

# **PEREGRINE INFORMATION**



U.S. Fish & Wildlife Service

# Peregrine Falcon

(*Falco peregrinus*)

*The peregrine falcon is one of nature's swiftest and most beautiful birds of prey. Its name comes from the Latin word peregrinus, meaning "foreigner" or "traveler." This impressive bird has long been noted for its speed, grace, and aerial skills. Now, it is also a symbol of America's recovering threatened and endangered species.*

Three subspecies of the peregrine falcon inhabit North America: the American (*Falco peregrinus anatum*), Arctic (*Falco peregrinus tundrius*), and Peale's (*Falco peregrinus pealei*).

Peregrine falcons are roughly crow-sized—about 15 to 21 inches long—with a wingspan of about 40 inches. As with many raptors, or birds of prey, females are larger than males. Adults have slate blue-gray wings and backs barred with black; pale undersides; white faces with a black stripe on each cheek; and large, dark eyes. Younger birds are darker below and browner.

Peregrine falcons live mostly along mountain ranges, river valleys, and

coastlines. Historically, they were most common in parts of the Appalachian Mountains and nearby valleys from New England south to Georgia, the upper Mississippi River Valley, and the Rocky Mountains. Peregrines also inhabited mountain ranges and islands along the Pacific Coast from Mexico north to Alaska and in the Arctic tundra.

The peregrine falcon also is found in other parts of the world. Most peregrines from northern Alaska, Canada, and Greenland migrate in the fall to Central and South America. On the way, they often hunt



along the barrier islands on the Atlantic and Gulf of Mexico coasts. Peregrines that nest south of Canada migrate lesser distances, and some do not migrate at all.

Peregrine falcons generally reach breeding maturity at 2 years of age. Usually, the male arrives at a nesting site and begins a series of aerial acrobatic displays to attract a mate. An average clutch of four eggs is laid in the spring, hatching about a month later. Peregrines vigorously defend their nests, although they may abandon them if severely or continuously harassed.

The nest is a scrape or depression dug in gravel on a cliff ledge. Rarely, peregrines will nest in a tree cavity or an old stick nest. Some peregrines have readily accepted manmade structures as breeding sites. For example, skyscraper ledges, tall towers, and bridges serve as the urban equivalent of a cliff ledge. In 1988, 21 nesting pairs of peregrines in various urban areas throughout North America successfully fledged more than 40 young.

Peregrine falcons feed primarily on other birds, such as songbirds, shorebirds, ducks, and—in urban areas—starlings and pigeons. Flying high above their intended prey, peregrines will “stoop” or dive and strike in mid-air, killing the prey with a sharp blow. Scientists estimate the speed of a diving peregrine to be more than 200 miles per hour.

Peregrine falcons have never been very abundant. Studies in the 1930s and 1940s estimated that there were about 500 breeding pairs of peregrine falcons in the eastern United States and about 1,000 pairs in the West and Mexico. Then, beginning in the late 1940s, peregrine falcons suffered a devastating and rapid decline. By the mid-1960s, the species had been eliminated from nearly all of the eastern U.S. Although less severe, the decline spread west, where peregrine populations were reduced by 80 to 90 percent by the mid-1970s. At that time, only the populations of Peale's falcons nesting along the north Pacific Coast in Alaska and British Columbia appeared to be stable.

Scientists at the U.S. Fish and Wildlife Service's Patuxent Wildlife Research Center near Laurel, Maryland, began investigating the peregrine's decline. They found unusually high

concentrations of the pesticide DDT and its breakdown product DDE in peregrine falcons and other birds of prey. The peregrines accumulated DDT in their tissues by feeding on birds that had eaten DDT-contaminated insects or seeds. The toxic chemical interfered with eggshell formation. As a result, falcons laid eggs with shells so thin they often broke during incubation or otherwise failed to hatch. Because too few young were raised to replace adults that died, peregrine populations declined precipitously.

In 1970, the American and Arctic peregrine falcon subspecies were listed as endangered under the Endangered Species Conservation Act of 1969 (the law preceding the Endangered Species Act of 1973), reflecting their critical biological status. Because DDT and other pesticides were not used in the areas where Peale's peregrines live, these falcons declined to a lesser degree and were not listed. In addition, Peale's peregrines were not susceptible to picking up DDT in other areas because they do not migrate and feed largely on non-migratory prey.

In 1972, under the authorities granted by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Environmental Protection Agency (EPA) banned DDT for most uses in the U.S. However, DDE residues are still found in some areas of the country and DDT continues to be used in many Latin American countries where some peregrines and prey spend the winter.

