

# STATUS OF THE PEREGRINE FALCON (*Falco peregrinus*) IN BRITISH COLUMBIA



Photo: Canadian Wildlife Service

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## EXECUTIVE SUMMARY

The Peregrine Falcon (*Falco peregrinus*) is a rare raptor that occurs in many regions of British Columbia. There are three subspecies in the province, two that breed and one that occurs as a migrant. Peale's Peregrine Falcon (*F.p. pealei*) breeds, and is largely resident, in the harsh landscape and environment of the Queen Charlotte Islands, northern Vancouver Island, and islands and headlands of the central and north mainland coast. It is listed as a species of Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Surveys in 2000 found 96 occupied territories, mainly on the Queen Charlotte Islands. This subspecies escaped the population crashes experienced by other subspecies in North America due to pesticide poisoning in the 1950s and 1960s. Populations did decline locally in the 1950s but the reasons for the decline remain uncertain. More importantly, over the last 45 years, Peale's Peregrine Falcon populations have remained stable. At present, there are few concerns for nesting or foraging habitats as both are plentiful and not under significant threat. Conservation concerns lie mainly with the abundance and distribution of Peale's favourite prey, small burrow-nesting seabirds. Most seabird colonies in British Columbia are within protected areas but populations are vulnerable to oil spills, introduced mammalian predators and large scale environmental impacts from global warming and changes in oceanic productivity. If seabird numbers decline, then Peale's Peregrine will likely suffer. Efforts to restore some seabird populations will likely benefit Peale's Peregrine.

The American Peregrine Falcon, "*anatum*" subspecies (*F.p. anatum*), is a bird familiar to many as one of the icons of the environmental movement after the late 1960s. It is currently listed as Threatened by COSEWIC, after being downlisted from Endangered in 1998. The American Peregrine Falcon has a fascinating history in British Columbia. This subspecies formerly occurred in interior British Columbia and in much of the rest of interior North America south of the treeline. Populations across North America suffered catastrophic declines in the 1950s and 1960s, due to pesticide poisoning, to the point where survival of the subspecies was in question. However, in British Columbia, "*anatum*" peregrines disappeared from the Okanagan Valley several decades before the DDT crisis occurred. As many as 15 Okanagan aeries were occupied shortly after the turn of the century but almost all were vacant by 1922. Two or three pairs persisted in later decades but the last active aerie was abandoned after about 1960. Elsewhere in the interior, occasional pairs were reported in the east Kootenay Trench, the Peace River, and near Williams Lake. Surveys in 2000 found two active aeries in the B.C. interior, with perhaps two additional occupied territories. Some of these birds originated from a release program at Kelowna in 1998-2000. Interior populations are therefore extremely low, even though overall North American populations have recovered to near historic numbers.

Remarkably, beginning in the 1970s, the American Peregrine Falcon seems to have colonized the Gulf Islands in Georgia Strait, where 11 occupied aeries were found during surveys in 2000, and has recolonized aeries in the Lower Mainland. It seems reasonable to conclude that pioneering individuals are now occupying a previously unoccupied region in British Columbia, having taken advantage of an abundant new prey species, the European Starling (*Sturnus vulgaris*), and available cliff nesting habitat. However, it is not clear why American Peregrines have colonized the Gulf Islands but have not yet recolonized the interior of British Columbia. It is possible that general conditions in the interior are no longer suitable for the species. Loss of wetland habitats and the subsequent decline of previously abundant waterbird prey species, the persistence of pesticides in the environment, and other factors may be affecting American

Peregrines in this region, making restoration of interior populations to historic levels difficult. Recent observations of American Peregrines in the interior suggest that recovery may now be beginning. The most feasible active management option for this subspecies is to hack young birds in areas with extensive amounts of suitable natural habitat, as significant natural recolonization has not occurred to date.

The Arctic Peregrine Falcon (*F.p. tundrius*) breeds in Arctic areas of North America and Greenland and occurs in British Columbia only as a migrant. Very few records exist for the province. It is designated as a species of Special Concern by COSEWIC. This subspecies suffered population declines from pesticide poisoning in the 1950s and 1960s, in the same way as American Peregrines, but has also recovered to near historic numbers. There are no meaningful management practices in British Columbia as the subspecies is so rare, except to minimize environmental contaminants and to maintain healthy prey populations.

This report discusses the history of harvesting peregrines for falconry in British Columbia and examines the options of re-opening harvest. It is recommended that as long as American Peregrines remain on the Red List, no harvesting of that subspecies should be allowed. It is concluded that harvesting of passage Peregrine Falcons is not advisable except for on northern and western Vancouver Island, because of the risk elsewhere of capturing American Peregrines, which would have to be released after capture. It is suggested that a regulated and limited harvest of Peale's Peregrines on northern and western Vancouver Island is biologically feasible, as long as provincial guidelines for harvesting raptors are followed and harvest is not within protected areas. Harvest of passage juvenile Peale's Peregrines on northern and western Vancouver Island is preferred over harvesting of young from nests, as the risk of harvest to population stability would be spread over a large geographic source area (British Columbia and Alaska) rather than at individual aeries. It would also remain clear for enforcement purposes that people climbing up to aeries would be conducting an illegal act. If harvesting is considered, government should be prepared for vigorous opposition from environmental and other public interest groups.

It is recommended that Peale's Peregrine Falcon remain on the Blue List because of its small, albeit stable, population and its susceptibility to changes in its seabird prey base, many of which are vulnerable. The American Peregrine Falcon should remain on the Red List, even though a new population has been established on the south coast, because interior populations are very small and show little sign of recovery. The Arctic Peregrine Falcon should remain on the Blue List because of very few occurrences, although there are arguments for moving it to the Yellow List.

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Lastly we thank falconers, such as our own world-authority on falconry, the venerable Frank Beebe, whose love for falcons and falconry have provided substantial point/counterpoint arguments re the management of peregrines in British Columbia. We would like to point out that falconers have provided most of the early information on peregrine populations in British Columbia. We also hope that, although their recreational pastime of falconry is a mysterious pursuit to most, their knowledge will be used to better manage peregrine populations in the future.

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## 1. INTRODUCTION

This report is part of an ongoing program within the Ministry of Water, Land and Air Protection to provide status reports for species at risk in British Columbia. This report includes information synthesized from published and unpublished literature on Peregrine Falcons in British Columbia and elsewhere.

The Peregrine Falcon (*Falco peregrinus*) has fascinated humankind for millennia. Revered for its rapid flight and ferocious hunting tactics in ancient Egypt, Mesopotamia, China and Japan, it was eventually tamed and brought to the hand by early falconers. The possession and use of falcons was later reserved for the ruling elite of Europe and Asia and, in time, falconry was brought to England by the Crusaders. Before the advent of the gun, trained falcons were one of the primary methods of obtaining gamebirds for food. European falconers brought their appreciation for Peregrine Falcons to North America during settlement of the New World.

The Peregrine Falcon has held one of the highest public profiles of any bird species in the 20<sup>th</sup> century. Long admired for its beauty, aerodynamic flight and exciting hunting behaviour, the Peregrine Falcon became one of the most enduring environmental icons in the 1960s and 1970s. Its widespread collapse as a breeding species in North America, from reproductive failure due to contamination from chemical pesticides, spawned a massive recovery effort over the last 30 years (White et al. 2002).

Globally, 19 subspecies of Peregrine Falcon are recognized (Hayes and Buchanan 2002; White et al. 2002), three of which may be found in British Columbia (Cannings 1998). Both the American Peregrine Falcon (*F.p. anatum*), and Peale's Peregrine Falcon

(*F.p. pealei*), breed in the province, whereas the Arctic Peregrine Falcon (*F.p. tundrius*) breeds in the Arctic and occurs in British Columbia only as a passage migrant (Campbell et al. 1990). All three subspecies have long been considered to be at risk in British Columbia. The reasons for this are different for each subspecies, but parallel concerns in other jurisdictions. Contributing factors for the decline of each subspecies include historic over-exploitation and the loss, degradation and fragmentation of their breeding and nesting habitats, as well as that of their prey species, and the persistence of pesticides in the natural environment.

At this time, most North American populations have recovered to near pre-collapse numbers. In the USA, two subspecies (Arctic and American) listed as Endangered in 1970 were de-listed in 1994 and 1999, respectively; Peale's Peregrines were never listed in the USA. The American Peregrine Falcon, the most widely distributed subspecies in North America, has recovered well in most of the continent but has shown little recovery in interior British Columbia.

## 2. DISTRIBUTION

### 2.1. Global

The Peregrine Falcon is nearly cosmopolitan in distribution, breeding in Eurasia, Africa, Australia, North America and South America. "Peregrine" means "wanderer," or "having a tendency to wander," an apt name for such a widespread bird which often migrates great distances. It is absent only from Antarctica, New Zealand and islands of the eastern Pacific Ocean (White et al. 2002). The North American distribution is shown in Figure 1.

Peale's Peregrine Falcon is restricted to coastal areas and breeds from the Aleutian Islands and other coastal Alaska islands,

south to the Queen Charlotte Islands (AOU 1957) and Triangle Island off the northern tip of Vancouver Island (Kirk and Nelson 1999). Peregrine Falcons breeding on northern and western Vancouver Island are also thought to be Peale's (D. Doyle, M. Chutter, pers. comm.). Peale's Peregrine Falcon may also breed on the outer coast as far south as Oregon (Hayes and Buchanan 2002). Its association with the marine environment allows Peale's Peregrine Falcon to remain as a resident in most years. In some years however, a few birds may shift somewhat to the south, wintering in coastal Washington, Oregon and California, and rarely northern Mexico (Campbell et al. 1990; Hayes and Buchanan 2002).

