

State of California
The Resources Agency
Department of Fish and Game

**Evaluation of Petition to Delist
American Peregrine Falcon
(*Falco peregrinus anatum*)**

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**Wildlife Branch
Nongame Wildlife Program Report 2007-03**

September 2007

Suggested Citation for this report:

Comrack, L. A. and R. J. Logsdon. 2007. Evaluation of Petition to Delist American Peregrine Falcon (*Falco peregrinus anatum*). California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2007-03. 26pp.

**Evaluation of Petition to Delist
American Peregrine Falcon (*Falco peregrinus anatum*)**

September 10, 2007

EXECUTIVE SUMMARY

This report was prepared in response to a petition received by the Fish and Game Commission (Commission) on May 1, 2007 from Mr. Gary R. Alten, private citizen, to delist the American Peregrine Falcon (*Falco peregrinus anatum*) as an endangered species. (See generally Fish & Game Code §2073.5, subd. (a); Cal Code Regs., title 14, §670.1, subd. (d)(1).)

Conclusions

The Department of Fish and Game (Department) has reviewed the petition to delist the American peregrine falcon as an endangered species pursuant to §2067 of the Fish and Game Code. As required in §§2072.3 and 2073.5, the Department has evaluated the sufficiency of information presented in the petition and supporting data. The Department believes the petition does include sufficient scientific information to indicate that the petitioned action may be warranted.

The petition and supporting information provided sufficient scientific information to indicate that the petitioned action, or at least downlisting to “threatened” status, may be warranted. In making this determination from the petition and supporting information, the Department relied upon the following key findings:

- 1) Peregrine falcon breeding range in California has recovered to include most of the historic breeding range;
- 2) Peregrine falcon breeding population size has increased dramatically and may have reached historic levels within California, as best as can be determined given the uncertainty of the historic population data;
- 3) The U.S. Fish and Wildlife Service (Service) delisted the peregrine falcon in 1999 and has an ongoing monitoring program, contingent on funding, to document breeding status of this species through the year 2015. A sub-set of nest sites will be monitored in California every three years, providing current occupancy and productivity data for the State’s peregrine population;
- 4) The captive breeding and reintroduction program established in the 1970s was highly successful in aiding the recovery of the peregrine in California;
- 5) The threat posed to peregrine falcon nesting populations in California by organochlorine pesticide contamination appears to be lessened by the restrictions imposed on the use of these substances in the U.S. and Canada since the 1970s. However, “hot spots” remain in the State and need further evaluation as to their impact on peregrine recovery.

**EVALUATION OF PETITION:
REQUEST OF MR. GARY R. ALTEN
TO DELIST
AMERICAN PEREGRINE FALCON
(*Falco peregrinus anatum*)
FROM ENDANGERED STATUS
UNDER THE CALIFORNIA ENDANGERED SPECIES ACT**

September 10, 2007

Introduction

A petition was submitted by Mr. Gary R. Alten on May 1, 2007 seeking action by the Fish and Game Commission (Commission) to delist the American peregrine falcon (*Falco peregrinus anatum*) from the endangered species list under the California Endangered Species Act (“CESA”; Fish & Game Code §2050-2116). In California, this subspecies is listed as “Endangered” under CESA. It is also a fully protected species under Fish and Game Code, §3511. The U.S. Fish and Wildlife Service (Service) delisted the American peregrine falcon under the federal Endangered Species Act (ESA) on August 25, 1999 (Federal Register Vol. 64, Number 164).

This report evaluates the information provided in the petition and includes the Department of Fish and Game’s (Department) recommendation as to whether the action may be warranted. CESA specifically requires the Department to “evaluate the petition on its face and in relation to other relevant information the department possesses or receives,” and to recommend to the Commission whether the petition contains sufficient information to indicate the petitioned action may be warranted (Fish & Game Code, §2073.5 (a); *see also* Cal. Code Regs., title 14 §670.1 subd. (d)(1)). In accordance with these requirements, this report analyzes and evaluates information contained in the petition and other relevant information known to the Department.

The petition and supporting information provided sufficient information to indicate that the petitioned action [or alternatively downlisting to “Threatened” status] may be warranted. The Department recommends, based upon the information contained in the petition and supplemental information gathered during the Departmental review, there is sufficient information to indicate the petitioned action may be warranted, and the petition should be accepted and considered.

Life History

The Department believes the petition and other relevant scientific information highlighted below provide an accurate description and overview of the species’ life history. The petition and other relevant scientific information evaluated by the Department indicate the peregrine falcon (peregrine) is an aerial specialist that has unique adaptations for flight and capturing prey. Peregrine morphology as described in the

petition, including molting patterns, can be highly variable, depending on the region. The petition was mostly accurate in citing the Birds of North America series (White et al. 2002), which the Department also used as a valid scientific source for the life and natural history of the peregrine, a brief summary of which is provided below (White et al. 2007).

Sexual dimorphism is prominent, with females said to be one-third larger than males in all dimensions. Definitive breeding plumage molt generally occurs in the second year; adult plumage is usually bluish-gray on the dorsal side, light on the ventral side. Head color in adults varies from all dark to displaying a prominent dark malar stripe of varying size, with lighter and often buff-colored neck and auricular region feathers.

Peregrines in the western states are now thought to generally begin breeding at age three, although the petition stated the more atypical younger age of two (Schmidt 2003). Time of year for breeding varies, with resident pairs in California seen copulating every month of the year (White et al. citing personal communication). Peregrines do not build nests, but scrape out a hollowed-out area of substrate such as sand, gravel, dirt, or decomposed matter. They typically nest on cliff ledges that vary in height, with a preference for ledges between 50 and 200 meters high. Tall trees are also used, although rarely in California. The petition did not mention that in California, other atypical nest sites are used, such as abandoned nests of ravens, hawks, or cormorants on sandy coastal bluffs without cliffs. They also use a variety of human-made structures in urban environments, such as buildings or bridges (White et al. 2007 citing Bell et al. 1996).

The petition states peregrines often lay three to four eggs, with incubation starting after the third egg. White et al (2007) more accurately states that incubation starts with the penultimate egg in temperate latitudes. Peregrines will lay another clutch if eggs are removed, with an observation of up to 20 eggs laid and an example of four complete clutches laid after being removed from a female in California (White et al. 2007 citing personal communication). Both sexes incubate for 34-35 days. The semialtricial hatchling has enough down to thermoregulate itself at about 10 days old. In colder climates, the parents continue to brood until this time, but it is not clear that this is required in temperate climates such as California. The petition states that males fledge as early as 35 days, with the larger females requiring about an extra week; White et al. (2007) indicates that first flight from the nest may occur as late as 40 days. Fledglings remain near the nest site to develop aerial and hunting skills for up to six weeks after fledging before they disperse. The average maximum lifespan varies between 16 and 20 years. The Department noted many sources with average lifespan estimates that ranged between 4 and 17 years and does not agree that 13 years, as stated in the petition, is necessarily an accurate average lifespan figure.