The Fish and Wildlife Service established peregrine falcon recovery teams composed of Federal, state, and independent biologists to recommend actions necessary to restore peregrines in the U.S. As part of recovery efforts, scientists at Cornell University successfully bred and raised peregrine falcons in captivity.

Under a cooperative effort among the Fish and Wildlife Service, state wildlife agencies, The Peregrine Fund, Santa Cruz Predatory Bird Research Group, and the Midwestern Peregrine Falcon Restoration Project, more than 6,000 American peregrines have been released since 1974. Large-scale reintroductions of peregrines have ceased due to the peregrine's recovery, and relatively few reintroductions are still taking place in the United States.

To release captive-bred peregrines, young birds are placed in specially equipped boxes on top of a manmade tower or cliff ledge. At first, the birds are fed through a chute so they cannot see their human benefactors. When they are old enough, the box is opened and the young peregrines begin testing their wings. Their food is gradually reduced as the young falcons learn to hunt on their own. This process is known as “hacking.”

Arctic peregrine falcons declined by as much as 80 percent; however, enough survived the impacts of pesticides that releases of captive-bred young were not necessary. Following EPA's restrictions on the use of DDT and recovery efforts under the Endangered Species Act, Arctic peregrine numbers increased to the point that the subspecies was reclassified in 1984 from endangered to the less critical category of threatened. Then, in October 1994, the Fish and Wildlife Service announced that the Arctic peregrine falcon had increased in numbers to the point that this subspecies no longer needed Endangered Species Act protection and could safely be removed from the threatened and endangered species list. There are now thousands of Arctic peregrines in North America, and the majority of peregrines on the continent belong to this subspecies.

Populations of peregrine falcons are now estimated at 1,650 breeding pairs in the U.S. and Canada, with additional birds in Mexico. In August 1999, the Fish and Wildlife Service removed the American peregrine falcon from the list of endangered and threatened species, marking one of the most dramatic successes of the Endangered Species Act.

The protection afforded by the Endangered Species Act, EPA's use of their authorities under FIFRA to severely restrict the use of DDT, and the reintroduction of captive-bred chicks have rescued the peregrine falcon from extinction. A cleaner environment and the success of cooperative recovery efforts provide great promise of a bright future for the peregrine falcon in North America.

**U.S. Fish & Wildlife Service**  
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## **COMMONLY ASKED QUESTIONS ABOUT THE PEREGRINE FALCON (*Falco peregrinus*)**

### **1. What do peregrine falcons look like?**

The peregrine falcon belongs to the genus "Falco," which is characterized by long pointed wings. In fact the word Falco is derived from "falx," the Latin word for sickle, in reference to the distinct sickle-shaped silhouette of the peregrine falcon's extended wings in flight. Also unique to this species is the notched beak that is used to kill prey by severing the spinal column at the neck. The peregrine falcon is a crow sized bird, weighing just over two pounds with a wing span of approximately 3½ feet. An adult peregrine has a dark grey back and crown, dark bars or streaks on a pale chest and abdomen, and heavy malar (cheek) stripes on the side of the face. Immature peregrines are buff colored in front and have dark brown backs; adults are white or buff in front and bluish-gray on their backs. Females and males are identical in appearance, however, the female can be a third larger than the male.

### **2. Where is the peregrine falcon found?**

The peregrine falcon has the most extensive natural distribution of any bird in the world, limited only by high elevations, extreme heat, and extreme cold. It is found on all continents except Antarctica and is absent in most parts of the world only in the high mountains, in large tracts of desert or jungle, and on isolated islands in the oceans.

### **3. How did the peregrine falcon get its name?**

Peregrine in Latin is "Peregrinus," which means traveler. Peregrine falcons are well known for their long fall and spring migratory flights to and from their nesting and wintering habitats. The Arctic peregrine falcon lives up to its name, breeding on the north slope of Alaska east across northern Canada to Greenland in summer and migrating as far south as the tip of South America to winter. Early falconers called these falcons peregrines because they were always trapped during passage (migration) and not taken from the nest, as were most birds used for the sport of falconry.

#### **4. Do peregrine falcons mate for life?**

Peregrine falcons are monogamous (they mate for life) and breed in the same territory or area for their entire lives. There are exceptions, such as when one mate dies or is out-competed and replaced by a stronger individual. Sexual maturity occurs during the second year of life and after approximately one month of courtship, then 3 or 4 eggs are laid in the spring. Incubation takes approximately 33 days and although both parents share incubating duties, the female performs the greater share. Two or three chicks usually hatch and fledge in approximately 42 days. After fledging, young peregrine falcons are still dependent on their parents for food until they learn to hunt, which takes about a month and a half.