The American Peregrine Falcon breeds in suitable habitats south of the tree line, from the interior of Alaska, across northern Canada to southern Greenland, south to northern Mexico, except for the coastal Pacific Northwest (White et al. 2002). American Peregrine Falcons also breed on southeastern Vancouver Island, the Gulf Islands, in the Lower Fraser River Valley, and in coastal Washington and Oregon.

The Arctic Peregrine Falcon breeds in the tundra, north of the tree line to approximately 76° N latitude, from Alaska across northern Canada to Greenland. It winters from Baja California to as far south as Chile and Argentina. This subspecies undoubtedly passes through British Columbia during migration; however records are very scarce (Campbell et al. 1990). Arctic Peregrines have been recently noted near Kelowna (1999; J. Weir, pers. comm.) and Nanaimo (2002; D. Doyle, pers. comm.).

## **2.2. British Columbia**

The Peregrine Falcon occurs on coastal islands and on the adjacent mainland from the Alaska panhandle, south to southeastern Vancouver Island and the Lower Fraser

River Valley. Small numbers continue to breed in the interior. During migration, Peregrine Falcons may occur almost anywhere in the province.

It is widely accepted that Peale's Peregrine Falcon is the subspecies that breeds on the Queen Charlotte Islands and on Triangle Island (AOU 1957; Campbell et al. 1990; Kirk and Nelson 1999). It is also widely accepted that the American Peregrine Falcon is the subspecies that breeds in river canyons and on suitable cliff ledges in the interior (Skeena River Valley, Peace River Valley, Cariboo-Chilcotin and southern interior) (Campbell et al. 1990; Rowell 2002).

However, the taxonomy of the peregrines found on the southern coast has been uncertain for several decades (Campbell et al. 1990; Hayes and Buchanan 2002). Kirk and Nelson (1999) treat the birds of the coastal mainland, as well as most of Vancouver Island, as American Peregrines (*F.p. anatum*), those of southeastern Vancouver Island as Peale's Peregrines (*F.p. pealei*), and state that there may be intergrading of the subspecies on the Gulf Islands. Rowell (2002) does not mention Vancouver Island when discussing the range of the American Peregrine Falcon, but does state that the subspecies occurs 'on the southwest coast and mainland of British Columbia'. Another author reports that close visual observations of birds on the Gulf Islands and along the southeast coast of Vancouver Island led to the conclusion that these birds were American Peregrine Falcons (M. Chutter, pers. comm., cited in Hayes and Buchanan 2002). Peregrines nesting in the San Juan Islands of Washington are thought to be American Peregrines, and the peregrines nesting in the Gulf Islands and Lower Fraser River Valley appeared to be similar (P. DeBruyn, pers. comm.). A small number of the Gulf Islands falcons have been captured and examined in

the hand for research purposes, and were observed to have the same morphological characteristics as American Peregrines. Two nesting birds captured and examined on northwestern Vancouver Island appeared to be Peale's Peregrines (D. Doyle, pers. comm.).

There continue to be differences of opinion as to which subspecies occurs in Georgia Strait, and uncertainties as to where the boundary between Peale's and American Peregrines occurs. Anecdotal reports indicate falconers released Peale's Peregrines in the Gulf Islands during the 1970s (M. Chutter, pers. comm.); however results of DNA analysis to confirm

subspecies are not yet available (D. Doyle, pers. comm.). There is also some uncertainty as to the subspecific status of Peregrine Falcons on the south coast. For the purposes of this report, Peregrine Falcons in the Lower Fraser River Valley, the Gulf Islands, and southeastern Vancouver Island are designated as American Peregrines (*F.p. anatum*). All Peregrine Falcons on the west and north coast of Vancouver Island and northward are considered to be Peale's (*F.p. pealei*). The southern boundaries of Peale's distribution may be as far south as Port Renfrew on the west coast, and near Campbell River on the east coast of Vancouver Island.



Figure 1. Breeding distribution of the Peregrine Falcon in North America (White et al. 2002).

Coastal Peregrine Falcons, whether of the Peale's or "*anatum*" subspecies, are largely sedentary, although there may be a partial migratory shift to the south during fall and winter. Peale's Peregrine Falcons banded on the Queen Charlotte Islands have been observed in California in the fall (R.W. Nelson, pers. comm.). MWLAP is beginning a research project to determine if there are major wintering concentrations on western Vancouver Island similar to concentrations observed in Washington State (D. Doyle, pers. comm.). Interior populations of American Peregrine Falcons move south, with many birds leaving the province and migrating as far as Baja California (Campbell et al. 1990); however an occasional bird has been observed over-wintering as far north as Dawson Creek (M. Phinney, pers. comm.).

### **3. POPULATION SIZE AND TRENDS**

#### **3.1. Population Size**

Rowell (2002) estimates that 7000-8000 breeding pairs, of all three subspecies, occurred across North America prior to population crashes in the 1950s and 1960s. White et al. (2002) estimate 8000-10 000 breeding pairs occurred in North America in the late 1990s, with as many as 40 000-50 000 individuals, including subadults and floaters, being possible. The recovery of North American populations was largely aided by extensive re-introduction programs in many areas of Canada and the USA (Federal Register 1999). Only one recent re-introduction program has been conducted in British Columbia.

Since 1970, because of widespread concern for the species' survival, nationwide population surveys have been conducted every five years in Canada. These surveys provide minimum breeding population estimates but not total population size because of limitations: not all areas are

surveyed, some birds within areas surveyed may be missed, nests that failed prior to surveys are not accounted for, and subadult birds and non-breeding floaters are not included in the calculations of occupied territories. However, surveys provide more complete coverage each cycle as the catalogue of historical aeries increases.

#### **Peale's Peregrine Falcon**

In British Columbia, intensive surveys in 2000 found 96 occupied territories of Peale's Peregrine Falcon on the Queen Charlotte Islands, northern Vancouver Island, other offshore islands and the adjacent mainland (Rowell et al. 2001). The estimated number of occupied territories (105) is somewhat higher after applying a correction factor for missed territories. The centre of the provincial population is on the Queen Charlotte Islands, where 69 occupied territories were observed and 76 were estimated to occur in 2000 (Schultze 2000). Surveys for Peale's Peregrine Falcon in the mid 1990s found 271 active aeries in Alaska, 17-20 in Washington and 5-10 in Oregon (although some of the Washington and Oregon birds may not be Peale's; Wilson et al. 2000; White et al. 2002).

#### **American Peregrine Falcon**

In British Columbia, 18 occupied territories of American Peregrine Falcon were located during similar surveys in 2000, including 11 active territories on southeastern Vancouver Island and the Gulf Islands, six active territories in the Lower Mainland, and one active territory in the Thompson-Nicola area. There were also two unconfirmed reports of active territories, one in the Thompson-Nicola and one in the Williams Lake area (Rowell et al. 2001). In 1997, known American Peregrine aeries elsewhere included 301 in Alaska, 347 in Canada, 329

in Washington, Oregon and California, 529 in the Rocky Mountain and southwest states of the USA, 170 estimated for Mexico, and 205 hybrid-“*anatums*” in the eastern USA (Enderson et al. 1995; White et al. 2002).

### **Arctic Peregrine Falcon**

Across the Arctic, there are an estimated 2300-3000 pairs of Arctic Peregrine Falcon (White et al. 2002). One recent sighting of a migrant Arctic Peregrine in Nanaimo was of a bird banded in interior Alaska (D. Doyle, pers. comm.).

### **3.2. Population Trends**

Widespread use of organochlorine pesticides (i.e., DDT and others) from the late 1940s through the 1970s, with subsequent bioaccumulation within the food chain, was detrimental to several species of avian predators including the Peregrine Falcon (White et al. 2002). Major declines in North American populations of American Peregrine Falcons occurred from the 1950s through 1970s due to eggshell thinning and the resultant reproductive failure (White et al. 2002). DDT was banned in North America in the early 1970s but is still used in other parts of the world, including the winter range of some American and Arctic Peregrines (i.e., Mexico, Central and South America). In the late 1990s, North American populations of Peregrine Falcons generally increased at 5-10% annually (Enderson et al. 1995; White et al. 2002).

### **Peale's Peregrine Falcon**

The Peale's Peregrine Falcon was one subspecies that avoided precipitous population declines from chemical pesticide contamination. Their non-migratory habits and reliance on remote seabird populations for their food source probably saved them

from exposure to high levels of DDT, even though recent studies show the continued persistence of organochlorines in seabird tissue within the range (Alaska panhandle) of Peale's Peregrines (Becker et al. 2003). In British Columbia, populations have been monitored intensively over the past 45 years on the Queen Charlotte Islands, with no obvious medium or long term population change noted for that region (Kirk and Nelson 1999). There was a notable decline in territory occupancy during the 1985/86 survey which was partly the cause of the 1990 closure on harvest. Subsequent surveys showed numbers were back to their earlier levels. Peale's Peregrine Falcon populations are currently believed to be stable or slightly increasing, as the 96 occupied territories in 2000 is higher than the 77 occupied territories reported for the mid 1990s (White et al. 2002). On the Queen Charlotte Islands, the 76 occupied territories estimated for 2000 were similar to the 75 occupied territories estimated for 1995 (Schultze 2000).