Peregrines tend to forage in open-space habitats. They usually hunt from a perched position, often above the air space in which other birds fly. Their unique flight adaptations allow special aerial techniques such as stooping down on prey with radar-recorded speeds of up to 144 km per hour (White et al. citing Alerstam 1987). The Department believes the measured speed of 242 miles per hour (389 km/hour), as stated in the petition, may be exaggerated for wild peregrines. The petition lists avian prey such

as pigeons, ducks, shorebirds, and passerines as the peregrine's prey base. While birds constitute the majority of peregrine food taken (up to 99% frequency), with pigeons and doves (Columbidae) being the most frequently taken birds, they also hunt mammals (primarily bats and some rodents), and on rare occasions amphibians, fish, and insects. For California, White et al. 2007 cited up to 190 species in the peregrine's prey base (B. Walton pers. comm.).

The Department believes the petition and other relevant scientific information cited provides an accurate description and overview of the species' life history, except where otherwise noted above.

Range and Distribution

The petition summarized the global range and distribution of the peregrine under the heading "Range, Territory, and Abundance". Some data on the range of the North American population were included in the petition (e.g. USFWS 2003) but in general, scientific references were lacking. However, no data were presented in the petition on the range and distribution of the species in California. The Department believes the relevant information presented below provides an accurate description and overview of the historic and current range of the species in California.

Historic Range in California

According to Grinnell and Miller (1944), the American peregrine falcon occurred the "entire length of the state, chiefly along seacoast and around the islands, but also, especially in winter, inland, normally west of southern desert divides." Peregrines nested in California at elevations ranging from sea level to about 6,000 feet elevation on the west slope of the Sierra and to 8,500 feet on the east side of the crest (Gaines 1992).

Historic nesting sites along the north coast included Castle Rock, Del Norte County, Trinidad, Humboldt County, Dry Creek, Sonoma County, Point Reyes and Tomales Point, Marin County. In the San Francisco Bay area, several eggs sets were collected at unnamed site(s) in Alameda County. The species was also documented nesting in the bay marshes of San Mateo and Santa Clara Counties. Many nesting sites were known from central and southern California including Pt. Lobos and Big Sur, Monterey County, Morro Rock, San Luis Obispo County, Gaviota Pass and Mission Canyon, Santa Barbara County, Corona del Mar, Orange County, and San Diego, San Diego County. Some interior nesting locales included Lava Beds National Monument, Siskiyou County, Mono Lake, Mono County, Santa Lucia Mountains, Monterey County, Mt. Diablo, Contra Costa County, the inner coast ranges of San Luis Obispo, San Benito and Kern Counties, and Escondido, San Diego County. Peregrines nested near Parker Dam at least until 1954 and probably at Imperial National Wildlife Refuge and Topock Gorge during the same time period (MVZ egg set data, Grinnell and Wythe 1927, Grinnell and Miller 1944, Hamilton and Willick 1996, Hunter et al. 2005, Lehman 1994, Roberson 1993, Rosenberg et al. 1991, Shuford 1993).

By the 1970s, the range of the peregrine in California was much more restricted. It was known to nest only at a few sites from Humboldt County east to Shasta County, south to Sonoma County. A few pairs continued to breed along the central California coast from Monterey County south to Santa Barbara County (Jurek 1989).

Current Breeding Range in California

The peregrine has reoccupied much of its historic breeding range in California (Figure 1). A summary of the species' occurrence in each region of the state follows. Along the north coast, peregrines are known to nest from the Oregon border south to Marin County; additionally, the northern Coast Ranges support nesting territories in Lake, Glenn and Napa Counties. There is confirmed nesting in the Klamath region including multiple sites in Siskiyou, Trinity and Shasta counties. There are scattered nesting sites throughout the Sierra Nevada from Plumas County south to Tulare County. The northeastern region including the east side of the Sierra holds only a few known nesting locations (Lassen County and Mono County). However, this region was historically sparsely populated by peregrines. The San Francisco Bay-Delta region supports multiple nesting territories including sites in San Francisco, Contra Costa, Alameda, Santa Clara, and Solano Counties. The central and southern California coastal regions continue to support nesting peregrines. Currently, the species nests from San Mateo County to the Mexican border, including the Channel Islands (SCPBRG 2007, Roberson 1993, Unitt 2004).

There are no recent nesting records for the Colorado River. Peregrines occur in the region only as winter residents and transients (Rosenberg et al. 1991). Although peregrines are encountered year-round at the Salton Sea, individuals found during the summer are likely visitors from the Gulf of California breeding population (Porter et al. 1988, Patten et al. 2003).