#### **5. Do peregrine falcons build nests?**

Most birds build nests made of sticks and soft natural fiber material in which their eggs are incubated. Peregrine falcons lay their eggs in "scrapes," which are shallow indentations they scratch out with their talons in the soft earth on the floor of the nest ledge. Peregrine falcons typically nest on ledges and in small shallow caves located high on cliff walls. They have been known to use the abandoned nests of other birds, and on the north slope of Alaska, commonly nest on the ground.

#### **6. How fast can a peregrine falcon fly?**

Peregrine falcons are the fastest flying bird in the world. In a stoop (dive) peregrine falcons can attain speeds in excess of 200 miles per hour as they attack their prey. In level flight, the normal speed for peregrines is about 40 to 55 miles per hour.

#### **7. How do they capture their prey?**

Peregrine falcons are aerial predators, feeding on live birds and occasionally bats, which they capture in mid-air. Tandem hunting flights are common with a pair of peregrine falcons alternately diving on their prey until it is caught.

#### **8. Do peregrine falcons have natural predators?**

Peregrine falcons are fast, aggressive and fearless predators located at the top of their food-chain, and therefore, rarely suffer from predation by other animals. Great-horned owls and golden eagles are known to occasionally kill fledgling peregrines, and less often, adults. Peregrine eggs sometimes fall victim to raccoons and red tail hawks. The nestlings of ground nesting Arctic peregrine falcons may be preyed upon by predators such as grizzly bears and foxes.

#### **9. What subspecies of peregrine falcon are native to North America?**

There are three subspecies nesting in North America, the Arctic peregrine falcon (Falco

peregrinus tundrius) nests on the north slope of Alaska east across northern Canada to Greenland, and winters in Latin America: the Peale's peregrine falcon (Falco peregrinus peali) is a year-round resident on the coasts of Washington, British Columbia, and Alaska north to the Aleutian Islands. The American peregrine falcon (Falco peregrinus anatum) nests in southern Alaska, Canada, United States and northern Mexico. Peregrine falcons that nest in subarctic areas generally winter in South America, while those that nest at lower latitudes exhibit variable migratory behavior. Some are nonmigratory.

#### **10. What was the historical peregrine falcon population in North America?**

The historical status of the peregrine falcon in North America is not known, but it was probably never common, even when compared to other birds of prey. The limited historical data suggest a best estimate of 3,875 nesting pairs. The decline of the peregrine falcon population in North America began in the 1940s, was most pronounced during the 1950s and continued through the 1960's into the early 1970's throughout most of its range. By the time biologists realized the magnitude of the peregrine falcon decline, the population was only about 12% of what it had been prior to the introduction of modern pesticides.

#### **11. What caused the near extinction of the peregrine falcon in North America?**

The use of DDT as a pesticide during the 1940s, 1950s and 1960s resulted in a precipitous decline of peregrine falcons in North America. During this period of DDT use, eggshell thinning and nesting failures were widespread in peregrine falcons, and in some areas, successful reproduction virtually ceased. As a result, there was a slow but drastic decline in the number of peregrine falcons in most areas of its range in North America. DDE, a metabolite of DDT, prevents normal calcium deposition during eggshell formation, resulting in thin-shelled eggs that are susceptible to breakage during incubation. Peregrine falcons feed near the top of the food chain and suffered from the accumulation of DDE due to eating contaminated prey.

#### **12. How many peregrines were there when the bird was first placed on the endangered species list?**

The eastern population of the peregrine was gone and the populations in the west had declined by as much as 80-90 percent below historical levels. By 1975, the population was only 324 nesting pairs in North America.

#### **13. How many peregrines are there in the United States today?**

Currently, there are 1,650 breeding pairs in the United States and Canada, well above the recovery goal of 631 pairs.

#### **14. What has contributed to the recovery of the peregrine falcon?**

The most significant factor in the recovery of the peregrine falcon was the restriction placed on the use of chlorinated hydrocarbon pesticides. The use of DDT was banned in Canada in 1970 and in the United States in 1972. Consequently, the reproductive rates of peregrine falcons improved and its comeback began. But the banning of DDT on its own was not enough. Listing the peregrine as endangered in 1970 gave the remaining pairs and their habitat the protection necessary to increase and reoccupy their historical range without persecution. The recovery of this species was enhanced by innovative recovery programs like the release of captive-bred birds to augment the wild population.