Long term fluctuations in local populations on the Queen Charlotte Islands have been noted, however. In the early to mid 1950s, Langara Island contained 21-23 breeding pairs (Kirk and Nelson 1999), and up to 35-40 pairs were estimated in the 1920s and 1930s by Allan Brooks (R.W. Nelson, pers. comm.). One ornithologist was quoted as saying “*Nowhere else in the world can one stand [on Langara Island] and be within view of six peregrine aerie sites at once*” (Hancock 1968). This number declined suddenly by about 25% in 1958, and continued to decline until the late 1960s when only six pairs remained. From 1968-1996, the number of breeding pairs has fluctuated between 5-9 pairs (Kirk and Nelson 1999). Ten pairs were observed in 1998 and 1999, nine pairs in 2000, and seven pairs in 2001 (Schultze 2000; Nelson 2001). The major decline was likely largely

linked to declines in seabird prey populations on Langara Island, but other factors may be involved (Nelson 1990; Kirk and Nelson 1999). The population on Langara Island seems to have stabilized at lower levels compared to those of the early and mid 20<sup>th</sup> century.

### **American Peregrine Falcon**

It is generally believed that numbers of American Peregrine Falcons across Canada have returned to historical (pre-DDT) levels, with the exceptions of populations in Labrador and the B.C. interior (Rowell 2002). The decline of American Peregrine Falcons in interior British Columbia, however, significantly pre-dated the DDT crisis.

In the Okanagan Valley, at least 15 aeries were in use in 1906-1907; about five active aeries were known from the shores of Okanagan Lake and 10 from the south end of the lake to the USA border. One huge cliff near Vaseux Lake was reported to contain three active Peregrine Falcon nests in one year (Cannings et al. 1987). By 1922, all or almost all of these aeries were inactive and Peregrine Falcons were reported to be absent from the valley (Taverner 1922). It is not known if this trend occurred in the Kootenay, Thompson or Chilcotin regions because historical information is very sparse.

After the mid 1940s, three aeries in the Okanagan Valley were known to be active, but the last activity was reported to be about 1960. One of these aeries, active from 1943 to 1951 (Cannings et al. 1987), was found to be active in 1996 (Cooper 1998). A pair of American Peregrine Falcons occupied the traditional nest cliff, and appeared to be feeding nestlings. This site was not active in subsequent years (M. Chutter, pers. comm.). Active aeries were reported near Fort St. John in 1963 and 1964 (Beebe 1965 in

Campbell et al. 1990), but there are no accounts of more recent occupation.

The current status of most other historically known American Peregrine Falcon aeries elsewhere in the B.C. interior (Cooper 1998) is uncertain, but it is believed most remain unoccupied. Campbell et al. (1990) refer to “former” breeding near the Gang Ranch in the southern Chilcotin, but no details are provided. However, in 2000, there were reliable reports of peregrines at the Dog Creek Airport and neighbouring cliffs, which are near the Gang Ranch (J. Steciw, pers. comm.). In 2000, an American Peregrine Falcon was observed close to a former falcon aerie near Canal Flats, and in 2000-2002, there were 3-4 other reports of peregrines near suitable-looking cliffs in the Kootenays (T. Antifeau, pers. comm.). Surveys in 1995 discovered an occupied territory near Forestdale in the Skeena Region (M. Chutter, pers. comm.).

In recent years, there have been increasing numbers of reports of peregrines from the Thompson region. One cliff near Hat Creek was occupied by peregrines in 1995 (M. Chutter, pers. comm.). One pair had bred successfully along Kamloops Lake in 2000 and returned to the same cliff in 2001, where behaviour suggested they nested again (G. Court, pers. comm.). A single Peregrine was observed near Stump Lake in 2002 (J. Hobbs, pers. comm.). Another single adult Peregrine was in east Kamloops in July 2002 (R. Howie, pers. comm.) and one bird was observed near Savona in 1999. These records suggest there may be more than one pair near Kamloops. An occupied territory was found west of Cache Creek in 2000 (J. Hobbs, pers. comm.).

One positive development in the B.C. interior is the successful hacking of captive-raised Peregrine Falcons at Kelowna. In 1998, 1999 and 2000, a total of 30 birds were released from an artificial aerie on an

office building in downtown Kelowna. Some of these birds have been resighted in subsequent years and may be the stock for recolonization of historic or new aeries in the region. A banded Peregrine from the Kelowna project was observed with an unbanded bird at Alki Lake in 1999 (J. Weir, pers. comm.). One of the Kelowna birds was likely involved with the breeding pair near Kamloops Lake in 2000 and another was observed near Enderby in 2002 (G. Court, pers. comm.). The released birds were from a breeding program in Alberta and were genetically as close to pure "*anatum*" as was available (M. Chutter, pers. comm. 2002).

American Peregrine Falcon populations in the B.C. interior have previously declined to the point of near extirpation, but a recent upswing in occupied territories suggests that populations in the southern interior may be recovering.

Although opinions differ as to which subspecies is involved, it appears that, since the 1970s, Peregrine Falcons have colonized the Gulf Islands and have recolonized the Lower Mainland of south coastal British Columbia, with up to 17 active territories recorded in 2000. Assuming these birds are American Peregrine Falcons, this represents a significant range and population expansion for that subspecies. It is possible that some of the territories have been occupied historically (e.g., territories near Hope and Squamish), but the Gulf Islands territories seem to be new. The subpopulation nesting on the Gulf Islands had at least five occupied territories in 1980, four in 1985/86, six in 1990 (M. Chutter, pers. comm.) and 11 in 1995 (R.W. Campbell, pers. comm. in Kirk and Nelson 1999), which is the same number as reported for 2000. The Gulf Islands subpopulation appears to be fairly stable during recent years but has increased during the last 20+ years.

## **Arctic Peregrine Falcon**

Breeding populations of Arctic Peregrine Falcons appear to have recovered to near pre-collapse numbers (White et al. 2002), but because few migrants have been documented in British Columbia, trends are not apparent here.

## **4. GENERAL BIOLOGY**

### **4.1. Breeding Ecology**

On the south coast, resident Peale's Peregrine Falcons may begin courting in late winter. In migratory populations (higher latitude Peale's and interior American Peregrine Falcons) both sexes return to their nest site simultaneously in the spring. A pair may re-establish the pair bond by initially roosting side by side. This is typically followed by cooperative hunting excursions, courtship flights, courtship feeding, copulation and nest scraping. Nesting may begin in late March on the coast; however, late April is more common in British Columbia (Beebe 1974; Campbell et al. 1990). Egg laying and hatching dates for interior American Peregrine Falcons probably average about one month later than coastal populations (Campbell et al. 1990), a trend similarly noted for the newly established pair at Kamloops Lake (R.W. Nelson, pers. comm.). Peregrine Falcons typically begin breeding at two years of age although there are records of breeding in one year-old birds. One brood is raised annually, although re-nesting may occur if the nest fails early in the incubation period (Beebe 1974).

Records for 159 clutches from British Columbia showed clutch sizes of one to five eggs, with three or four being most common (Campbell et al. 1990). The female is the primary incubator, although occasionally both male and female birds may alternate

between incubation and hunting (Beebe 1974). Incubation begins with the second to last egg laid, and continues for 32 to 35 days (Campbell et al. 1990; Baicich and Harrison 1997). Once the chicks hatch, the female does most of the brooding, which is nearly continuous for up to the first ten days. Chicks leave the nest after about 40 days, with males typically fledging three to five days earlier than their female siblings. Young are fed by adults and may remain in the vicinity of the nest site for three to six weeks after fledging (Beebe 1974).

Most studies report 1-2 young fledged per territory (White et al. 2002), but in some years about three young per territory are produced on Langara Island (Nelson 2001). Some territories and individuals regularly produce more young than others. At Langara Island, one male produced 22 young in seven years and one female produced 18 young in eight years (Nelson 1990).

#### **4.2. Species Movement**

All three subspecies of Peregrine Falcon migrate through British Columbia. However, migration of Peale's Peregrine Falcon is not well defined, with some birds remaining in breeding areas year round. American Peregrine Falcons move south for the winter with subadult birds showing up in the Fraser River delta by August (Campbell et al. 1990). In the Okanagan Valley, breeding birds formerly left the valley from early September through October (Cannings et al. 1987). Arctic Peregrine Falcons are known to occur in British Columbia only as migrants (Campbell et al. 1990).

#### **4.3. Home Range**

Peregrine Falcon home ranges are not well known. For the American Peregrine Falcon, Rowell (2002) suggests that a rough

estimate of one square kilometer is defended as the nest territory and that 27 square kilometers represents the average hunting territory. In Colorado, breeding home ranges ranged from 358-1508 km<sup>2</sup> (Enderson and Craig 1997). There are no data for home range size in British Columbia. Elsewhere, birds have been recorded traveling up to 26 km from their nest site in search of food. On Langara Island, Peale's Peregrine Falcons formerly nested within 400 m of each other, and typically hunted within several kilometers of their nest sites (Beebe 1960; Nelson 1977).

#### **4.4. Behaviour/Adaptability**

The Peregrine Falcon is a remarkably adaptable bird, given its wide geographic range, and its use of a diversity of habitats. In the last 2-3 decades, many American Peregrine Falcons have been acclimatized to nesting in urban habitats where they use buildings, towers or bridges as surrogates for cliffs. Other examples of adaptability in choosing nest sites are the increasing uses of old nests of Common Raven (*Corvus corax*), Bald Eagle (*Haliaeetus leucocephalus*) (Campbell et al. 1990), Osprey (*Pandion haliaetus*) (T. Antifeau, pers. comm.), and cormorants (*Phalacrocorax* sp.), and holes in dead trees. Special towers built in salt marshes have also been used (White et al. 2002).

Adaptability to breeding in urban environments has proven to be a key in the recovery of North American populations of American Peregrine Falcons. Some authors even suggest that this adaptability may ultimately allow peregrines to exceed their known historical abundance (Cade et al. 1996). This behavioural trait makes the Peregrine Falcon a much easier species to recover than its cousin, the Prairie Falcon (*Falco mexicanus*).