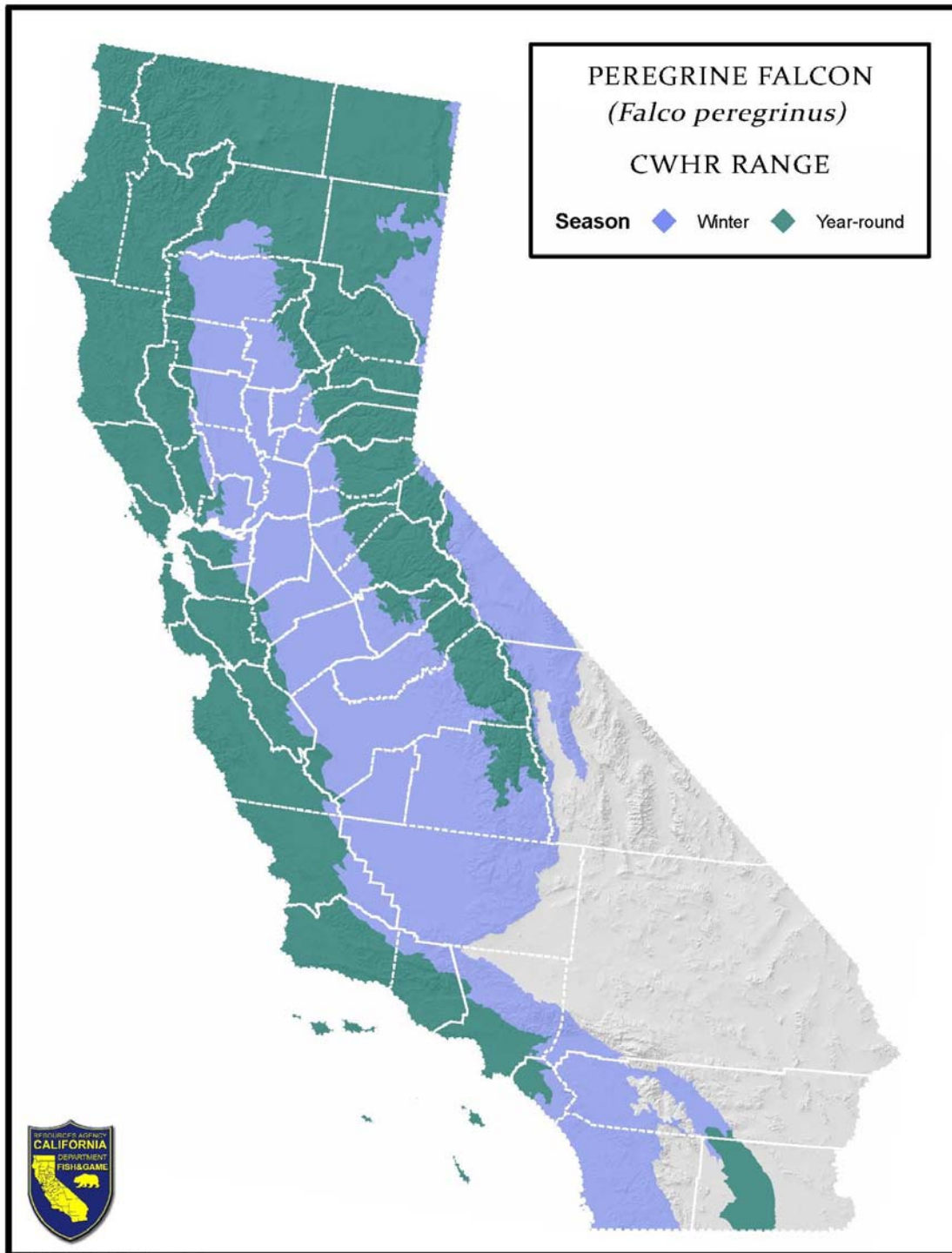
Winter Range in California

In winter, the peregrine "ranges along the entire coast from the Oregon border to the Mexican border and into adjacent mountains, valleys and lowlands, as well as along the entire Central Valley" (Small 1994).

Habitat Necessary for Survival

The Department believes the petition and its scientific sources provide a partially accurate description of the species' habitat requirements. The petition contained a limited discussion of habitat types necessary for all aspects of peregrine survival, including breeding, foraging, and roosting requirements. The petition and other relevant scientific information reviewed by the Department indicate that the range of the peregrine is cosmopolitan, and a wide variety of habitats are used depending on the region. In temperate climates, such as in California, they are found to inhabit rocky coasts and interior mountain ranges in higher densities than in other habitats (White et al. 2007). The following is a summary of the important habitat types necessary for peregrine survival

Figure 1. Current Range of the American Peregrine Falcon in California (CWHR 2007)



that were discussed in the petition, including important considerations that the Department determined were missing from the petition.

Nesting habitat considerations in the petition focused on the need for protecting coastal cliffs with high ledges that contain loose substrate for scraping. Protection measures should also be considered for sandy coastal bluffs that may contain abandoned corvid, hawk, or cormorant nests, which peregrines have also been known to use. The petition also referred to the peregrine's ability to adapt to urban environments where the requirements of food abundance and high buildings with suitable ledges are present. Accounts were cited of different types of urban structures that were seen being utilized by nesting peregrines; however, the Department would need to follow up on additional published scientific data indicating trends on the use of such urban habitats in California, as well as the impact of urban dangers for fledglings (Bell 1994). White et al. (2007) describe additional requirements to those stated by the petition, including nesting territories surrounded by open landscapes for foraging. Considering territoriality, there are minimum distance requirements for the amount of open landscape around each nest site necessary to avoid confrontation over food or perches. Additional considerations are that nest sites are usually associated with water and may require close proximity to rivers, lakes or coastal shorelines. Peregrines also occasionally nest in trees, in tree snag cavities, or in abandoned raptor nests in forest habitats (Polite and Pratt 2005). Though nesting in trees is not as common in California as it is in northern regions such as Canada, the Department still gives consideration to protecting these structures along riparian zones such as streams or rivers for peregrine nesting.

For foraging, the petition noted that coastal and inland wetlands supporting an abundance of prey species were important to peregrines, particularly barrier islands and their associated lagoons. Other types of open landscapes should also be considered for the other types of prey species peregrines consume, including the shores of inland lakes, which often have similar development pressures as coastal shores. The petition stated that the peregrine is "equally adept hunting in the city as in natural areas" without a citation to a scientific source. The Department would need to conduct further review of published scientific data regarding pressures or limitations on peregrine foraging techniques in urban environments. Peregrines also require high vantage points, usually near the nest site, from which they have an advantageous position for successful pursuit of aerial prey. These often include cliffs, bluffs, or man-made structures such as poles, towers, wires, buildings, or bridges. (See also discussion of these objects under "Threats" section.)

The Department believes the petition and its scientific sources provide a partially accurate description of the species' habitat requirements. While the importance of ledges, perches, and open space for foraging were acknowledged by the petition, the requirements for multiple uses and proper juxtaposition or arrangement of these habitat characteristics was underestimated. For example, ledges and perches of varying heights are not only used for the actual placement of the nest and for hunting, but also for different types of breeding rituals, behavioral displays, and self-maintenance such as sunning (White et al. 2007). Features offering predator protection, such as overhangs and sufficient height above the reach of ground predators, also limit ledge selection

(Wrightman and Fuller 2005). Thus, it is important to consider these features in addition to the general habitat requirements stated in the petition.

Abundance

The petition presented some data on abundance for the global and North American populations of the peregrine falcon under the section entitled “Range, Territory, and Abundance”. Adequate detail on the abundance of the California population was presented under the section entitled “Present Peregrine Population Trend and Status in California”, especially in Table 2 (Recent California Peregrine Population Data; petition page 15). However, the references selected were largely from websites and newsletters rather than peer-reviewed literature (e.g. Stewart 2007, SCPBRG 2006). Further, several of the references were erroneous or misleading and will be discussed below. However, the Department believes the petition and other relevant scientific information highlighted below provides an accurate description of the historic and current abundance of the peregrine falcon in California.