**15. Has international cooperation by other countries played a critical role in the recovery of the American peregrine falcon?**

Yes, Canada has played a significant role in the American peregrine falcon success story in North America. Canada actually restricted the use of DDT in 1970, two years before the United States. It listed the American peregrine falcon giving it legal protection, wrote a recovery plan and formed a recovery team to implement the recovery measures prescribed in the plan. Canada also developed captive breeding and release programs that helped accelerate the recovery of the American peregrine falcon in Canada. By 1995 Canada had 319 known pairs surpassing its recovery goal of 60 pairs by 341. Although Mexico never listed the American peregrine falcon, it has supported the research of both breeding and migrating peregrines by both American, Canadian, and Mexican biologists.

**16. How much money has been spent to recover the peregrine falcon?**

American Peregrine Falcon Estimated Expenditures 1989 Through the End of Fiscal Year 1997

1989	\$ 2,744,200
1990	\$ 2,873,300
1991	\$ 5,986,360
1992	\$ 8,978,800
1993	\$ 2,581,000
1994	\$ 2,733,900
1995	\$ 2,438,730
1996	\$ 1,379,020
1997	\$ 2,600,790

1998  
data being compiled

**TOTAL:**  
\$ 32,316,100

Note: The Expenditures Report for 1996 and 1997 have not been published yet. They have been completed, but are awaiting Signature of the Secretary. Since Fiscal Year 1999 (October 1, 1998 - September 30, 1999), the Service has funded delistings and reclassifications under the recovery program rather than the listing program. Therefore, delistings and reclassifications no longer compete for funding with listing activities.

These estimated expenditures for the American peregrine falcon come from the Service's annual Expenditures Report to Congress. It represents expenditures of the Service, other Federal agencies with conservation duties, and State agencies (State data are compiled by the International Association of Fish and Wildlife Agencies under contract by the Service). The requirement to track reasonably identifiable expenditures for listed species did not begin until 1989 (after the 1988 Endangered Species Act amendments). Therefore, recovery expenditures for the American peregrine falcon prior to 1989 can not be estimated.

The species was listed in 1970 under the predecessor of the Endangered Species Act and was listed under the Endangered Species Act in 1973. It is important to note that the cooperation and recovery efforts by conservation organizations, universities, corporations, foreign governments, and private individuals are not enumerated in the expenditures reports, yet those actions were and are vital to the recovery of the American peregrine falcon.

**17. Should we be concerned that many of the peregrine falcons today are nesting in urban environments?**

Most peregrine falcons nest on cliff ledges found in the wild landscapes of North America. However, one of the most promising characteristics of the peregrine falcon is its ability to adapt to its environment, which is demonstrated by the diversity of habitats it occupies throughout its range. Urban environments provide peregrine falcons with nesting structures, in many cases buildings, and a food base of wild and domestic birds that have also adjusted to city life. With human assistance or on their own, peregrine falcons have discovered and occupied this man-made habitat and these urban birds have contributed positively to the recovery of the species.

**18. What is "hacking" and what role did it play in the recovery of the peregrine falcon?**

Hacking is the controlled release of young captive-bred peregrine falcons from artificial nests, usually plywood boxes secured to cliff ledges or tall buildings. It was developed centuries ago by falconers as a means of building flight skills and strength prior to actual training. An estimated 6,000 peregrine falcons have been released to the wild since the first two peregrine

falcons were hacked out in 1974. These hacked peregrine falcons have augmented extant wild populations and helped repopulate areas where peregrine falcons were extirpated in the wild. The majority of releases occurred in the late 1970's, 1980's, and the early 1990's. Few people are currently hacking captive-bred peregrine falcons. The last major releases took place in 1997, when 47 birds were hacked.

**19. Wouldn't it be prudent to delay the delisting until we have time to evaluate how the release program influenced the stability of the current peregrine falcon population?**

Most releases took place in the 1970's and 1980's. By the early 1990's, the peregrine falcon release program was winding down. The current breeding population is made up of many generations of released captive-bred birds and the wild birds that survived the near extinction. Most of the original released birds have died and it's their progeny that have bred successfully in the wild. There are areas within the range of this species that support large populations, Alaska (301 pairs) and the Southwest (214 pairs) that have recovered without the release of captive-bred birds. There is no reason to expect any decline in the status of the wild population due to the cessation of the release program.

**20. Why didn't the Service consider downlisting the peregrine falcon to threatened rather than delisting?**

Substantial improvements in numbers of peregrine falcons and productivity have occurred in the 1990's. These data show that goals set for numbers of pairs and productivity by the existing peregrine falcon recovery plans have been met or exceeded. The combined population goal in the current peregrine falcon recovery plans is 631 pairs. Currently, a minimum of 1,650 pairs occupy the range of the peregrine falcon in Alaska, Canada, and the Continental United States, exceeding the recovery goal by 962 pairs.