#### 4.5. Site Fidelity

Adult Peregrine Falcons demonstrate a high degree of breeding site fidelity (Ambrose and Riddle 1988 in Hayes and Buchanan 2002) and are known to reuse the same aerie for several successive seasons (Beebe 1974; Court et al. 1989 in Hayes and Buchanan 2002). Established pairs may also use alternate nest sites within their breeding territory, either on the same cliff or on alternate cliffs, over successive seasons (White et al. 2002).

Young birds are known to disperse widely. On Langara Island, only six of 140 banded nestlings have been found to return to breed, with others settling elsewhere up to 300 km away (R.W. Nelson, pers. comm. 2001).

#### 4.6. Tolerance to Human Disturbance

The Peregrine Falcon shows a range of tolerance to disturbance at aeries. Individual Peregrine Falcons in urban settings tolerate humans and appear to be undeterred by noise and other general disturbance. In remote situations, however, the species may be more susceptible to human disturbance (Rowell 2002). During population surveys conducted every five years, aeries on the B.C. coast are routinely checked for occupancy by firing cracker shells from guns, which temporarily disturbs the adults. One or both birds will call loudly and fly off their nest and/or perch, thus identifying that the territory is active. However, short term infrequent rock climbing and research activities near nests do not appear to cause problems if reasonable precautions are observed (White et al. 2002); see Section 9.4. Continuous disturbances at aeries in remote areas are likely problematic, and if aeries are visited just prior to or during egg-laying, abandonment may occur (White et al. 2002).

In British Columbia, rock climbing and paragliding have inadvertently caused disturbance to peregrines. Some cliffs favoured by climbers have active falcon aeries, and both falcons and climbers have disturbed each other. At one Gulf Island site (in 1999), paragliders frequently jumped off a cliff immediately above an active aerie one year, causing substantial disturbance to the nesting falcons. This activity was determined to be an offense under the B.C. *Wildlife Act*, and was stopped by Enforcement staff (M. Chutter, pers. comm.).

Prior to legal protection, shooting, trapping and egg collecting resulted in significant mortality for peregrines, but mortalities from these types of activities are now thought to be rare. The impacts of falconry are debatable, as falconers capturing eyas<sup>1</sup> birds from the nest tend to take the “best” of the young. However, this is usually compensated for by the parents as the “next best” young becomes dominant, receives the most food, and therefore becomes the “fittest”.

#### 4.7. Food

Peregrine Falcons prey primarily on birds, which are typically caught in flight. They therefore require an ample supply of suitable prey species that occur in areas that permit aerial hunting (Beebe 1974). Burrow-nesting colonial seabirds, and other concentrated populations of shorebirds, waterfowl, pigeons and songbirds are important prey for all subspecies. Other prey may include bats, rodents and insects (Rowell 2002).

Peale's Peregrine Falcons are usually found near seabird colonies, and seabirds comprise a high percentage of their diet. In

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<sup>1</sup> eyas – first year pre-flight nestling stage, from hatching to flight.

British Columbia, Peale's Peregrines most frequently take auklets, murrelets, and storm-petrels, with the Ancient Murrelet (*Synthliboramphus antiquus*) being the most important prey species. In the Okanagan Valley, American Peregrine Falcons are known to take shorebirds, waterfowl, swallows, quail and songbirds (Cannings et al. 1987). American Peregrine aeries typically are on cliffs along lake shores, rivers, or at confluences of major valleys which provide easy access to prey. In the Georgia Strait region, European Starlings (*Sturnus vulgaris*) account for a large proportion of the American Peregrine's diet (R.W. Campbell, pers. comm. in White et al. 2002).

#### **4.8. Response to Sudden Environmental Change**

Peregrine Falcons have proven to be highly susceptible to the effects of chemical contamination, as evidenced by the widespread reproductive failure in American and Arctic Peregrine populations due to organochlorine pesticide contamination (i.e., DDT and others). There are no available data on the cumulative effect of non-organochlorine contaminants on birds that live within urban environments, where they are sometimes exposed to a high level of contamination from various compounds (White et al. 2002).

Peale's Peregrine Falcon populations on Langara Island are known to fluctuate in response to changes in their seabird prey populations, declining as prey decline (Nelson and Myres 1976). Population decline due to lower reproductive success caused by a declining food supply is a ubiquitous response in raptors (Newton 1979).

The extirpation of breeding populations of American Peregrines in the Okanagan Valley may be linked to large-scale climatic events (Cannings et al. 1987), suggesting

that this subspecies is relatively sensitive to environmental change. However, the lack of recolonization of the Okanagan Valley suggests that a combination of factors, such as loss and fragmentation of foraging habitat and increasing levels of human activity, may hinder natural recolonization.

#### **4.9. Causes of Mortality**

Great Horned Owls (*Bubo virginianus*), Northern Goshawks (*Accipiter gentilis*) and Red Foxes (*Vulpes vulpes*) are the main known predators of wild Peregrine Falcons (Rowell 2002). Hacked<sup>2</sup> young falcons have also been taken by Golden Eagles (*Aquila chrysaetos*), Cougars (*Puma concolor*), and Marten (*Martes americana*) although these predators may not take wild-reared young (Hayes and Buchanan 2002). Observations on the Queen Charlotte Islands suggest that Bald Eagles may threaten nesting birds as Peregrine Falcons often harass Bald Eagles that fly near their nests (M. Chutter, pers. comm.).

Although it is no longer likely that shooting has a major population level effect, there are recent records of Peregrine Falcons being occasionally shot in the U.S. (Hayes and Buchanan 2002). This may also still occur in British Columbia, but would be extremely reduced from previous eras as the killing of raptors has become unlawful and appreciation by the public for the ecological role of raptors has improved markedly. In addition, Peregrine Falcons do not attack domestic animals as Bald Eagles and Northern Goshawks sometimes do, so they are less likely to be targeted. Campbell et al.

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<sup>2</sup> hack (hacking) – process of artificially accommodating captive-bred birds to the wild. Usually involves an artificial nest structure (that can be locked) set up in the wild. The bird is fed there with the door closed for a period, then the door is opened while food is still supplied, then food supply is discontinued).

(1990) noted that from 1890 to 1987, at least 508 Peregrine Falcons, their eggs or nestlings have been collected in British Columbia.

Adult peregrines may also succumb to bad weather. In particular, migrant individuals may encounter tropical storms. Weather conditions may reduce nesting success, as there are several reports of chick mortality after severe rains (e.g., Bell et al. 1996). Several days of rain may reduce hunting efficiency of adults and lead to starvation of young (Mearns and Newton 1979), or to the collapse of nests constructed by other species (e.g., Common Raven) (Bell et al. 1996).

Collisions with buildings and vehicles account for some mortality (White et al. 2002); three such mortalities were observed for the hacked Kelowna peregrines (M. Chutter, pers. comm.). Pairs that nest on bridges also may suffer higher fledgling mortality due to young falling into water (Bell et al. 1996) or being hit by vehicles as they attempt to return to the bridge on their initial flight.

#### **4.10. Protection of Areas of Concentration**

Many Peale's Peregrine Falcon aeries are located within protected areas. Ecological Reserves are established at Triangle Island (980 ha), Beresford Islands (425 ha), Sartine Island (1091 ha), and Solander Island. Some breeding sites on the Queen Charlotte Islands are protected within the South Moresby National Park Reserve, Naikoon Provincial Park (72 000 ha), and Lanz and Cox Islands (5500 ha). Foraging habitat is protected in Ecological Reserves at Lepas Bay, Rose Spit, Tow Hill, Bligh Island, Big Bunsby Island and Satellite Channel.

Various measures are in place to protect most seabird colonies along the coast of British Columbia, some of which are vital for Peale's Peregrine Falcon food supplies.

In 2002, of 98 alcid and storm-petrel colonies in coastal British Columbia, 89% have some form of protection (National Park Reserve, Ecological Reserve, Wildlife Habitat Area or proposed WHA, Lighthouse Reserve); the remainder are on Crown Land (Hipfner et al. 2002).

Some American Peregrine Falcon aeries are in protected areas. One known aerie is protected within Garibaldi Provincial Park, and other Lower Mainland aeries are protected within other provincial parks.

## **5. HABITAT**

### **5.1. Nesting Habitat**

The Peregrine Falcon generally requires a suitable cliff face, or human-made substitute, close to an adequate food supply (Campbell et al. 1990). In British Columbia, most nests are located in cliff faces, usually on a shelf (Campbell et al. 1990). Nests typically feature overhanging cover, often consisting of sod, tree roots, salal, and mosses (Campbell et al. 1990), presumably to provide protection to the nest and young from weather and predators (Beebe 1974). Nest height from cliff bases in B.C. ranges from 4-335m (Campbell et al. 1990), but most aeries tend to be near the tops of cliffs.

Peale's Peregrine Falcon typically nests on ledges of rocky island cliffs, usually near seabird colonies. Occasionally, nests occur on mainland headland cliffs. A few nests occurred on grassy ledges on rock bluffs. More rarely, old nests of Pelagic Cormorants (*Phalacrocorax pelagicus*), Bald Eagles and Common Ravens have been used (Campbell et al. 1990).

American Peregrine Falcons typically nest on rock cliffs above lakes or river valleys where abundant prey is nearby; stick nests are also used occasionally (T. Antifeau, pers. comm.). In the Okanagan Valley, aeries have been reported as low as

6 m above a lake (Figure 2) and as high as >260 m on cliffs above the valley floor (Cannings et al. 1987). In the Lower Mainland, nests are on rock cliffs above the Fraser River, on major bridges over the Fraser River, on cliffs above large lakes, and on cliffs near estuaries. In the Gulf Islands, nests are found on seaside cliffs. On Vancouver Island, nests are on cliffs adjacent to marine habitats.