Historic Breeding Population in California

Grinnell and Miller (1944) considered the American Peregrine Falcon to be a “permanent resident, fairly common for a hawk...numbers, save locally, seem to hold fairly constant.” Willett (1912) described it as a “common” resident on the Santa Barbara [Channel] Islands although “less plentiful” in the interior. The actual size of the historic breeding population in California is unknown. Best estimates range from between 100 to 300 active eyries prior to the 1940s (Herman et al. 1970; Shuford 1993). Breeding densities were higher along the coast and lower in the interior including the Cascade range, Sierra Nevada and Great Basin (Bond 1946).

By the 1970s, the statewide population of the peregrine falcon had declined by about 90% from pre-1947 levels (Jurek 1989). Only 5 successful breeding pairs were documented by Herman (1971); Thelander (1976) found only 9 active nest sites. The statewide population was estimated at between 22-40 active pairs (Thelander 1977 in Walton et al. 1988).

The population decline was apparent in all regions of the state. Along the north coast, Shuford (1993) found no peregrines were documented nesting along the coastline north of San Francisco between 1971 and the mid-1980s, an area formerly supporting over 30 nest sites. The central coast had about 65 historical nest sites, twenty-four of which were known from Monterey County although not all were active in any given year (B. Walton pers. comm. in Roberson 1993, Shuford 1993). None of the historic sites were active by the mid-1960s (Davis and Baldrige 1980 in Roberson 1993). According to Shuford (1993), over 40 pairs of peregrines bred along the southern California coast and Channel Islands. By 1960, the species was essentially gone from all of southern California (Walton et al. 1988).

Current Breeding Population in California

Approximately 274 peregrine falcon nesting sites were documented as “active” (that is, used at least once since 1975) in the state through 2007 (Table 1; SCPBRG unpublished data). The results of the 2006 peregrine nest monitoring effort revealed that 236 known or suspected sites were sampled; 215 of these sites yielded some data. One hundred sixty seven sites had at least one adult present and 154 sites had an active pair present (SCPBRG 2007).

The population has increased substantially in the northern coast and northern interior and the central coastal areas of the state; the Sierra Nevada and the Channel Islands populations have grown since the 1970s (Table 1; SCPBRG unpublished data). Coastal southern California populations have also increased in recent years. San Diego County’s approximately 12 breeding pairs of peregrines were extirpated with no nesting reported between 1950 and 1989. By 2004, however, five pairs had established eyries in the county (Unitt 2004).

Productivity data for the peregrine falcon in California were presented in the petition. The petition warns that some of the recent productivity data may have been inflated; the Department had insufficient time to analyze the data set and thus can offer no opinion as to reliability. Results of the 2006 nest monitoring effort show an average fledge rate at successful nests was approximately 2 young per pair, with a minimum total of 146 young produced (SCPBRG 2007).

The petition contains several inaccuracies, misinterpretations, and errors regarding the current peregrine population size in California. Under the headings “Executive Summary” and “Present Population Trend and Status in California”, the petition correctly cites 271 known *nest sites* in 2006 but erroneously compares this figure with federal recovery goals for a population *size* of 120 pairs in California (USFWS 1982). Thus, the petition’s conclusions that peregrine population goals have been exceeded by 151 is incorrect. The two figures are unrelated. Additionally, the federal recovery plan of record is not the 1982 plan referenced in the petition but rather the addendum published in 1993. Further, the petition erroneously cites CDFG 2007 as a source for fledgling [sic] rate and incorrectly states the Department “has listed the Peregrine Falcon as recovered.” The website referenced shows, instead, the result of the recent *federal*, not state, action to delist the species.

Wintering Population in California

Peregrines winter statewide but are more numerous along the coast and at areas where prey (shorebirds, waterfowl) are concentrated. The resident population is bolstered by transients and winter visitants who breed elsewhere.

The Department believes the petition and other relevant scientific information highlighted above provides an accurate description of the historic and current abundance of the peregrine falcon in California, with certain exceptions noted.

Table 1. Peregrine Falcon Territories Active at least once since 1975 (SCPBRG data)

COUNTY	Number of Known Nest Sites (1975-2007)
Alameda	4
Butte	6
Calaveras	1
Contra Costa	4
Del Norte	5
El Dorado	2
Fresno	4
Glenn	1
Humboldt	22
Lake	3
Lassen	2
Los Angeles	19
Madera	3
Marin	7
Mariposa	4
Mendocino	29
Mono	1
Monterey	8
Napa	7
Orange	1
Plumas	3
Sacramento	1
San Benito	1
San Diego	6
San Francisco	3
San Luis Obispo	13
San Mateo	5
Santa Barbara	32
Santa Clara	3
Santa Cruz	5
Shasta	6
Siskiyou	17
Solano	2
Sonoma	10
Tehama	7
Trinity	15
Tulare	5
Tuolumne	3
Ventura	3
Yuba	1
Total	274

Population Trend

The petition includes adequate data from which population trend in California can be interpreted. However, the petition relies on newsletters and websites as data sources (e.g. Stewart 2007, SCPBRG 2006) rather than peer-reviewed scientific literature. The Department has reviewed this information along with supporting data; we find sufficient scientific information to indicate a population increase has occurred and continues through the present.

The breeding population of peregrine falcons in California has been steadily increasing following listing as an endangered species by the State of California and the federal government in the early 1970s and the concomitant management and protective strategies that resulted (restriction of DDT and management effort; Table 2). Passive and active management of the peregrine by state and federal government, private research and conservation organizations, notably the Santa Cruz Predatory Bird Research Group and the Peregrine Fund, effectively bolstered the California peregrine population through a highly successful captive breeding and nest augmentation program.

Table 2. Peregrine Falcon Breeding Population Size and Productivity in California, 1975 through 1989 (Jurek 1989)

YEAR	# Sites Observed ¹	# Sites Active ²	# of Young Fledged, Total ³	% of Young Released ⁴	# of Young Wild-Fledged ⁵
1975	10	7	12	0	12
1976	15	11	17	0	17
1977	17	12	20	5	19
1978	24	19	31	10	28
1979	37	28	37	14	32
1980	48	39	68	12	60
1981	50	38	61	30	43
1982	61	49	63	35	41
1983	67	52	67	49	34
1984	73	63	91	49	46
1985	88	70	105	27	77
1986	92	77	98	28	71
1987	100	79	108	22	84
1988	109	82	117	21	92
1989	103	90	117	15	99

¹ All sites where peregrines have occupied territories in any year since 1975.

