

# Conservation Status Report

## Peregrine Falcon

Scientific Name:	<i>Falco peregrinus</i>
French Name:	<i>Faucon pèlerin</i>
Spanish Name:	<i>Halcón peregrino</i>
Body length:	36–58 cm (female: 51.5, male: 42.5)
Wingspan:	90-117 cm (female: 111.0, male: 92.1)
Mass:	530–1,595 g (female: 1,000, male: 660)

(There are three native subspecies in North America and 19 subspecies worldwide. Reintroduction efforts in North America involved four exotic subspecies, leading to establishment of a hybridized North American population derived from the native and introduced subspecies. Some variation in measurements may be due to the use of these introduced subspecies.)

*Breeding Range* (words in italics are defined in the glossary):

Breeding range is discontinuous, with known breeding in Alaska, including the Aleutian Islands, Alaska Peninsula, the northwest coast and north slope of the Brooks Range; Canada, including Yukon, Northwest Territories, Nunavut, British Columbia, Ontario along the Great Lakes, Quebec along the St. Lawrence River; portions of the contiguous 48 United States, including northern and eastern states as well as Arizona, Colorado, California, coastal Pacific Northwest, Montana, New Mexico, Utah, and Wyoming; Mexico, including Baja California and islands of the Gulf of

California, Sonora, Chihuahua, Coahuila, Durango; Latin America, including parts of South America, but not Central America.

*Winter Range:* Winters primarily in coastal western Canada and Alaska, and in the contiguous 48 states; often in major urban areas. Neotropical distribution concentrated along coasts, in cities, and in wetlands throughout Caribbean, Mexico, Central and South America to approximately 40° S.

*Type of Migrant:* Partial, “leap-frog”.

*Nest Type:* Small “scrape” or depression on a cliff ledge or in a cliff crease or cavity; sometimes in old stick nests of other birds, within large tree cavities, or on the ground; also on building ledges in cities. Some nest sites are used across many decades, even after years of absence.

*Food Habits:* Preys primarily on birds of between 50 and 500 g, including pigeons and doves, passerines, waterfowl and shorebirds, gallinaceous birds, as well as smaller raptors. Also takes mammals (primarily bats), amphibians, fish, and insects. Avian prey generally are taken in flight.

*Primary Flight Mode:* Powerful, deep flapping with infrequent gliding and soaring, and sequences of alternate flapping and gliding. “Stoops” (dives) in pursuit of flying prey.

## **ECOLOGY**

One of six (seven including Caracaras) falcons in North America, the Peregrine Falcon is long-winged and second in mass to the Gyrfalcon. Adult peregrines have bluish-gray upperparts and a blackish head. The species has a dark facial or “moustache” mark on each side of its face, whitish cheeks, whitish or buffy underparts with black spotting or bars, and gray or black barring on the undersides of its wings and tail. Females are 15–20% larger and 40–60% heavier than males. Although peregrines occasionally soar and glide, they are most often seen in flapping flight.

North America’s best-known falcon, the peregrine is a truly cosmopolitan species. Found on every continent except Antarctica, some individuals from northern populations annually migrate up to 25,000 km. These characteristics make the species name, which is derived from Latin for “wanderer,” quite fitting. Despite its near global range, the Peregrine Falcon is sparsely distributed in all but a few locations. This pattern of distribution makes organisms vulnerable to local extirpation (Rabinowitz et al. 1986).

Peregrine Falcons, which have been prized for falconry for centuries, are often described as the perfect flying machine. The species is a powerful hunter, well suited for capturing avian prey. Peregrines are known for fast and maneuverable flight when chasing prey and when performing aerial courtship and territorial displays. Hunting peregrines typically strike their prey in the air and then grasp it with the talons. Sometimes they deliver a stunning strike or blow at the end of a high-speed “stoop” or spiraling dive and retrieve their prey on the ground.

The species prefers to nest on cliffs, and the presence of suitable nest sites often determines its distribution and density. Nest sites often overlook rivers and lakes, coasts, mountain valleys, and rocky islands. A nest site must afford protection from the weather

and potential predators, and it must be in or near areas with adequate prey. Successful breeders rarely change nest sites, and preferred nest sites are used for generations. It is not uncommon for nest sites to be occupied for decades and, sometimes, for centuries.

Peregrines also nest in tree cavities and in the stick nests of other species, as well as on the ground, and on manmade structures, including bridges, cooling towers, water tank towers, and old hacking platforms. Historically, peregrines were known to nest on old buildings in cities and small towns. With the Peregrine Falcon's reintroduction in eastern North America, many individuals now nest in cities. In 2000, 14 pairs of Peregrine Falcons were breeding in New York City.