The peregrine falcon has achieved or exceeded the goals established for recovery. The Service also believes that when viewed on a range-wide or even region-wide basis the species clearly is not in danger of extinction throughout a significant portion of its range and warrants full delisting.

**21. Why are we delisting the peregrine falcon if it has not been restored throughout its historical range?**

We have determined the peregrine falcon has recovered throughout its historical range. Restoration of the peregrine falcon throughout its historical range is not required by the Act. The goal of a recovery program is to restore the species to a point at which protection under the Act is no longer required. To be recovered, a species must not be in danger of extinction, or likely to become endangered, within the foreseeable future, and the threats that led to the species' listing must be reduced or eliminated. Although a few, localized areas have not quite met their numerical recovery goals, the overall status of the species has improved significantly

such that it is considered recovered and warrants delisting. As a species recovers in numbers and populations expand, more of the remaining historical range can be re-occupied. In the case of the peregrine falcon, suitable habitat still remains, therefore continued expansion is expected.

**22. How can the Service delist the peregrine falcon when all recovery goals in the existing recovery plans have not been met or exceeded?**

Section 4(f) of the Act directs the Service to develop and implement recovery plans for species of animals or plants listed as endangered or threatened. Recovery is the process by which the decline of an endangered or threatened species is arrested or reversed and threats to its survival are neutralized so that long-term survival in nature can be ensured. One of the main purposes of the recovery plan is to enumerate goals (guidelines) that will help the Service to determine when recovery for a particular species has been achieved. The Act does not require that all of the specific recovery goals for a listed species be met or exceeded before it can be delisted. The Service determines whether recovery has been achieved based on a species' performance relative to the goals set in its recovery plan, the best available scientific information, and interviews with species experts. A species is recovered when it is no longer in danger of extinction (i.e., endangered), or likely to become endangered within the foreseeable future throughout all or a significant portion of its range (i.e., threatened), and the threats that led to the species' listing have been reduced or eliminated. The peregrine falcon meets these requirements for removal from the List of Endangered and Threatened Wildlife.

The peregrine falcon has either met, exceeded, or is very close to meeting the recovery goals set for this species throughout its range. The Service has determined the available information supports full delisting of the species throughout its range, and when viewed on a range-wide or even region-wide basis, the species is clearly not in danger of extinction, is not likely to become endangered within the foreseeable future throughout a significant portion of its range, and warrants full delisting.

**23. There are gaps in the scientific knowledge about peregrine biology, genetic diversity, viable population size, population dynamics, and long-term stability. Shouldn't a population viability analysis have been done before delisting?**

Current evidence of population increases and the expansion of the peregrine falcon into urban area make a population viability analysis unnecessary. A complete understanding of the biology of a species is not required prior to delisting. Population viability analyses are important tools for attempting to quantify threats to a species, particularly those facing loss and fragmentation of habitat, and the consequences of conservation actions, as well as aiding in identifying critical factors for study, management, and monitoring. These analyses are not essential, however, to determine when a species has recovered, particularly for the peregrine falcon. It is evident that recovery of this species has been largely achieved by eliminating the use of DDT and because of management activities under the Endangered Species Act, including the reintroduction of captive-bred peregrine falcons. Recovery goals have been met

or exceeded, with few exceptions.

#### **24. What is the status of the eastern peregrine population?**

The eastern peregrine population has an unusual history and a complex status under the Act. Peregrine falcons were extirpated in the eastern United States and southeastern Canada by the mid-1960's. In 1974, shortly after the passage of the Endangered Species Act of 1973, the National Audubon Society sponsored a meeting of experts in peregrine biology, including representatives from the Service, to address the species' conservation. This sparked the beginning of an effort to reestablish the peregrine in the east through the introduction of offspring from parents of multiple subspecies. The first experimental releases of captive-produced young in the eastern States occurred in 1974. These and future releases, coordinated by the Service, State fish and wildlife agencies, and representatives of The Peregrine Fund, The Raptor Center and the Santa Cruz Predatory Bird Research Group demonstrated that hacking was an effective method of introducing captive-produced peregrines to the wild.

In 1978, the Director issued a policy statement confirming support for the use of intercrossed North American peregrines to establish an eastern peregrine falcon population and the use of endangered species funds. In 1979, the Service published the first Eastern Peregrine Falcon Recovery Plan. This was the one of four U.S. regional plans to be developed in order to guide the restoration of the peregrine in the East. The primary objective of the Plan was to restore a new self-sustaining population of peregrine falcons in the eastern United States through preservation and management of essential habitat, captive propagation and release, and protection of the population from take, elimination of harmful environmental pollutants, and public education.