## 5.2. Breeding Season Foraging Habitat

During the breeding season, the Peregrine Falcon requires ample, accessible prey near the nest site. Because prey is usually taken in flight, access to a supply of flying birds is important to their foraging success, as are habitat features which support their preferred hunting behaviours. Peregrines

search for prey mainly from perches, but also while in flight. Perches are usually from high vantage points near the aeries, where positions allow for rapid stoops down to low-flying prey (White et al. 2002).

Peale's Peregrine Falcons specialize in seabirds, primarily Ancient Murrelets (Beebe 1960; Nelson 1977). American Peregrine Falcons tend to nest near where concentrations of waterbirds occur, especially along large lakes and river valleys (White et al. 2002).

## 5.3. Migration Habitat

Very little is known about migration routes in British Columbia (Campbell et al. 1990), but Peregrine Falcons could occur almost anywhere. Habitat use is likely closely



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**Figure 2. Small cliffs above lakes, as well as large cliffs, were formerly used by nesting American Peregrine Falcons in the Okanagan Valley.**

**Table 1. Biogeoclimatic zones (BGZs) used by Peale's and American Peregrine Falcons in British Columbia (from Stevens 1995).**

BGZ	Subzone code	Subzone	Peale's	Anatum
Coastal Douglas-fir	CDF			X
Coastal Western Hemlock	CWH	Wet hypermaritime	X	
		Very wet hypermaritime	X	
		Various maritime		X
Interior Douglas-fir	IDF	Very dry		X
		Dry		X
		Moist		X
Ponderosa Pine	PP	Very dry, hot		X
		Dry, hot		X
Montane Spruce	MS	Dry, cool		X
Interior Cedar-Hemlock	ICH	Dry, warm		X
		Dry-moist, cool		X
		Moist, warm		X
		Wet, cool		X
Sub-boreal Pine-Spruce	SBPS	Dry cold		X
		Moist cool		X
		Moist cold		X
Sub-boreal Spruce	SBS	Dry cool		X
Engelmann Spruce-Subalpine Fir	ESSF	Very dry		X
		Dry		X
		Moist		X
		Wet		X
Spruce-Willow-Birch	SWB			X
Boreal White and Black Spruce	BWBS	Dry cool		X

correlated with abundance and availability of avian prey. Therefore, large lakes, major river valleys, and sea coasts are considered to be important habitats. Migrants likely target concentrations of migrating songbirds, shorebirds, and waterfowl.

#### 5.4. Wintering Habitat

Resident coastal populations tend to remain on or near breeding grounds throughout the year (White et al. 2002). Other wintering Peregrine Falcons tend to concentrate near their prey base. Therefore areas where seabirds congregate in winter, and areas where wintering waterbirds concentrate, such as wetlands and estuaries, tend to

support wintering Peale's Peregrine Falcon populations and coastal populations of American Peregrine Falcons. Interior American Peregrine Falcons are migratory and winter outside of the province (Campbell et al. 1990).

#### 5.5. Distribution of Habitat

The Peregrine Falcon uses a wide variety of habitats throughout its range. In British Columbia, breeding seems to be restricted to sea coasts and broad, interior valleys. Cliff habitat for nesting appears abundant in most areas of British Columbia. Adequate foraging habitat is likely more limited in distribution.

**Table 2. Current and historic ecoregions used by breeding Peale's and American Peregrine Falcons in British Columbia (from Campbell et al. 1990).**

Ecoprovince	Ecosection	Peale's	Anatum
Georgia Depression	Fraser Lowland		X
	Nanaimo Lowland		X
	Southern Gulf Islands		X
Coast and Mountains	Queen Charlotte Lowland	X	
	Hecate Lowland	X	
	Skidegate Plateau	X	
	Nahwitti Lowland	X	
	Queen Charlotte Strait	X	
	Windward Island Mountains	X	
	Windward Queen Charlotte Mountains	X	
Southern Interior	Northern Okanagan Basin		X
	Southern Okanagan Basin		X
	Thompson Basin		X
	Pavilion Ranges		X
Southern Interior Mountains	East Kootenay Trench		X
Central Interior	Fraser River Basin		X
Sub Boreal Interior	Babine Upland		X
Boreal Plains	Peace River Basin		X

### 5.5.1. Biogeoclimatic Zones (BGZ)

In British Columbia, the Peregrine Falcon occurs in 11 BGZs (Table 1).

### 5.5.2. Ecoregions

In British Columbia, the Peregrine Falcon breeds in five ecoprovinces and 14 ecosections (Table 2).

### 5.5.3. Forest Regions and Districts

The Peregrine Falcon breeds in the following Forest Regions and Districts:

- Coast Forest Region
  - Chilliwack
  - Queen Charlotte Islands
  - North Coast
  - North Island-Central Coast
  - Campbell River

- South Island
- Southern Interior Forest Region
  - 100 Mile House
  - Central Cariboo
  - Okanagan Shuswap
  - Rocky Mountain
- Northern Interior Forest Region:
  - Peace

### 5.6. Present Habitat Availability

Cliff habitat for nesting does not seem to be limiting anywhere within the breeding range in British Columbia. Many historic interior aeries remain unoccupied. Foraging habitat is abundant on the coast, but is more restricted in the interior. Foraging habitat in the Okanagan Valley has declined as the valley was drained and developed (see Cannings et al. 1987), which perhaps explain why peregrines have not yet recovered there.

## 5.7. Trends in Habitat

Habitat suitability has likely declined to some degree in the southern interior, especially in the Okanagan Valley. The extent and reasons for the decline are, however, uncertain. Cannings et al. (1987) discuss the devastating effects on Okanagan Valley bird communities caused by the encroachment of settlements on bird habitat, the effects of wide scale modern agriculture, the draining of wetlands, and the general increase in human use of scarce land and water resources. These activities have all led to a decline in the abundance of waterbirds, which are key prey species. However, American Peregrine Falcons elsewhere have managed to switch to different prey such as European Starlings, which are now abundant in the Okanagan (Campbell et al. 1997).

In the Okanagan and other parts of the interior, cliffs suitable for nesting remain, but human developments have encroached to the bases of some of those cliffs. Increased levels of human activities may also preclude recolonization of some historically active aeries. Conversely, peregrines released from hack sites are now occupying urban habitats in many areas of North America (Holroyd and Banasch 1990), which has made new habitat available to birds able to become conditioned to human disturbance. The hacked birds from Kelowna have not returned to nest in Kelowna but rather are being observed in other areas of the southern interior. Although occupation of urban sites by peregrines suggests that human encroachment should not affect suitability of historically remote aeries, the habitat at those remote aeries has certainly changed, and the reason for lack of recolonization may be related more to a shortage of source birds capable of adapting to that change.

On the coast, the suitability of cliff nesting habitat in remote areas is likely

unchanged. The population of American Peregrine Falcons in Georgia Strait, which primarily uses seaside cliffs for nesting, is likely exposed to increasing levels of human activity (i.e., boating near cliffs and other recreational uses). An expanding human population in the region will undoubtedly continue to lead to increased disturbance in the future. The Gulf Islands subpopulation apparently has not suffered negative consequences from human activity to date.

## 6. LEGAL PROTECTION

The Peregrine Falcon is protected internationally under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which restricts the import and export of birds and eggs in signatory countries.

Like other raptorial birds, Peregrine Falcons are not protected by the federal *Migratory Birds Convention Act*. However, subspecies designated at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) come under the jurisdiction of the federal *Species at Risk Act*, and the federal requirements for protection and recovery planning apply. Currently, COSEWIC lists the American subspecies as Threatened, while Peale's and Arctic subspecies are listed as Special Concern.

In British Columbia, American Peregrine Falcons are red-listed, while Arctic and Peale's Peregrine Falcons are blue-listed (CDC 2003). Unlike for the Prairie Falcon, protective measures are not available under the B.C. *Forest and Range Practices Act*.

The strongest current protection for the Peregrine Falcon in British Columbia is under the Provincial *Wildlife Act*. Section 34 of the *Wildlife Act* protects birds, their eggs, nestlings, and nests when the nests are occupied. A "nest" is defined as a structure,

or part of a structure, prepared by or used by a bird species to hold its eggs or offspring. A nest is considered occupied from the time it is under construction to when fledglings leave the nest. However, the Peregrine Falcon is one of a select group of bird species identified under Section 34 (b) for which the nest is protected year-round, regardless of whether it is occupied or not.

Persecution (shooting, trapping, poisoning or any other measure of killing) of Peregrine Falcons in British Columbia is illegal under Section 34 of the *Wildlife Act*, though allowances can be made when domestic animals are being defended. Current penalties for conviction for offences under Section 34 include a fine of up to \$50,000 and six months in jail for a first offence.

As of 2003, harvesting of Peregrine Falcons for falconry is not permitted in British Columbia, though it has been in the past. Recent down-listing and de-listing of the American Peregrine subspecies has resulted in the lifting of falconry harvest bans in parts of the USA and Canada. Provincial policy does not allow any harvest on red-listed taxa, therefore current bans on the harvest of American Peregrines will remain in place. However, re-opening a restricted harvest on the blue-listed Peale's Peregrine in British Columbia is under consideration by the Ministry of Water, Land and Air Protection.

## **7. LIMITING FACTORS**

### **7.1. Nesting Habitat Availability**

Peregrine Falcons require a suitable nest site near a sufficient prey base. Cliff habitat is not limiting in most areas of British Columbia, except that intra-specific territoriality partially regulates population densities. Competition for aeries with Prairie Falcons, often previously cited as a possible

reason for decline of peregrines in British Columbia, is not likely, as Prairie Falcons tend to evict Peregrine Falcons when the two species occur together (White et al. 2002).