Peregrine nests, or "eyries," typically consist of a shallow nest scrape, or depression. Nesting material is not added to the scrape. Males usually initiate construction of the scrape, but females often are involved as well. In some cases, males prepare several scrapes at the nest cliff.

Although best known as aerial hunters, peregrines also hunt from perches. In North America, known prey includes more than 420 species of birds and 23 mammals, including 10 bats. Peregrines kill birds as large as Sandhill Cranes, but their typical prey consists of smaller birds, including Mourning Doves, Rock Pigeons, American Robins, and Starlings. In coastal areas, shorebirds and ducks are commonly taken. When migrating in concentrated flyways, Peregrine Falcons sometimes feed on other raptors, including Sharp-shinned Hawks, American Kestrels, and Merlins.

The Peregrine Falcon is a *partial migrant*. Migration begins across a broad front, but clearly defined routes become evident as the species concentrates along *leading* and *diversion lines*. Unlike many other raptors, peregrines often cross large bodies of water

and are seen along coastlines not so much to avoid water, but rather because coastlines are prime hunting areas. Peregrine Falcons regularly cross the Gulf of Mexico and the Caribbean Sea. In eastern North America, coastal watchsites report many more migrating peregrines than inland watchsites, with the largest known migratory concentration of the species in North America occurring each fall in the Florida Keys (Lott 2006).

Some peregrines migrate distances of up to 13,000 km one way. Northern breeders in Greenland and Canada, for example, overwinter as far south as central Argentina and Chile. Peregrines exhibit a “leap-frog” migration pattern in which breeders from northern areas over-winter south of the more southerly breeders.

## **POPULATION STATUS**

Partners in Flight estimates that North America contains 23% (276,000 individuals) of the global population of peregrines (Rich et al. 2004, summarized in Appendix B, Table 1). Population estimates summarized in White et al. (2002), however, placed the continental population at 52,000 - 62,000 individuals at the end of the 20<sup>th</sup> century, which seems more likely given that the pre-*DDT* population of North America has been estimated to contain 10,600-12,000 breeding pairs (Cade 2003). Data from *raptor migration counts* and *Christmas Bird Counts (CBCs)* indicate that populations of Peregrine Falcons have (1) increased in eastern North America since 1974, and apparently begun to stabilize since 1995; (2) increased in western North America since the early 1980s; and (3) increased in areas of North America monitored by migration counts in the Gulf of Mexico.

### Eastern North America

**Historic analyses.** Bednarz et al. (1990) reported a non-significant increase in counts of Peregrine Falcons at Hawk Mountain Sanctuary from 1934 to 1942. A non-significant increasing trend in peregrine numbers was reported for the period 1973 to 1986, and a *statistically significant* decline ( $P \leq 0.05$ ) was recorded from 1942 to 1972 at Hawk Mountain Sanctuary (Bednarz et al. 1990), but no estimates were made of the rates of change. In a study of counts at six *raptor migration counts* in eastern North America, Titus and Fuller (1990) reported a regional increasing trend of 15.3% per year ( $P \leq 0.05$ ) from 1972 to 1987. Hussell and Brown (1992) reported that counts of Peregrine Falcons at Hawk Ridge Bird Observatory increased a *statistically significant* 6.1% per year ( $P \leq 0.05$ ) from 1974 to 1989, while those at Grimsby, Ontario (a spring count) increased 27.8% per year ( $P \leq 0.05$ ) from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported statistically significant increases in counts of peregrines from 1936 to 1999 ( $P \leq 0.01$ ) and from 1951 to 1999 ( $P \leq 0.01$ ). Overall, previous estimates of population trend for falcons indicate that populations passing northern raptor migration count locations increased steadily between the early 1970s and late 1990s.

**Recent analyses.** Raptor migration counts and CBCs indicate that populations of Peregrine Falcons have increased in northeastern North America since 1974 (initiation of reintroduction efforts). From 1974 to 2004, statistically significant increases in migration counts were recorded at Lighthouse Point, Connecticut (7.8% per year,  $P \leq 0.01$ ), Cape May Point, New Jersey (6.0% per year,  $P \leq 0.01$ ), Montclair Hawkwatch, New Jersey (12.3% per year,  $P \leq 0.01$ ), Hawk Mountain Sanctuary, Pennsylvania (4.3% per year,  $P \leq 0.01$ ), Waggoner's Gap, Pennsylvania (2.3% per year,  $P \leq 0.01$ ), Holiday Beach,

Ontario (4.7% per year,  $P \leq 0.01$ ), and Hawk Ridge Bird Observatory, Minnesota (7.8% per year,  $P \leq 0.01$ ).