² “Active” sites are those with a copulating pair of peregrines (seen or inferred). This summary excludes the number of sites annually observed to have one or more non-copulating birds (“occupied” sites).

³ Total number of young that fledged from manipulated and non-manipulated sites. Manipulated sites are those that received captive-hatched nestlings.

⁴ Of all young fledged from nests of wild peregrines, this is the proportion that had been captive-hatched and placed (“fostered”) into active nests.

⁵ Total number of young fledged from unmanipulated sites.

The Department is aware that other data sets exist regarding peregrine population size, occupancy, and productivity. We were unable to obtain these data during the review period but recommend an assessment of all population data be completed. The Department believes the scientific information in the petition and other relevant scientific information described above provides an accurate overview of the species' current population trend. We believe the population is increasing and the trend positive.

Factors Affecting the Ability of the Population to Survive and Reproduce

In general, the Department believes the petition and other relevant scientific information cited provide an accurate description and overview of the threats to the reproduction and survival of the peregrine falcon in California, except for the factors noted in the discussion below. A description and discussion of the degree and immediacy of these threats is presented in the following section.

The petition and other relevant scientific information evaluated by the Department indicate that the pesticide DDT and the use of other organochlorine pesticides (referred to as HEOD) were the most significant factors contributing to the precipitous decline of peregrine falcon populations between the late 1940s and the early 1970s, when the use of the pesticides was banned (White et al. 2007). Population declines due to reproductive failure were correlated with egg-shell thinning caused by DDT throughout North America, including in California (Peakall and Kiff 1988, Green et al. 2003). Contaminants in general are recognized by the Service as posing the most likely long-term future threat to peregrines, because there still remains a significant amount of exposure and vulnerability to inorganic compounds, and the effects on peregrines have not yet been adequately studied (Green et al. 2003, Mesta 1999).

Other factors related to mortality of peregrines, primarily within the first year, are accurately listed by the petition, as follows. Predators of young peregrines include other raptors, primarily great horned owls (*Bubo virginianus*) and golden eagles (*Aquila crysaetos*) (White et al. 2007, Mesta 1999). Especially if nests are on or near the ground, mammalian carnivores such as *Felis* species (cats) or canids (dogs) may also prey on young peregrines. Human disturbance was listed as another significant factor affecting peregrine survival. Disturbance of nesting sites can occur from recreational rock climbing; from activities of researchers, falconers, or egg collectors; and even occasionally from shooting (pers. comm. in White et al. 2007, Mesta 1999). Collisions with structures or objects are a significant threat, especially to fledglings practicing their novice flight skills and particularly in urban environments (Bell 1994, White et al. 2007). Electrocutions from collisions with electrical wires or towers commonly cause fatal accidents in both urban and rural environments (White et al. 2007).

Habitat degradation was considered another factor affecting peregrine populations, mostly in respect to loss of suitable nesting structures as a result of increasing commercial and residential development along the coast. Degradation of wetlands that would otherwise provide an abundance of shorebirds and other preferred peregrine food was also recognized as significantly detrimental to Peregrine survival

(White et al 2007, Mesta 1999). Shifting weather patterns, such as those related to the warming trends associated with climate change, are affecting the marine food web that supports the associated seabirds peregrines depend upon for foraging (White et al 2007). The petition provides citations of personal communications and observations of other weather phenomena directly destroying nests or killing young peregrines (e.g., unusually cold spring conditions, early storms, ephemeral waterfalls of unusual strength).

The petition also lists such factors as disease and parasites (e.g., Asian Bird Flu, West Nile Virus), construction of roads and quarries, heavy metals such as mercury, lead, and cadmium causing risks associated with poisoning, as well as polychlorinated biphenyls (PCBs) potentially causing liver damage or mortality. However, references were made to sources discussing birds in general or for peregrines outside of California, and the petition did not identify these as significant threats to peregrine populations. The Department has not reviewed scientific information that implicates these as significant threats to the peregrine's survival at the population level, and recommends further analysis.

Degree and Immediacy of Threats

The petition and other relevant scientific information cited below provide some important details about the threats to the reproduction and survival of the peregrine falcon in California. However, due to a lack of data available for some of these threats, and specifically from studies that apply to locally-affected regions within California, the Department cannot be certain that the petition adequately addresses all of the potential threats the peregrine might be facing now and in the future.

The petition did not provide a separate discussion that ranked the various threats it described in terms of degree and immediacy. It did, however, provide comments in the "Mortality and Related Factors" section regarding those threats the author considered to have minimal impact to Peregrines and why. The petition dedicated entire sections to discuss the details of the threats of DDT, other organochlorine pesticides, heavy metals, and considerations for habitat that may be jeopardized or lost due to human activities. The Department conducted a review of the petition and other scientific information to summarize the importance of each threat to the peregrine falcon today, as follows.

DDT

DDT (Dichloro-diphenyl-trichloroethane) is a modern synthetic insecticide that was used from the early years of World War II until it was banned in 1972. Its peak usage in the United States was during the late 1950s, with some of the heaviest concentrations dumped in California ocean waters between Los Angeles and the Channel Islands (Mesta 1999). When DDT is metabolized, it breaks down into a compound known as DDE (dichlorodiphenylethane), which accumulates in animal tissue and affects predators higher in the food chain. Coinciding with consumption of prey species with high bioaccumulations of DDE, peregrines suffered a sharp decline in reproduction and a near population crash. Many studies correlated decreases in peregrine eggshell thickness with

increased DDE concentrations in the eggshell membrane (Cade et al. 1971, Enderson and Wrege 1973, Peakall and Kiff 1988). Following the ban of DDT in 1972, population recovery in the U.S. was positively correlated with reductions of DDE detected in peregrine falcon tissues and eggs, and these reductions were positively correlated with increasing eggshell thickness (Henny et al. 1996, Mesta 1999, White et al. 2007).