Reflecting a 1983 Department of the Interior Solicitor opinion that intercrosses of listed species were not covered by the Act, the Service, through the rule making process reclassifying the Arctic peregrine falcon from threatened to endangered status, modified the regulatory status of introduced mixed heritage eastern birds by designating all free-flying Falco peregrinus in the lower 48 States as Endangered due to Similarity of Appearance to listed American and Arctic peregrines (F. p. anatum and F. p. tundrius). This was done because intercrossed peregrines were not readily distinguishable from listed American and Arctic peregrines, making enforcement of the taking prohibitions for the listed subspecies difficult. Accordingly, to ensure the protection from illegal take of American and Arctic peregrine falcons that may be nesting, migrating, or wintering in the lower 48 States, the Service designated any free-flying peregrine (Falco peregrinus) found within the lower 48 States as endangered due to Similarity of Appearance, thereby extending the taking prohibitions of section 9 to these birds. The 1983 Solicitor opinion was subsequently withdrawn, and the Service continues to endorse the eastern restoration program.

#### **25. What is the status of the American peregrine falcon in Mexico?**

Although there is a lack of historical or recent information on peregrine falcons in Mexico for

accurately assessing their current status, there are no recent data indicating peregrine falcon populations in Mexico are declining, are imperiled by organochlorine pesticides, or have not recovered in recent years similarly to populations in the United States and Canada. The status of the Mexican population may be similar to that of the population occupying similar habitat in nearby Arizona.

In 1997, as part of the North American Free Trade Agreement, the Commission for Environmental Cooperation established a North American Regional Action Plan (NARAP) on DDT. Specific NARAP goals that will benefit the peregrine falcon in Mexico are: beginning in 1997, a phased reduction in DDT by 80 percent in 5 years, resulting in the eventual elimination of DDT used for malaria control; elimination of the illegal use of DDT in agriculture; develop a cooperative approach to reduce the illegal importation of DDT; and advance global control of DDT production, export, and use.

**26. Can you consider all threats removed if organochlorine pesticides still persist within the breeding range of the peregrine falcon and continue to depress natural productivity in some areas?**

Despite the continued presence of organochlorine residues in certain populations, peregrine falcons have increased and are no longer in danger of extinction throughout a significant portion of their range.

**27. Isn't the unrestricted use of organochlorine pesticides in Latin America a threat to wintering peregrine falcons?**

Available information indicates that pesticide use in Latin America has apparently not been significant enough to cause a decline in the number of peregrine falcons nesting in North America. Although migrant peregrine falcons accumulate pesticides while wintering in Latin America, DDE residues in the blood taken from female peregrine falcons captured during spring migration at Padre Island, Texas decreased between 1978 and 1994 to levels that would not affect reproduction. The overall reproductive success and resultant population increases throughout the peregrine falcon's range suggest only minor and very spotty problems with DDT that continue to diminish. Arctic peregrine falcons, which also winter in Latin America, were delisted in 1994.

**28. How will we know that the peregrine falcon population in North America will not start to decline without the protection of the Act?**

The Act requires that the Service implement a system, in cooperation with the States, to monitor for not less than five years, a species that has been delisted due to recovery. The peregrine falcon monitoring program has been developed in cooperation with State resource agencies, recovery team members, and interested scientists and will be carried out in collaboration with Federal, State, and private cooperators.

The scope of the monitoring program will include 5 geographical regions representing the types of landscapes inhabited by the peregrine falcon throughout its range; surveys will be conducted in index areas within each designated region. The peregrine falcon monitoring program will begin in the spring of 2001 and end in 2013. During the 13-year period, surveys will be conducted every 3 years for a total of 5 surveys. The designation of a 13 year monitoring period encompasses approximately 2 generations of peregrines in the wild which should be sufficient in length to detect an inability of the population to be self-sustaining. Monitoring will include the collection of information on territory occupancy, nesting success, and contaminant exposure. At the end of each tri-annual monitoring period and at the conclusion of the 13 year monitoring program, we will review all available information to determine if relisting, continuation of monitoring, or termination of monitoring is appropriate.