Recent, short-term trends indicate that population growth in this species is slowing in the breeding range monitored by raptor migration counts in northeastern North America, presumably in the arctic and boreal breeding populations. From 1994 to 2004, statistically significant increases occurred at l'Observatoire d'oiseaux de Tadoussac, Quebec (7.2% per year,  $P \leq 0.01$ ) and Hawk Ridge (7.8% per year,  $P \leq 0.01$ ). Non-significant increases were recorded at Lighthouse Point (3.2% per year), Montclair Hawkwatch (7.1% per year), Hawk Mountain Sanctuary (1.6% per year), and Waggoner's Gap (1.0% per year). Non-significant declines were recorded at Cape May Point (-1.3 % per year) and Holiday Beach (-2.7 % per year) (Fig. 1). Continued population change at the 1994–2004 rates would lead to a 50% increase of Peregrine Falcon source populations in approximately 10 years at Tadoussac, 22 years at Lighthouse Point, 10 years at Montclair, 16 years at Hawk Mountain, 69 years at Waggoner's Gap and 9 years at Hawk Ridge. Fifty percent declines would occur in 53 years at Cape May, and 26 years at Holiday Beach.

CBC data (National Audubon Society 2002) for the northeastern United States and eastern Canada (Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, New Brunswick, Nova Scotia, Ontario, and Quebec) from 1974 to 2004 indicate a statistically significant increase of 5.5% per year ( $P \leq 0.01$ ). CBCs for the southeastern United States increased a statistically significant 9.2% annually ( $P \leq 0.01$ ) in the same period.

BBSs do not include the Peregrine Falcon, so no population trend data are available from this source. However, other studies of breeding populations in North America indicate rates of increase between 5 and 10% annually.

#### Western North America

**Historic analyses.** Hoffman and Smith (2003) reported statistically significant increases in migrating falcons from 1983 to 2001 at the Goshute Mountains, Nevada ( $P \leq 0.01$ ), between the late 1970s and late 1980s and from 1987 to 2001 in the Wellsville Mountains, Utah ( $P \leq 0.01$ ), from 1985 to 2001 in the Manzano Mountains, New Mexico ( $P \leq 0.01$ ), and from 1985 to 2001 in the Sandia Mountains, New Mexico (spring counts,  $P \leq 0.01$ ). In contrast, no significant trends were recorded at Lipan Point, Arizona (1991–2001) or in the Bridger Mountains, Montana (1992–2001).

**Recent analyses.** Long-term trends from raptor migration counts and CBCs suggest that populations of the Peregrine Falcon have increased in parts of the western United States since the mid-1980s. For purposes of this report, only migration counts from the Manzano Mountains, New Mexico, could be analyzed because counts at all other western sites average  $< 20$  birds per year. In New Mexico, a *statistically significant* long-term increase was recorded from 1985 to 2005 (9.6 % per year); however, a significant polynomial regression indicated that the increasing pattern that was so prominent from the late 1980s through the mid-1990s largely stabilized after 1998 (non-significant -2.1% decline since 1998). A non-significant increase occurred from 1995 to 2005 in the Manzano Mountains (5.0% per year) (Fig. 1). Most of the datasets reported by Hoffman and Smith (2003) were not analyzed again in the context of this report due to low annual counts and restrictions associated with the regression-based index, but the

long-term patterns shown in the Goshute and Wellsville Mountains are very similar to those shown in the Manzano Mountains. Evidence of increases in the last decade is also apparent in counts from Washington, Oregon, Idaho, Arizona, and Alberta.

CBC data (National Audubon Society 2002) for the western United States and Canada (Alaska, Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, Alberta, British Columbia, Northwest Territories, Yukon Territory) indicates that wintering populations of Peregrine Falcons increased 4.2% per year ( $P < 0.01$ ) from 1983 to 2005, and from 1995 to 2005 ( $P < 0.01$ ).

### Gulf of Mexico

**Recent analyses.** From 1995 to 2005, migration counts of Peregrine Falcons increased significantly at Smith Point, Texas (1997–2005, 5.8% per year,  $P \leq 0.05$ ), and similar but non-significant positive rates of change were estimated for the other three sites: 6.9% per year in the Florida Keys (1999–2005), 3.3% per year at Corpus Christi, Texas (1997–2005), and 3.2% per year at Veracruz, Mexico (1995–2005) (Fig. 1).