It is recognized by the Department and the Service (Mesta 1999) that DDT contamination still presents a threat to current reproductive levels and survival of the peregrine, particularly in isolated regions such as California's Channel Islands. The high residual levels of DDE and resulting eggshell thinning still pose a significant threat to populations in this region, and this threat is compounded by additional high concentrations of other environmental contaminants released in this area (Mesta 1999). Service biological monitoring results in 2003 indicate that the Pacific Region, which contains California, had either the lowest or second to the lowest figures reported for such population health indicators as percent of territory occupancy, nest success, and productivity in comparison with the other monitoring regions in the United States (Green et al. 2006). Because egg shell thinning and DDT measurements were not included in the Recovery Plan goals for the Pacific Region, it is not clear whether or not these goals would have been met, had they been set. The petition did not provide substantial scientific citations indicating that DDE concentrations in the tissues and eggshells of southern California peregrine populations have decreased to levels suitable for recovery, and monitoring efforts are still underway in 2007. DDE contamination in migrant peregrines and prey species from Latin American countries is also recognized by the Department and the Service as a potential threat to California populations; however, California favors a higher density of year-round resident peregrines (White et al. 2007, Mesta 1999).

Productivity numbers exceeding the Service recovery goals for the Pacific Region could have been confounded by temporally ephemeral increases due to the release of captive-bred young or dispersals from other areas (Mesta 1999, Pagel et al. 1996). Therefore, the Department has determined that residual DDT continues to present a high risk for peregrines in California, and current data from monitoring peregrines in the Channel Islands should be evaluated before the degree of the threat is determined.

HEOD

Other organochlorine pesticides, collectively called HEOD, are listed as another threat that contributed significantly to the severe peregrine population decline of the late 1950s, but not in North America (Newton et al. 2000). HEOD, which includes aldrin and dieldrin, was introduced in the U.S. shortly after DDT and its use was restricted in 1974, although it was not completely banned. The petition and other scientific sources indicate that HEOD causes lethal poisoning of adult birds but does not have the same effect as DDT on reproductive failure due to eggshell thinning. To determine whether or not HEOD contributed to peregrine reproductive failure and to what degree, the Department would need to locate literature that presents an adequate multivariate analysis of both

HEOD and DDT to determine which impacts were caused by HEOD independently of DDT in California.

The majority of HEOD-related peregrine mortalities occurred in Great Britain, and the few fatalities reported in North America that are attributed to HEOD are said to be mostly circumstantial (White et al. 2007). The Department considers HEOD alone to be a low-degree risk, but it should be cautiously considered as part of the larger threat of extant local source contamination causing reproductive failures in the region of the Channel Islands (Mesta 1999).

Habitat Degradation

The petition and other scientific sources indicate that destruction of habitat for both breeding and foraging could have a significant impact on peregrine survival and reproduction, but a measurement of such impact would be difficult to develop given the wide variety of habitats and landscapes used by peregrines (White et al. 2007). In California, coastal and mountain development continually degrades the quality of potential nesting sites with suitable characteristics (for example, cliffs with ledges that have an appropriate height and cover—see Habitat section). The petition indicates that Peregrines are resourceful enough to find suitable alternative nesting sites within a variety of urban or natural structures and substrates, and Mesta (1999) did not consider habitat degradation to threaten peregrine populations now or in the foreseeable future. Biological monitoring would need to be continued statewide to determine peregrine use of these alternate nesting sites, as well as the rate of fledging success from such nests, to determine the degree of the impact.

The Department also considers degradation of wetlands as a threat. The majority of literature reviewed concur that peregrines favor open wetlands for foraging on waterfowl and shorebirds, and the loss of such foraging grounds could be detrimental to local peregrine populations. Conversion of wetlands to agriculture or commercial use affects the abundance of migratory or resident birds that use these areas for feeding or breeding grounds; peregrines depend upon such prey to exploit and cache during their breeding season (White et al. 2007). White et al. (2007) also indicates that fixation on a certain prey base may result in increased skill in capture; thus a change in the landscape within a peregrine's foraging territory could cause a change in the prey available and a resulting decrease in hunting success.

Bird species that constitute a large proportion of the peregrine's diet, such as pigeons and doves, congregate in cultivated landscapes that resulted from the degradation of natural habitats such as forests. In California, over half of the peregrine's diet may be composed of seabirds such as alcids and urban-dwelling gulls, particularly in the winter (White et al. 2007). The Department cautiously agrees with the petition's determination that the combination of peregrine resiliency in habitat selection and existing habitat protection and enhancement programs could mitigate the potential for habitat degradation occurring in California.

Human Disturbance

The degree of human disturbance impacts on the peregrine varies, depending on the location of the population. In mountainous regions that are frequently-visited recreation areas, such as Yosemite National Park, human activity such as rock climbing may cluster around the same cliffs with conditions favored by peregrines for nesting. Rock climbing in California is becoming an increasingly popular activity. There are localized programs in place that educate and restrict climbing, including closures during the breeding season, so that such disturbances do not cause permanent nest abandonment or other detrimental effects on peregrine populations. However, pairs in remote locations tend to be more reactive to human disturbance (White et al 2007). In the greater Los Angeles area, direct mortality from shooting was still a problem within the last decade; however, there was no evidence of these direct mortalities causing an increase in nesting failures (B. Walton pers. comm. *in* White et al. 2007). The Department recognizes that the combination of recreational activities and the intentional approach of nests for the purposes of research, falconry, or illicit egg collection, particularly in remote areas, may present a moderate threat to the survival and reproduction of peregrines.

Collisions and Electrocutions

Collisions with structures and stationary or moving objects are considered a threat to peregrines nesting and foraging in urban environments, particularly for fledglings that are still practicing novice flight skills (Bell 1994). In California, drowning fatalities occur when peregrines nest on bridges, and electrocutions from collisions with wires are common in rural environments (B. Walton pers. comm. *in* White et al. 2007). The petition acknowledges that peregrine use of urban landscapes for nesting and foraging is increasing as California becomes more developed, but it does not address the corresponding increase of mortalities associated with such use of human-developed land. In the Pacific Region (including California), a relatively small amount of peregrines use urban versus natural environments (see Habitats section); therefore, such collisions may not present a significant threat to peregrine populations statewide. This threat should be considered significant in urban populations, particularly in Southern California, where such mortalities could augment other threats that are significant to the region.

Predators

Predation of peregrine adults by larger raptors such as eagles and owls is considered a minor threat to the peregrine and is not known to have any effect at a population level (Mesta 1999). Predation of nestlings and younger falcons occurs more frequently by mammals and other birds when nest sites lack such protective characteristics as ledge cover or are too low near the ground. Predation pressure on young peregrines could increase as an indirect effect of other threats; for example, degradation of nesting habitat could cause birds to select nests without ideal protection characteristics, or human disturbance of nests could cause birds to fledge prematurely (White et al. 2007).