**29. Will the Service allow take for falconry purposes now that the species has been delisted?**

Once the American peregrine falcon is removed from the endangered species list, take of peregrines is no longer prohibited under the Endangered Species Act. That will leave management of the species solely to the Migratory Bird Treaty Act and to state wildlife programs. We are working with the states to develop a proposal for management of take of nestlings and passage birds for falconry and for raptor propagation. We plan to use that proposal as the basis for an agreement with the authorities in Canada and Greenland to set preliminary limits for take of migrating young-of-the-year peregrines. Once we do, we must then complete an environmental assessment on the take of nestlings and passage birds, solicit public comment on the proposal, and publish the final criteria in the Federal Register. Until the final criteria are published in the Federal Register, take will be prohibited. This includes take for falconry, captive propagation, and scientific research. Once we reach agreement with the other government entities, take of peregrines for falconry and for raptor propagation will be authorized according to the criteria we agree upon. The allowed take of peregrines likely will be very small.

**30. Will the take of peregrine falcons for falconry or for captive propagation create an additional threat to the species?**

The Migratory Bird Treaty Act governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. Implementing regulations (50 CFR 20 and 21) include provisions for the taking of migratory birds for educational, scientific, and recreational purposes. Special regulations pertaining to raptors are found in 50 CFR 21.28 to 21.30. These regulations allow for the use of raptors for falconry and for captive propagation. Take from the wild for these activities must not threaten wild populations (50 CFR 13.21(b)(4)). Permit regulations require that issuance of permits not threaten wild populations of wildlife (50 CFR 13.21(b)(4)). The Service, in cooperation with the states, will develop biological criteria to govern the take of peregrine falcons prior to authorizing take for falconry and raptor propagation under the MBTA.

The taking, possession, transport, sale, purchase, or barter of raptors for falconry is permitted

in states that have certified to the Director of the Fish and Wildlife Service that their laws or regulations governing falconry meet federal falconry standards. There are currently 45 States that have done so. In all cases, anyone wishing a falconry permit must either get a joint federal/state permit, or separate state and federal permits (depending on the procedures of the state in which the person lives). This form of checks and balances is structured to ensure that falconers meet both federal regulations and state regulations that may be more stringent.

Generally, Federal standards limit the term of the permit, require at least two years of falconry experience, set a minimum age requirement, limit the number of peregrines that can be possessed, restrict the use of endangered raptors and golden eagles and limit the take of threatened raptors. State standards generally require that the applicant pass an examination, require state approval of all holding facilities and equipment, set detailed take restrictions and provide for inspections of peregrines and holding facilities to ensure that health and housing standards are being met. Both Federal and State agents can rescind a falconers permit if they are found to be violating their permit requirements.

A working group made up of cooperating states was established and developed falconry harvest plans for the United States. The plans include biological criteria for harvest, implementation criteria, and procedures for evaluating the harvest. The goal of the harvest plans is to arrive at a sustainable level of take that does not compromise the restoration of peregrine falcons in North America. The falconry regulations for take of peregrine falcons will be based on recommendations put forward in the harvest plans. The biological criteria and proposed regulations will be coordinated with and approved by all states, Canada, and Mexico then published in a separate rule for comment. No take of peregrine falcons in the United States will be allowed until the falconry regulations have been finalized, approved, and published in the Federal Register.

The scientific evidence to date indicates that falconry does not adversely affect wild populations of raptors. In addition, federal and state restrictions on the take of peregrines for falconry and propagation mean that it is unlikely that take for these purposes could threaten the recovery of the peregrine falcon. However, to ensure that it does not, the Service and its cooperating States will monitor the effects of falconry on the peregrine falcon population for 13 years after the delisting. Section 4(g)(1) of the Act requires that the Secretary of the Interior, through the Service, implement a monitoring program for not less than five years for all species that have been recovered and delisted. The purpose of this requirement is to develop a program that detects the failure of any delisted species to sustain itself without the protective measures provided by the Act.

**31. What other U.S. species have recovered to the point of being removed from the Endangered Species List?**

The Brown Pelican (Atlantic coast and eastern Gulf populations), the American Alligator, the Rydberg Milk-vetch, the Gray Whale and the Arctic Peregrine Falcon.

*The Canadian Peregrine Foundation*

**Peregrine Biology:**

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American raptors. San Diego: Academic Press.

This list is far from complete, and we will expand it over time. If you know of any appropriate references, please send them to us. See also the [Links](#) section for further sources of information on peregrines.

[Return to Peregrine Biology home page](#)

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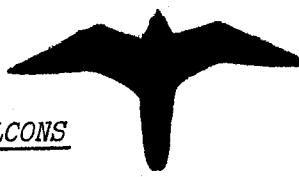
© 2003 Canadian Peregrine Foundation

## IS IT A PEREGRINE ?

THE MOST IMPORTANT CHARACTERISTICS TO NOTICE TO IDENTIFY A RAPTOR OR OTHER LARGE BIRD ARE:

- Wing shape
- Flight pattern
- Tail shape
- Location of dark and light markings

This sheet provides clues to distinguishing Peregrines from other species that may occur in the vicinity of your observation site.