Although the precision of the latter three trend estimates was low due to relatively high interannual variability and the short duration of the monitoring periods, the marked similarity of the estimates at all four sites suggests a common pattern that may become clearer once the monitoring periods are extended for another 5–10 years.

### **HISTORIC CONSERVATION CONCERN**

Historically, peregrines were subject to several types of direct persecution, including shooting, trapping, and egg collecting. They also have been captured for use in falconry. Peregrines were shot at well-known migration spots, including Hawk Mountain and Cape May Point, in the early 20<sup>th</sup> century. During the *DDT era* of 1945–1972,

numbers of peregrines in North America declined significantly. Counts of migrating peregrines declined precipitously at Hawk Mountain from the 1950s through the 1970s, and the species was considered *extirpated* in the eastern United States by 1965. In 1963, the desertion of nest sites in Great Britain was linked to the widespread use of organochlorine insecticides like *DDT*. In 1965, attention was drawn to the status of Peregrine Falcon populations in North America at a conference of raptor scientists held in Madison, Wisconsin, where significant declines caused by reproductive failure were described throughout the continent (see Hickey 1969). As a result of concerns raised at this conference, programs to breed peregrines for reintroduction were begun in several locations. Subsequent research identified eggshell thinning as the cause of reproductive failure, and *DDT* residues (primarily the contaminant, DDE) as the cause of eggshell thinning. The widespread use of *DDT* was banned in the U.S. in 1972.

The Peregrine Falcon was listed as endangered under the Endangered Species Conservation Act in 1970, and it received protection under amendments to the Migratory Bird Treaty Act in 1972, and under the new Endangered Species Act in 1973. Regional recovery plans for the species were established under the Endangered Species Act, all of which sought to reduce the environmental contamination caused by pesticides, and most of which also called for extensive captive propagation and release programs. The release and reintroduction of peregrines propagated in captivity began in 1974 (see Cade et al. 1988). By 1998, almost 7,000 individuals had been released and breeding pairs had reclaimed more than 700 territories vacated during the *DDT* era. The combined effects of strict legal protection, restoration efforts, and the ban on the widespread use of *DDT* enabled Peregrine Falcon numbers to begin increasing in the late 1970s. Populations

continued to increase in the 1980s and 1990s, and by the late 1990s most populations had almost fully recovered.

Counts of migrating raptors began to reflect this increase in the late 1970s. For example, whereas an average autumn count for Hawk Mountain between 1934 and 2002 was 26 peregrines, an average of 44 were seen between 1993 and 2002.

## **CURRENT STATUS AND CONCERNS**

Migration counts at Cape May Bird Observatory have declined a non-significant 9% per year since 1998. This may indicate either that the source population has recently stabilized or is declining. Either way, our analysis of migration counts in North America suggests that populations of the Peregrine Falcon need to be monitored continually.

Monitoring of migrants at watchsites is particularly important for this species because it is not monitored by BBSs on the breeding grounds and recent delisting may limit special breeding surveys.

The Peregrine Falcon is considered apparently secure globally and within the United States and Canada (Appendix B, Table 1). Most of the U.S. Fish and Wildlife Service regions and Bird Conservation Regions still consider it a species of regional concern, however (Appendix B, Table 2).

In the breeding range monitored by raptor migration counts in northeastern North America, the Peregrine Falcon is considered vulnerable in one of the states and provinces, imperiled in three, and critically imperiled in four (Connecticut, Massachusetts, Rhode Island, Pennsylvania ) (NatureServe 2006; Appendix B, Table 2). In the remaining states and provinces of this breeding range, the species is not ranked or is currently under review. In the breeding range monitored by raptor migration counts in

western North America, the Peregrine Falcon is considered apparently secure in one of the states and provinces, vulnerable in three, imperiled in eight, and critically imperiled in three (Idaho, Oregon, Wyoming). In the Northwest Territories of Canada, it is not ranked or currently under review (NatureServe 2006; Appendix B, Table 2). Kirk and Hyslop (1998) listed the Peregrine Falcon populations breeding in Canada as stable or increasing, but those in coastal British Columbia had not returned to historic levels by 1998.

## **SUMMARY**

In the last 30 years, Peregrine Falcons have made a strong recovery from historic population crashes. Dramatic increases in migration counts have occurred throughout northeastern North America, accompanied by more moderate increases in western North America. Migration counts along the Gulf of Mexico reinforce the conclusion that North American populations of the species are increasing. Recent trends in northeastern North America further suggest that populations are stabilizing after a long period of growth. Peregrine Falcons are not well monitored by other large-scale surveys (i.e. BBS and CBC), and migration counts are an important tool for monitoring populations of this charismatic raptor.