In general, mortality rates of first-year peregrines fall within 40-50%, due to predation as well as other factors (White et al. 2007). The Department recognizes that first-year survival of peregrines in California could be affected by direct or indirect causes of predation. The Department recommends evaluating whether or not these predator-related mortalities contribute to a trend in first-year survival rates in California.

Weather

Unusual climate conditions such as early or extra-torrential storms, excessive spring water runoff, increased toxicity resulting from warming water trends, and other weather phenomena are recognized by the petition and other scientific sources as potential threats to wildlife populations in general, and the peregrine is no exception. Particularly in California, where a large proportion of the peregrine's diet comes from marine ecosystems, changes in climate can alter the abundance and types of prey the peregrine relies upon and can indirectly cause adult mortality or reduced foraging success. The petition lists a number of anecdotal accounts of weather-related nest failures during the breeding season. While such weather-related factors are not considered a threat at the population level nationwide (Mesta 1999), the Department recommends evaluating whether or not these accounts of weather-related mortalities contribute to any trend in first-year survival rates.

Management conflicts with other sensitive species

Management conflicts arise when peregrines occur in areas occupied by other species listed as threatened or endangered. The California least tern (*Sternula antillarum browni*), a State and federally-listed endangered species and the western snowy plover (*Charadrius alexandrinus nivosus*), a federally-listed threatened species, both nest along the beaches and strands of coastal California. Peregrines, known to prey upon these species, may be hazed from these sensitive nesting sites if the predation pressure exerted is excessive. Hazing or other harassment activity would only be undertaken with appropriate State and federal permits.

Impact of Existing Management Efforts

The petition, Mesta (1999), and other scientific sources list a number of management efforts that are currently underway to monitor peregrine falcon populations for the purpose of ensuring recovery goals are being met and to continue to enforce certain protection measures against excessive mortality rates, reproduction failures, and habitat degradation. The Department summarizes these programs below, with comments regarding the degree of efficacy.

Management of Factors that Cause Mortality or Nest Failure

There are controls in place for the protection of California birds in general that are particularly beneficial to peregrines. For example, peregrines spend a considerable amount of time in the air while foraging, displaying, defending territories, or practicing

flight-intensive hunting skills. The Service and California Energy Commission (CEC) are working to control problems with electrocution caused by collisions with electrical towers and wires. Power companies are provided with guidelines to construct towers and lines designed to mitigate potential collisions, to report such collisions and resulting mortalities, and in some cases, are prosecuted and fined for these deaths (USFWS 2005, SCPBRG 2007). The SCPBRG is cooperating with other agencies or associations on a number of funded projects that monitor the mortality rates of raptors due to electrocutions and the efficacy of the existing programs. The Department concurs that the above management efforts are effective in mitigating this source of peregrine mortality.

Human disturbances such as rock climbing are managed by the agencies that govern the land (e.g., National Park Service, U.S.D.A. Forest Service, California Department of Parks and Recreation). Some historical and current breeding sites throughout California are officially closed during the peregrine breeding season (Access Fund 2006). Additionally, State and federal agencies post seasonal restrictions and publish educational pamphlets warning the public about peregrine nesting. While these are undoubtedly helpful in mitigating mortality and nest failure within these localized regions, it should be noted that some of the closures are voluntary, and much of this mitigation depends upon the education and decisions of the climbing community. Remote climbing areas not on governed lands do not have these measures in place, and Peregrines in remote areas are more susceptible to human disturbances than peregrines accustomed to human presence (White et al. 2007). Furthermore, researchers and falconers are managed only by broad-purpose permits and regulations (e.g., federal Migratory Bird Treaty Act collecting or banding permits, scientific research memoranda of understanding), and the permitting agencies do not always have the resources available to effectively evaluate all activities that are being permitted at very specific and localized levels. In 2001, the Service implemented focused management plans with biological criteria for falconry take of nestlings, which improves the impact to California populations by imposing limits on the number of individuals taken (USFWS 2001). Illegal disturbances are managed by a limited amount of enforcement personnel. Overall, these management activities have limited efficacy in controlling the problem of human disturbances.

Population and Recovery Goals Management

Though eggshell thickness and contaminant level measurements were not listed as a Service recovery goal for peregrines in California, there have been ongoing monitoring efforts in the Channel Islands region of the establishment of territories, nests, and reproductive success. As surveys continue in 2007, eggshell fragments or addled eggs are being collected from nests to provide data for contaminant analysis (SCPBRG 2007), but it is not clear what contaminants are being analyzed or if eggshell thickness measurements are also being taken. The Southern California Bight (which includes nearshore waters from Pt. Conception to the Mexican border) is the focus of a multiagency Montrose Settlement Restoration Program, under which all natural resources affected by the high concentrations of DDTs and PCBs are studied and restored. Peregrine management options currently under consideration include restoring local

island populations, acquiring and enhancing habitats at specific regional levels, and creating a peregrine falcon management group (NOAA 2004). The Department considers these options as viable management tools, but until they are implemented and current monitoring efforts are completed, their effectiveness is unknown.

The Service continues monitoring indices of population health under the peregrine falcon post-recovery monitoring plan (Green et al. 2003). These indices include territory occupancy, nest success rates, and productivity (e.g., number of birds successfully fledged per nest). Random populations are being sampled over the entire Pacific Region, which includes four other states, and for five sampling periods at three-year intervals (Green et al. 2003). Data gathered on a temporal and spatial scale as large as this will give information about overall trends of potential population declines on a national level, but not necessarily on a regional level within the State. It would be effective for California populations only if supplemented with additional localized surveys, such as the one described in the paragraph above. The petition also refers to the contaminants-monitoring component of this study. It is not likely that the contaminants monitoring funded by the Service will occur in the Pacific Region, since the recovery goals for such measurements were only set for two of the other regions (Alaska and Rocky Mountains/Southwest) (Green et al. 2003, Mesta 1999). Therefore, these efforts would have a very limited impact on California populations.

Habitat Management

Under the section entitled “Habitat Considerations”, the petition lists a large number of laws and programs that protect natural habitats on the State and federal levels. The Department agrees that the list of agencies, programs, and laws concerned with habitat stewardship is extensive, but it must also consider the broad scope of the protections. While peregrines undoubtedly are contained within the larger set of wildlife species affected by these programs, habitat management impacts for peregrines would be better realized by concentrating on restoration, acquisition, and prevention of degradation for those habitats deemed specifically critical to peregrine natural history. Some of these programs and agencies focus on the protection of wetlands (e.g., waterfowl habitat protection programs, wetland conservation programs), and these programs will confer a higher management impact to peregrine foraging success. Management programs that directly restore, acquire, or regulate specifically defined habitat areas suitable for peregrine territories (such as those being considered by the Montrose Settlement Restoration Program described above) would have a much more significant impact on recovering and sustaining Peregrine populations.