### **7.2. Foraging Habitat Availability**

Interior populations of American Peregrine Falcons are typically associated with wetland habitats that support their waterbird prey species. Loss or degradation of wetlands may be an important limiting factor for this subspecies. Declines in waterbird prey species, which are logically linked to extensive losses of wetland habitat, seem to have occurred in areas such as the Okanagan Valley. Even though alternate prey (e.g., European Starlings) seems to be available, there may be other unrecognized constraints that reduce the availability of that prey to Peregrine Falcons.

Coastal American and Peale's Peregrine Falcon populations have extensive amounts of foraging habitat available.

### **7.3. Prey Availability**

Factors that affect prey availability are critical limiting factors for Peregrine Falcons. For Peale's Peregrine Falcon, the abundance and distribution of seabird prey is the primary limiting factor. Seabirds, in turn, are strongly limited by ocean productivity, which can be affected by such diverse factors such as global warming, El Nino events, and over fishing. Populations of seabirds can also be adversely affected by other factors such as introduced mammalian predators on nesting islands and oil spills.

The American Peregrine Falcons that have colonized the Gulf Islands in Georgia Strait seem to focus on prey other than seabirds (R.W. Campbell, pers. comm. in White et al. 2002). These falcons have better access to alternate prey such as European Starlings, Rock Doves (*Columba livia*), and

waterbirds other than seabirds, especially shorebirds in winter and during spring and fall shorebird migrations, so are likely less susceptible to fluctuations in seabird numbers than Peale's Peregrine Falcons.

#### **7.4. Agriculture**

DDT was banned in North America in the early 1970s but is still used in other parts of the world including the winter range of some American and Arctic Peregrine Falcons (i.e., Mexico, South and Central America; White et al. 2002). In addition, many prey species winter in the south where they may be exposed to and accumulate organochlorines, which may in turn be passed on to falcon predators on their breeding grounds. The current effect of residual organochlorine pesticides in British Columbia on Peregrine Falcons is unknown.

Agricultural practices that result in drainage or degradation of wetlands, and affect waterbird populations, may adversely affect interior American Peregrines.

#### **7.5. Urban Development**

Some peregrines are able to adapt to live within urban centres and many successful hack sites have been established on tall buildings in cities since the first successful attempt in New York State in 1974 (Cade et al. 1996). Examples in Canada include 1) a male and female hacked in Winnipeg in 1990 returned and nested in the Regina City Hall building in 1991 and years following (Regina Peregrine Falcon Project 2003); and 2) since 1995 a pair has nested on a ledge of a building at the University of Calgary, Alberta (University of Calgary 2003). In many North American cities American Peregrine Falcons breed successfully (Cade et al. 1996). Possible hazards in urban environments may include collision with vehicles and buildings, and exposure to a

high level of contaminants. However, to date, no adverse effects to Peregrines living in urban centers has been noted. Millsap et al. (1998) determined that urban Peregrine Falcons were functional members of the overall population.

Urban development, however, may affect wetlands or estuaries and those effects likely negatively affect breeding Peregrine populations. Migrants are very adaptable in their use of foraging habitat and prey selection (White et al. 2002), so urban development is not likely a limiting factor during that phase of their life cycle.

#### **7.6. Winter Habitat**

The wide range of habitats used in winter (e.g., tropical forests, deserts, farmlands, urban areas, wetlands, valleys and mountains), and the extensive geographic area of the winter range suggests that availability of winter habitat is not limiting (White et al. 2002).

### **8. SPECIAL SIGNIFICANCE OF THE SPECIES**

#### **8.1. Status**

The Peale's Peregrine Falcon is on the provincial Blue List (CDC 2003), mainly because breeding populations within British Columbia are small and they occur within a restricted range (Fraser et al. 1999: Table 3). Nationally, it is considered to be a species of Special Concern by COSEWIC because there are relatively few individuals and this subspecies' food source is primarily seabirds, whose populations may be at risk (Kirk and Nelson 1999).

The American Peregrine Falcon is on the provincial Red List because of the very small population and the fact that it has not yet recovered in the interior of British Columbia, from near extirpation caused by organochlorine effects (Fraser et al. 1999),

and other factors (Cannings et al. 1987). Nationally, it is considered Threatened by COSEWIC because of the relatively small population across its range in Canada, (even though overall populations have recovered to near pre-collapse abundance), and because of the potential for threats such as pesticide use and loss of wetlands to negatively affect populations once again (Rowell 2002). This status was likely warranted as southern populations have not recovered as much as northern populations, southern populations were mainly urban-based, and down-listing to Special Concern could lead to the premature opening of harvesting for falconry.

The Arctic Peregrine Falcon is on the provincial Blue List because of the very few occurrences in British Columbia, the previous decline in breeding populations in the Arctic, and the possibility of confusion with other subspecies if it was available for harvesting for falconry. Nationally, it is considered a species of Special Concern by COSEWIC.

### **8.2. Degree of Public Interest**

For the public, the Peregrine Falcon is one of the most widely recognized birds by name alone, even if most people have never seen one. The Peregrine Falcon has become an icon of the environmental movement in North America and elsewhere. The collapse of North American populations of American Peregrine Falcons helped galvanize a shift in public attitude toward better general environmental stewardship (especially regarding use of organochlorines and other pesticides) and a view that raptors were not vermin. Many people know the Peregrine Falcon as the “fastest” bird in the world. Some researchers have calculated the maximum speed in a near vertical stoop at around 370 km/hr (Orton 1975 cited in White et al. 2002), and up-close

observations of a free-falling parachutist recorded a trained falcon keeping up with him at 320 km/hr (Franklin 1999).

The Peregrine Falcon also holds a high level of esteem in the world of falconry, a rather exclusive activity that transcends many cultures and countries. The Peregrine’s status as a CITES species has given it a high profile in international trade circles, as customs officers are well aware of its existence.

### **8.3. Related Species**

The Peregrine Falcon is a member of the *Falconidae*, along with caracaras, forest falcons and other true falcons (Sibley 2001). In British Columbia, this family is represented by five species of true falcons (genus *Falco*) including: American Kestrel (*Falco sparverius*), Merlin (*Falco columbarius*), Gyrfalcon (*Falco rusticolus*), and Prairie Falcon (Campbell et al. 1990). In British Columbia, the Prairie Falcon is red-listed and the Gyrfalcon is blue-listed. The Merlin and American Kestrel are wide ranging and relatively abundant.

## **9. RECOMMENDATIONS AND MANAGEMENT OPTIONS**

There are several management options that could benefit Peregrine Falcons in British Columbia. Most of these are applicable mainly to the interior American Peregrine Falcons because populations are extremely low and direct management action may be necessary to restore populations. Peale’s Peregrine Falcon populations have remained stable for decades, and were not affected by the pesticide contamination that decimated American Peregrine populations in North America (Beebe 1974; Kirk and Nelson 1999; White et al. 2002). Arctic Peregrines only occur in British Columbia as passage migrants. Therefore, other than general conservation of habitat for avian prey

**Table 3. Status of the Peregrine Falcon in various North American jurisdictions.**

Jurisdiction	<i>F.p. pealei</i>		<i>F.p. anatum</i>		<i>F.p. tundrius</i>	
	Natural Heritage Rank	Status	Natural Heritage Rank	Status	Natural Heritage Rank	Status
British Columbia	S3B S2N	Blue	S2B SZN	Red	SZN	Blue
Alberta			S3B	<60 pairs		
Saskatchewan			S1B SZN			
Ontario			S2S3B SZN			
COSEWIC		Special Concern		Threatened		Special Concern
Washington			S1B S3N	State Sensitive, downlisted from endangered in 2002		
Idaho			S1B SZN			Not listed
Montana			S2B SZN			Not listed
Alaska		Sensitive		Special Concern		Special Concern
U.S. Fish & Wildlife Service				De-listed by U.S. 1999		De-listed by U.S. 1994

species, management actions within the province for this subspecies are not necessary. One management option, harvesting for falconry, is discussed in detail below.

Peregrine Falcons have shown remarkable tolerance and adaptability for living near humans. The recolonization and expansion in recent decades of the breeding population on the Gulf Islands is a good local example of this. Peregrine Falcons do very well when their presence is tolerated by humans, when they are left undisturbed, and when they are not poisoned by chemicals (Cade et al. 1996). The authors agree generally with Cade et al. (1996), who suggest that protection from undue disturbance and poisoning is all the management that is needed, except for controls on any harvesting for falconry, once populations have recovered. The re-opening of harvest for falconry is one of the more

contentious management options explored below.

### 9.1. Falconry

#### American Peregrine Falcon

At present, the harvesting of Peregrine Falcons for falconry is not permitted in British Columbia. Provincial policy prohibits the harvesting of red-listed wildlife; therefore harvesting of American Peregrine Falcons shall continue to be prohibited as long as they remain on the Red List. Interior populations of American Peregrine Falcons may be just now showing early signs of recovery but that process will likely take many years. The more established population on the Gulf Islands may, on the surface, appear to be candidates for harvesting, but the subspecies remains on the Red List, and problems for falconers and government associated with private

ownership of nesting cliffs and the high visibility to the public of aeries makes harvesting at these aeries unwise. Legal problems with CITES and SARA will also occur as long as American Peregrines are listed as Appendix 1 and Threatened, respectively.