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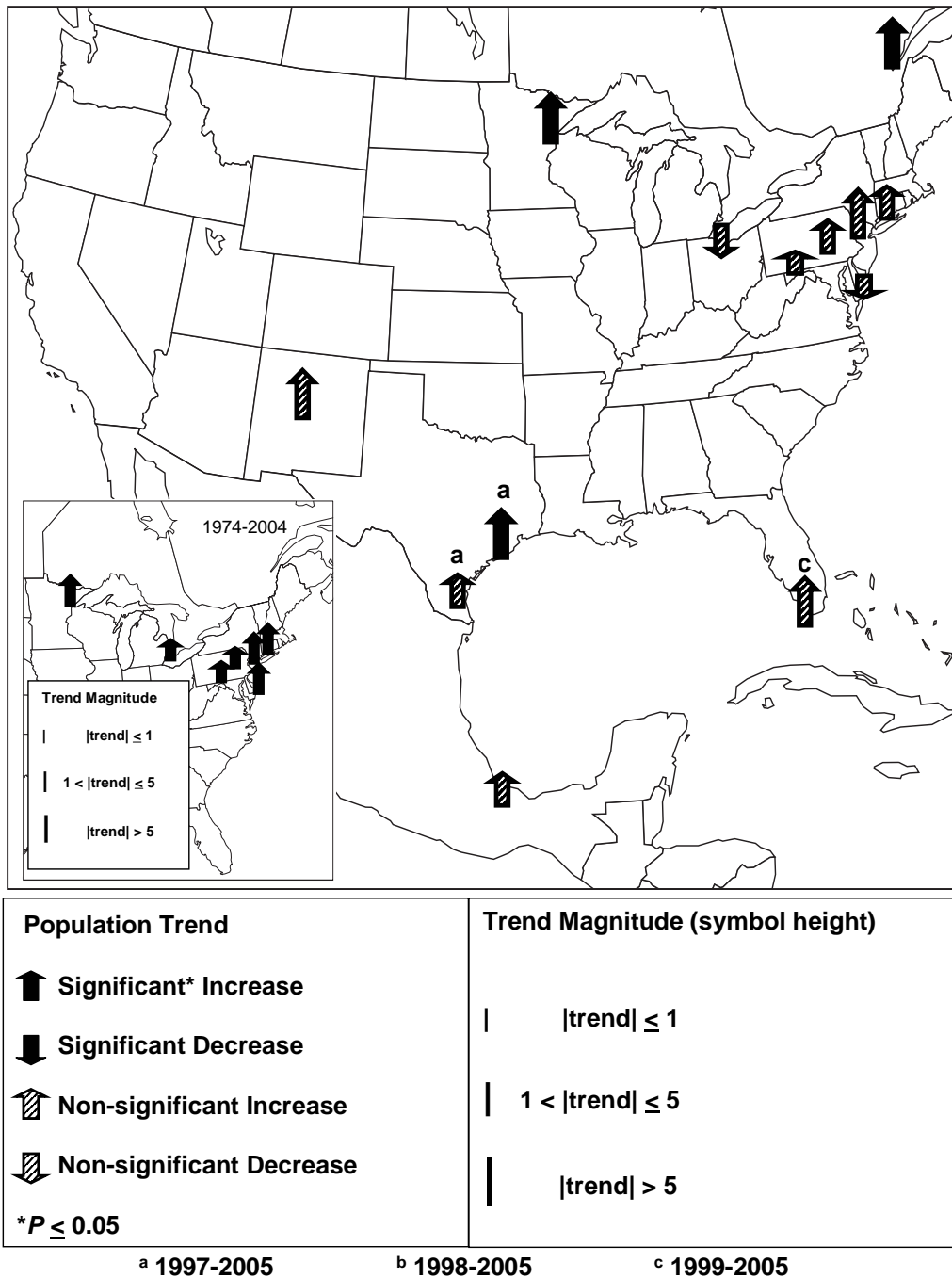


Figure 1. Population trends for Peregrine Falcons at 7 eastern and midwestern (1994-2004), 1 western (1995-2005), and 3 Gulf of Mexico raptor migration counts in North America, and long-term trends (1974-2004) for 7 eastern counts (inset). Trend magnitudes are expressed in percent change per year.