The Department believes the petition and other relevant scientific information cited provide a partially accurate overview of the current management impacts on peregrine recovery; however, many of the programs described are either too broad in scope or geography to be considered effective for the problems facing peregrines in isolated regions within California.

Captive Breeding Program

Jurek (1989) provided an overview of the captive breeding program established for the peregrine in California as follows. The SCPBRG and The Peregrine Fund established a captive breeding program and release of young to the wild at facilities at the University of California, Santa Cruz. This project was multi-faceted and included collecting and captively incubating wild-laid, thin shelled eggs; breeding of peregrines in captivity; hatching of captive-laid and wild-collected eggs; and releasing young birds into the wild. Release methods included several processes: “Fostering” in which nestlings were placed into nests where eggs had previously been collected and replaced temporarily by artificial eggs and the wild parents then cared for the young; “cross-fostering” included putting captively –hatched nestling peregrines into the nests of wild prairie falcons (*Falco mexicanus*) in place of translocated prairie nestlings; and “Hacking” whereby groups of captively raised peregrine nestlings were released from artificial nesting structures without contact with humans or wild adults.

By the close of the active captive breeding program in 1992, approximately 800 peregrines had been released to the wild. Peregrine falcon nests are now manipulated only as a result of intervention resulting from human impacts or need to salvage young from unsafe urban nest situations.

Suggestions for Future Management

The petition did not include recommendations for future management of peregrines in California. Under the heading “Management and Protection”, the petition described the federal post-delisting monitoring program.

The petition noted that the peregrine falcon will continue to be protected under the federal Migratory Bird Treat Act (MBTA) and other federal laws after a State delisting action. Not mentioned but relevant to this discussion, the American peregrine falcon is a Fully Protected species under Fish and Game Code §3511. Both the MBTA and the Fully Protected statutes protect peregrine falcons from take, except under limited conditions by special permit (usually restricted to scientific research activities as approved by the Service or the Department, respectively). However, neither of these protections contains a provision to protect the peregrine from disturbance or harassment situations that could potentially cause injury to the species short of take. The MBTA protects nests of the peregrine as long as eggs or chicks are present. Additionally Fish and Game Code §3503 “Unlawful destruction of nest or eggs” provides protection against needless destruction of nests and eggs while Fish and Game Code §3503.5 “Birds-of-prey or their eggs” provides protection against take, possession or destruction of raptor birds, nests or eggs.

The Department needs to work with the Service, US Forest Service, National Park Service, Bureau of Land Management, and other affected federal and state agencies, universities, researchers, Santa Cruz Predatory Bird Research Group, the Peregrine Fund,

other conservation organizations and other interested parties to identify and prioritize future management needs for the peregrine falcon. A memorandum of understanding that addresses peregrine falcon conservation may be desirable between State and federal entities.

Future management of the peregrine falcon needs to address the following:

- The Department recommends continued monitoring of mortalities resulting from collisions with electrical power lines and towers. The committee tabulating such mortality data from different sources should also coordinate with scientists who are analyzing general mortality trends (such as first-year mortality rates) to determine the degree these mortalities contribute to these trends and the efficacy of current guidelines and regulations.
- Improve regulation and education programs regarding human disturbances of falcon nests in natural habitats. A multi-agency committee could be formed to oversee this effort.
- Implement Southern California Bight peregrine falcon restoration ideas that were under consideration by the Montrose Settlement Restoration Program Trustees (NOAA 2004). Continue monitoring efforts and contaminant analyses, which should include levels of DDE, HEOD, PCBs and heavy metals (mercury, lead, and cadmium). Eggshell thickness should also be analyzed.
- Implement monitoring studies similar to the above-mentioned Southern California Bight surveys in other localized regions of California, to supplement the larger-scale post-recovery Service monitoring plan for the Pacific Region (Green et al. 2003). These should include contaminant analyses as described above.
- Implement management programs that directly restore, acquire, or regulate specifically defined habitat areas suitable for peregrine territories (in addition to those being considered by the Montrose Settlement Restoration Program). Habitat improvements and manipulations should be continued to provide nesting structures with predator-protection characteristics and safe placement of alternate nesting sites (e.g., safe for fledglings practicing flight) (White et al. 2007).

Availability and Sources of Information

In evaluating the petition, the Department consulted with knowledgeable Department staff as well as peregrine falcon experts and reviewed published and unpublished information. Notably, Janet Linthicum and Brian Latta, Santa Cruz Predatory Bird Research Group kindly provided detailed information and assistance.

The petition and supporting information used in this report are available at the following address and telephone contact: California Department of Fish and Game, Wildlife Branch, Attn: Lyann Comrack, 1812 9th Street, Sacramento, CA 95814; telephone (916) 341-6981.

Detailed Distribution Map

The petition included a generalized range map for peregrine falcon breeding range in California. The Department's Wildlife Habitat Relationship program provided an accurate range map depicting both current breeding and wintering range in California (Figure 1).

Summary of the Evaluation of the Petition

The petition and supporting information provided sufficient scientific information to indicate that the petitioned action, or at least downlisting to "threatened" status, may be warranted. In making this determination from the petition and supporting information, the Department relied upon the following key findings:

- 1 Currently, peregrine falcon breeding range in California has recovered to include most, but not all, historic breeding range;
- 2 Peregrine falcon breeding population size has recovered to historic levels in California, as best as can be determined given uncertainty of the historic population size;
- 3 The Service delisted the peregrine falcon in 1999 and has an ongoing monitoring program to document breeding status of this species through the year 2015. A sub-set of nest sites are monitored in California every three years. Thus a sub-set of the California population is currently being monitored, contingent upon available funding.
- 4 The threat posed to peregrine falcon nesting populations in California by organochlorine pesticide contamination appears to be lessened by the restrictions imposed on the use of these substances in the U.S. and Canada. However, "hot spots" remain and need further evaluation.

The Department would need additional time to work with peregrine falcon experts, the Service, and others to tabulate and analyze definitive population numbers of peregrines for California, especially for the last decade. Peregrine falcon breeding success outside the boundaries of California, while not relevant to this delisting effort, could yield important information on overall regional health of the species and should be reviewed and considered. Additionally, Christmas Bird Count data should be analyzed for winter range and population trend information. The state delisting petition will require an intensive evaluation of the status of the peregrine falcon in California.

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