### **Peale's Peregrine Falcon**

In British Columbia, there has been a long history of harvesting of Peale's Peregrine Falcons for falconry purposes. Harvesting was unregulated prior to the 1960s, then was regulated by a permit system until the last major harvest of nine birds in 1972 (Shelford 1988). At least 133 nestlings were taken from the Queen Charlotte Islands from 1963-1967 (Blood 1968), yet that harvest was dismissed as a factor in population regulation (Blood 1968; Nelson and Myres 1976). Harvesting permits were issued for two birds from the Queen Charlotte Islands in 1979 and two birds from coastal British Columbia in 1984. The last legal harvest is believed to have occurred in 1987 (M. Chutter, pers. comm.). A small harvest approved for the Queen Charlotte Islands in 1988 was met by protests by the Haida Nation, other residents, and environmental activists. These protests were a small part of larger-scale, anti-logging and landclaims-related protests in the late 1980s. A provincial inquiry was struck (Shelford 1988) as an outcome of these protests, and resulted in the closure of the Queen Charlotte Islands to falcon harvesting in 1988. In order to simplify management and deal with conservation concerns for all subspecies, the harvest closure was applied to all Peregrine Falcons in B.C..

Since the American Peregrine Falcon is red-listed, which precludes harvesting, and the Arctic Peregrine Falcon occurs so rarely in British Columbia as to be essentially inconsequential as a harvested wildlife

species, the question remains: is a harvest of Peale's Peregrine Falcon biologically defensible? Populations of Peale's Peregrines have been stable for many decades and earlier harvests on the Queen Charlotte Islands, which were at times extensive, were determined to have no consequences to populations. One of the reasons for this is that falconry harvest is limited to birds less than a year old. There is a relatively high mortality rate for raptors in the nestling stage and in their first year, so few of these harvested birds would likely have survived (survival of fledglings in the first year is thought to be only 40-50%: White et al. 2002). Also falcons have a relatively long life span, which allows experienced breeding birds time to produce sufficient young to recruit into the population (Newton 1979). Clutch size in British Columbia is usually 3-4 eggs (Campbell et al. 1990), but in North America fewer young generally fledge (e.g., often <2 per nest: White et al. 2002). However, on Langara Island fledgling rates average 2.31 fledglings per pair (Nelson 1990). Last hatching young are especially vulnerable to mortality due to sibling competitive pressures (White et al. 2002); therefore removal of these birds should have low impact on productivity.

Provincial falconry policy dictates that only immature (either nestlings or fledged birds of the year) birds may be taken. Harvest of nestlings is based on the number of young in a raptor's nest; a maximum of two raptors can be taken annually under the permit of a single falconer. Peregrine Falcons are Class 1 raptors and policy dictates:

- A minimum of two young must be left in the nest of Class 1 raptors.
- Young must not be transferred from one nest to another to meet the requirements of this subsection.

Harvesting of eggs or nestlings may increase the survival chances of the remaining young because of reduced sibling competition for food. As long as requirements for leaving sufficient young in the nest are met (see above), falconry harvest could potentially assist recruitment in some cases. However this remains highly speculative, with no data to support this suggestion, and removal of young to increase productivity has not been suggested as a conservation measure in other jurisdictions. Late hatching young have a reduced chance of survival, and could be removed for falconry purposes without affecting productivity of any particular aerie, especially if less productive territories could be identified for harvesting purposes. Therefore, it seems there is little reason to fear biological consequences from a well-regulated harvest of Peale's Peregrines, especially if it is on a small scale.

If a harvest is considered to be biologically defensible then the harvest location must be determined. Previous experience on the Queen Charlotte Islands suggests that re-opening harvest would lead to public concern and opposition. It is likely that island residents and the Haida Nation would oppose such an action as each group has become very protective of its biological assets. The Queen Charlotte Islands, however, holds the core of the provincial Peale's Peregrine population and would be the best area to conduct a harvest for biological reasons.

If not on the Queen Charlotte Islands, the next best location for eyas capture would be on northern Vancouver Island at aeries that are not within protected areas. It seems plausible to re-open harvesting at such aeries, especially if harvesting can be targeted at aeries that tend to be less successful than others, though it is also possible that concerns from the public would

be raised and that local First Nations may respond similarly to the Haida.

The harvest of free-flying, subadult passage Peale's or Arctic Peregrine Falcons is also an option and falconers typically enjoy capturing free-flying birds. The major problem with this harvesting method is that non-target birds such as adult Peale's and Arctic Peregrines, and American Peregrines of all age ranges will likely be inadvertently captured. Furthermore, separation of the subspecies in the field is difficult and monitoring of falconer activities to ensure compliance with regulations may be problematic. The public may demand levels of enforcement that are not cost-effective or feasible to attain. Compulsory inspection seems to work for some big game species and may be a method of checking on harvest of Peregrine Falcons. However, some falconers have multiple captive Peregrine Falcons or hybrids and the identification and separation of these are extremely difficult. It is recommended that widespread harvesting of free-flying Peregrine Falcons not be implemented, as it is believed that this type of harvest is very difficult to satisfactorily regulate, that the probability of capturing American Peregrine Falcons by mistake is high enough to be of concern, and that the possibility of injury to falcons that cannot be harvested is also sufficiently high as to be of concern. Clearly, the harvest of American Peregrine Falcons should not be permitted given the concerns outlined above, and harvesting of free-flying birds should be precluded in most areas because of the chance of capturing and harming individuals of that subspecies.

However, if the harvest was restricted to the north and west coasts of Vancouver Island, it would likely result in a harvest consisting entirely of Peale's Peregrines. A passage harvest would result in a broader source of harvested birds than a localized eyas harvest, thereby spreading out the risk

of potential effects of harvest and reducing the chances of local adverse effects. On the other hand, because the origins of harvested birds are unknown, there may be effects to populations in unknown localities that will not be possible to determine.

Capture of free-flying birds reduces the likelihood of complaints from the public, who might become concerned upon observing permitted falconers accessing aeries for eggs or young. Wildlife managers will have to balance a desire to avoid public controversy or concern with providing recreational opportunities informed by the best biological advice for a potential harvest. From an enforcement perspective, harvest of free-flying birds would be easier to manage as no legal access to aeries by falconers would be allowed; therefore any reports of such activities would be justification for an investigation. Also, with no legal opportunity for eyas harvest, there would be less opportunity for an unscrupulous individual to place a seamless band on an eyas bird and try to pass it off as captive bred.

If allowed, the total number of nestlings or subadults that could be harvested should be determined after a careful analysis of productivity of each aerie (for eyasses), the demand from falconers for Peregrines, historical harvest rates and existing management policy for other blue-listed raptors such as Gyrfalcons.

Should the harvesting of Peregrine Falcons be considered at all? Events in the mid and late 1980s in the Queen Charlotte Islands showed that this issue is potentially controversial. Government wildlife managers and regulators should consider the need to consult all stakeholders, including those who may question harvesting of wildlife based on moral positions rather than on scientific information on population effects.

Falconry is an age-old activity, and government supports the harvesting of many wildlife species as important recreational opportunities and contributions to the economy. There seems little biological reason to preclude a carefully regulated harvest of Peale's Peregrine Falcons. In addition, in the past, we have depended upon captive breeding of falcons to provide a supply of young birds to foster recovery efforts for American Peregrines and thus both the species and the government may benefit from supporting certain falconry activities.

It is recommended that the option of harvesting Peale's Peregrine Falcons in areas that are not subject to protection for biodiversity values, are not subject to objections from First Nations, and that follow provincial guidelines for falconry harvesting, be considered by government agencies involved in managing this magnificent bird.

## **9.2. Population Augmentation**

### **Peale's Peregrine Falcon**

Population augmentation of this subspecies is not required as populations have been stable for a long period of time, the subspecies may be slowly expanding its range southward on western Vancouver Island (D. Doyle, pers. comm.), and habitat in core areas seems to be well-occupied. Although there may be fewer occupied territories on certain islands (e.g., Langara Island) than there were historically, it is likely that large-scale environmental conditions are limiting numbers and population augmentation would not be effective.

## **American Peregrine Falcon**

The recovery of North American populations of American Peregrine Falcons has been largely aided by the release of young, captive-raised birds at artificial and wild aeries. By 1994, more than 4600 Peregrine Falcons had been released in the USA and more than 1500 had been released in Canada (Cade et al. 1996). In Alberta, up to 50 captive-bred young peregrines were released each year between 1992 and 1996 (Holroyd et al. 1995). In British Columbia, 30 peregrines were released at Kelowna in the late 1990s, with some of the birds returning in subsequent years to as far away as Kamloops (J. Hobbs, pers. comm.). One breeding pair near Kamloops is thought to include a bird released at Kelowna (G. Court, pers. comm.).

There seems to be great potential to conduct releases of captive-raised birds in many areas of interior British Columbia, as there are large areas with suitable habitat that are unoccupied by peregrines. The East Kootenay Trench, Okanagan Valley, Thompson Valley, and Peace Lowland would be four areas to target for release of captive-bred birds.

Techniques for conducting such work are well described in Cade et al. (1996). Cade et al. (1996) suggest that this type of intensive management is only required to assist population recoveries in areas where populations remain low, which is certainly the case in interior British Columbia. Birds used for such purposes should be as close to genetically pure “*anatum*” peregrines as possible. It is recognized however, that birds from captive-breeding programs may have mixed genetics due to the limitations on the availability of “genetically pure” birds.

It is also possible that habitat may not be suitable in some areas, such as the Okanagan Valley, where pesticide residues in the environment are still relatively high

(Elliott et al. 1994) and may still inhibit reproductive success. Still, it is strongly recommended that wildlife managers support private or public initiatives to release Peregrine Falcons in areas where populations are low, as long as those releases follow accepted procedures.

## **Arctic Peregrine Falcon**

This subspecies does not breed in British Columbia so hacking techniques are inappropriate.

