	2	4	6
OR	(+ 1979-1983 N=2 YOUNG)	2	0	0	0	M-1	0	0	3	7	7	3	13	35
WY						0	4	5	3	3	5	7	11	38
WA				0	3	2	2	4	3	1	4	3+	9	31
	TOTAL	2	0	2	3	2	6	12	25	27	39	45	55	218
ID	# OCCUPIED SITES/YEAR			1	1	?	2	3	8	9	9	13	13	59
MT											2	1	4	7
OR		3	0	0	1	1	1	2	4	4	3	6	7	32
WY						1	1	3	2	2	5	6	9	29
WA				1	1	1	2	2	3	3	5	3	5	26
	TOTAL	3	0	2	3	3	6	10	17	18	24	29	38	153
ID	KNOWN NEST SITES / YEAR			1	1	1	3	4	9	10	11	15	16	71
MT											2	2	4	8
OR		1(3)	1	1	1	1	1	2	4	4	4	8	8	38
WY						1	1	3	3	3	6	7	10	34
WA				1	1	2	3	3	4	4	6	6	9	39
	TOTAL	1(3)	1	3	3	5	8	12	20	21	29	38	47	190
ID	AVE. YOUNG/NEST SITE/YEAR			2.0	0.0	0.0	0.0	0.8	1.8	1.6	2.1	2.0	1.1	1.5
MT											0.0	1.0	1.0	0.8
OR		0.7	0	0	0	M-1	0	0.0	0.8	1.8	1.8	0.4	1.6	0.9
WY						0.0	4.0	1.7	1.0	1.0	0.8	1.0	1.1	1.1
WA		0.7	0	0	3	1	0.7	1.3	0.8	0.3	0.7	0.5	1	0.8
		0.7	0.0	0.7	1.0	0.3	1.2	0.9	1.1	1.2	1.1	1.0	1.2	1.0
******	OREGON													
SITE	OWNERSHIP		1979	1980	1981	1982	1983							
OR	USNPS-CRATER LAKE		2	0	M-2	M-2	0							
	M= Manipulated nest													

Table 4. Ownership of peregrine falcon nest sites in the Columbia Basin Assessment Area.

OWNERSHIP	ID	MT	OR	WA	WY	TOTAL	%OWNERSHIP
USFS	10	3	4	3	5	**25**	53.2
USFWS	1	0	0	0	0	**1**	2.1
USBLM	2	0	0	0	0	**2**	4.3
USNPS	0	0	1	0	4	**5**	10.6
STATE	2	0	1	3	0	**6**	12.8
TRIBAL	0	1	0	0	0	**1**	2.1
PRIVATE	1	0	2	3	0	**6**	12.8
UNKNOWN	0	0	0	0	1	**1**	2.1
TOTAL	**16**	**4**	**8**	**9**	**10**	**47**	**100.0**
% TOTAL/STATE	34.0	8.5	17.0	19.1	21.3	**100.0**	