### **9.3. Wildlife Management Areas**

Unlike for Prairie Falcon, there are no provisions for management of habitat for Peregrine Falcons under the B.C. *Forest and Range Practices Act* through the establishment of Wildlife Habitat Areas. However, Wildlife Management Areas (WMAs) can be established to conserve and manage important wildlife habitat. By 2001, 22 WMAs were established in British Columbia, all of which are administered by the Ministry of Water, Land and Air Protection. It may be appropriate to establish WMAs around some aeries, particularly if other wildlife and/or wildlife habitat values can also be represented.

## **Peale's Peregrine Falcon**

An unknown but presumably relatively large number of aeries are located in protected areas. Protection of additional habitat through this type of measure is not necessary as most aeries are in very remote locations. For Peale's Peregrine Falcons, conservation of their seabird prey base is likely the most important management action that can be undertaken. At present, most seabird colonies are protected in one form or another (Hipfner et al. 2002), but further conservation for Peregrine Falcons

may be achieved through sound fisheries management, prevention of oil spills and other measures. The seabird prey base is extremely vulnerable to large-scale changes in oceanic productivity and to catastrophic events such as large oil spills.

### **American Peregrine Falcon**

Where land tenure allows, and threats to nesting aeries are expected, it is suggested that cliffs with aeries and a reasonable adjacent buffer area be designated as Wildlife Management Areas. Although WMAs have been traditionally used to conserve and manage larger areas of wildlife habitat, this management tool could be used if and where needed to conserve habitat for American Peregrines, especially for interior populations. Some aeries in the Fraser Lowland and on the Gulf Islands may also benefit from such protection.

### **9.4. Best Management Practices**

#### **Peale's and American Peregrine Falcons**

Best management practices (BMPs) for conserving wildlife values have been developed for some areas of British Columbia and likely have value for Peregrine Falcons. On Vancouver Island, BMPs for raptors in urban and rural areas and targeted for land developers and municipal governments have recently been developed (Manning, Cooper and Associates 2003). Some of the BMPs related to conservation of foraging habitat and reduction of disturbance near nest sites during the nesting season could apply to Peregrine Falcons.

One concrete example of BMPs for Peregrine Falcons in British Columbia is that provincial agencies and rock climbers have developed a joint management strategy for one popular rock climbing cliff with an

occupied aerie. The aerie location is confirmed each year and during the breeding season, that part of the cliff is declared off-limits to climbing. Signs are posted at the bottom of the cliff establishing the breadth of the no-climb zone. Not only does this help the peregrines, but it improves safety for climbers as it may be dangerous to be buzzed by a startled Peregrine when dangling several hundred metres up a cliff. This strategy appears to be working well for both the peregrines and the climbers.

### **9.5. Predator Control**

#### **Peale's Peregrine Falcon**

Introduced rats and raccoons have been linked to the decline of local burrowing seabird populations (Bertram 1995; Harfenist and Kaiser 1997; Hartman and Eastman 1999). Since Peale's Peregrine Falcons depend on these seabirds for prey, it seems reasonable to conclude that control of these predators would be beneficial for falcons.

A comprehensive eradication program on Langara Island has recently been completed and the island is now free of rats (Kaiser et al. 1997). Control programs have been initiated at other islands as well (e.g., St. James Islands: Hipfner et al. 2002). The effects on seabird populations remain to be determined, but recovery to a certain degree is the forecast effect. Efforts to eradicate introduced mammalian predators on seabird colony islands should be strongly encouraged.

### **9.6. Nest Surveys**

#### **Peale's and American Peregrine Falcons**

As part of its Recovery Plan, nest surveys for the American subspecies are conducted nation-wide, including British Columbia, every five years. British Columbia has

traditionally conducted surveys for the Peale's subspecies at the same time and has recently expanded coverage for American Peregrine Falcons as more aeries have become known. Additional province-wide surveys are not warranted, as long as this program continues. However, because of their extreme rarity, monitoring of active and historically active American Peregrine aeries in the interior should occur annually.

### **9.7. Species At Risk Act**

#### **Peale's and American Peregrine Falcons**

The federal *Species At Risk Act* (SARA) (Environment Canada 2004) provides for recovery of species designated nationally as Threatened, Endangered, or of Special Concern. Provisions of this Act should be considered to conserve and protect habitat, especially in interior British Columbia.

The American Peregrine Falcon is listed as Threatened by COSEWIC and therefore requires a Recovery Team to be established and a Recovery Plan to be prepared, to guide recovery efforts and actions. Due to its widespread distribution in Canada, the American Peregrine Falcon Recovery Team is chaired by Canadian Wildlife Service, with members from all provinces and territories. It has a completed Recovery Plan and is working on a revised one. The Peale's Peregrine Falcon is listed as Special Concern by COSEWIC, and as such requires a management plan be prepared.

### **9.8. Public Stewardship**

#### **Peale's and American Peregrine Falcons**

The best stewards of rare wildlife may be the landowners upon whose land the species depend. Landowners increasingly wish to conserve special natural resource values on their property as appreciation for those values continues to increase in our society.

Landowners that control nesting cliffs or foraging habitat should be approached and informed about the importance of their land for Peregrine Falcons.

Stewardship agreements and/or land conservation covenants are just two types of stewardship actions that can be most beneficial over the long term (Stewardship Centre 2003). These and other agreements between government and landowners can provide long term certainty over protection and conservation of falcon aeries.

### **9.9. Artificial Nest Sites**

#### **American Peregrine Falcon**

Artificial nest sites are required when peregrines are hacked in urban environments. Unlike the Prairie Falcon, which often nests in silt cliffs where nesting potholes tend to collapse over time, cliffs used by Peregrine Falcons tend to be rock and nest ledges seldom become unsuitable. Hack boxes can also be used in natural sites such as cliffs (Cade et al. 1996) and perhaps their use should be considered rather than encouraging falcons to nest in urban environments. The installation of artificial aeries would likely be a useful management tool for release programs in some areas.

### **9.10. Research**

#### **Peale's and American Peregrine Falcons**

The most important research need in British Columbia is to determine the subspecific status of various breeding populations. This can be accomplished through collection of morphometric data from adult and fledged juveniles throughout coastal British Columbia. Blood samples from nestlings and adults should be collected from a sample of aeries along the coast to allow analysis of DNA to determine how discrete the various populations are. This research is

currently underway (D. Doyle, pers. comm. 2002).

Continued monitoring of pesticide contamination is important so that potential negative consequences for populations can be predicted. DDT and other organochlorine-based pesticides are still being used in Latin America, so peregrines are exposed to these contaminants on some of their winter ranges or from their prey. Blood collected from nestlings and adults can be used to analyze organochlorine pesticide contamination. This research is also currently underway, and preliminary samples show high but variable concentrations (D. Doyle, pers. comm. 2002). Long-term, and perhaps more intensive, sampling is recommended.

There is some suggestion that there are wintering concentrations of peregrines on the west coast of Vancouver Island, similar to those found in Washington. It seems important to determine if this is true and to determine the habitat needs and origins of those birds. This research is currently being planned (D. Doyle, pers. comm.).

## 10. EVALUATION

Three subspecies of Peregrine Falcon occur in British Columbia, each of which has been evaluated on a national level by COSEWIC: Peale's Peregrine Falcon – Special Concern, American Peregrine Falcon – Threatened, and Arctic Peregrine Falcon – Special Concern.

In British Columbia, Peale's Peregrine Falcon is currently blue-listed. Overall populations have remained stable for many decades, although local populations have declined in some areas. Its breeding range in British Columbia encompasses a vast area including the Queen Charlotte Islands, the central and northern mainland coast, northern and western Vancouver Island, and many offshore islands in the above-

mentioned areas. British Columbia is home to about 25% of the world's population. There seem to be few threats to nesting habitat, legal harvesting for falconry has been stopped, and poaching of birds for falconry purposes is thought to be minimal. Potential threats are mainly related to threats to abundance and distribution of seabird prey.

The future for this subspecies in British Columbia seems fairly secure. Although that conclusion may give cause to consider delisting, given the relatively small population, the reliance on seabird populations for food and the vulnerability of many of those seabird populations to potential catastrophes such as oil spills, oceanic changes due to global warming, and introduced mammalian predators, it is recommended the Peale's Peregrine Falcon remain on the Blue List.

In British Columbia, the American Peregrine Falcon is currently red-listed. Populations throughout most of North America have recovered to near historic levels (White et al. 2002). The interior of British Columbia is one glaring exception, as there are only a few active aeries known. On the other hand, this subspecies has recently colonized the south coast of British Columbia and a new population exists in the Fraser Lowland, Gulf Islands and southeastern Vancouver Island. However, the taxonomy of those birds remains somewhat uncertain.

The reasons for the lack of recovery in interior British Columbia are uncertain, as there seem to be large amounts of suitable habitat in several regions. There are indications, however, that recovery may be beginning as new birds are being observed more frequently in the last 2-3 years. Because of the extremely low number of American Peregrine Falcons in interior British Columbia, and their precipitous decline from historical numbers, it is

recommended the species remains on the Red List.

In British Columbia, the Arctic Peregrine Falcon is currently blue-listed. This listing is due to scarcity of records in the province, and the past decline caused by pesticide poisoning. Breeding populations in the Arctic have recovered to near historic levels, but records of occurrence in British Columbia remain scarce. This trend will undoubtedly continue in the future. It seems questionable for any biological reason to place this subspecies on the Blue or Red List in British Columbia, given the Arctic Peregrine's historical range is outside the province and it occurs in B.C. only as a migrant. However, it is recognized that there may be confusion between subspecies, with possible legal consequences under SARA and CITES; therefore this subspecies should remain on the Blue List.

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