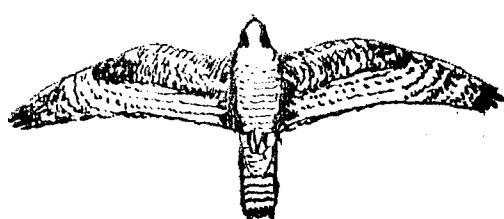
FALCONS

- Long, pointed wings
- Relatively long, tapered tail (may be fanned when gliding)
- Strong, rapid flight



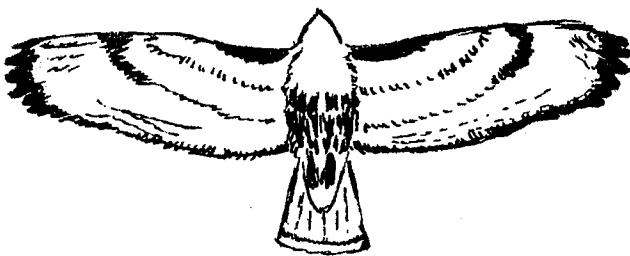
BUTEOES

- Long, broad wings
- Fan-shaped tail
- Frequently soar



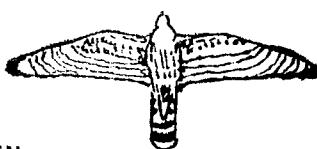
PEREGRINE

- Large chunky body
- Dark sideburns
- Slate gray back & wings
- Powerful flight
- Length 15-20", wings 40-44"



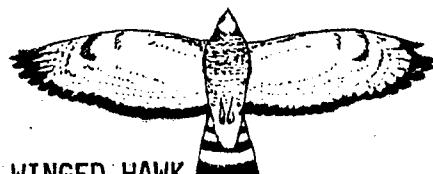
RED-TAILED HAWK

- Large size
- Dark patagial mark
- Dark comma at wrist
- Light breast with belly band
- Red tail
- Length 18-25", wings 46-58"



MERLIN

- Non-descript
- Banded tail
- No facial pattern
- Small size
- Length 10-14", wings 23½-26½"



BROAD-WINGED HAWK

- Small size
- Black and white banded tail
- Light underwings
- Length 12-19", wings 32-39"



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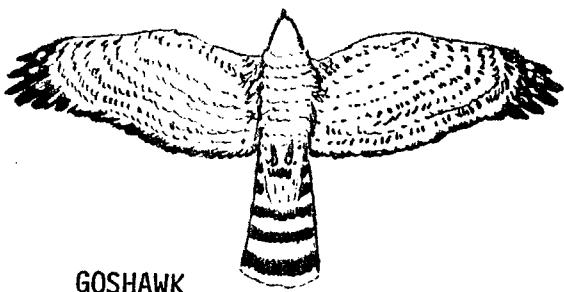
Website: <http://www.nwf.org/northeast>



ACCIPITERS

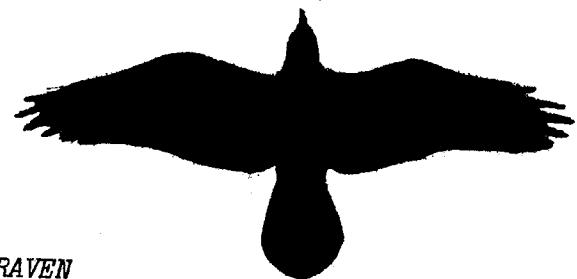


- Short, wide, rounded wings
- Long, narrow tails
- Flap-flap-sail flight pattern



GOSHAWK

- Large size
- Blue-gray back & wings
- Light breast
- Length 20-26", wings 40-47"



RAVEN

- All black
- Long head and neck
- Long wedge-shaped tail
- Length 21-27", wings 46-56"

NOTES



COOPER'S HAWK

- Blue-gray back
- Rusty breast
- Long rounded tail
- Length 14-20", wings 47-36"



SHARP-SHINNED HAWK

- Small size
- Blue-gray back & wings
- Rusty breast
- Long squared-edged tail
- Length 10-14", wings 20-27"

## **How do you identify a peregrine and its nesting site?**

**Size:** Adults are 14-18 inches tall, with 3-3 1/2 foot wingspans  
Females are usually 1/3 larger than males; no distinguishing marks between the sexes

**Calls:** "Cack-cack-cack" (defensive; means the birds have been disturbed)  
"Ee-chup" (usually between courting adults or between adults and young)  
High pitched wail (usually between adults to locate each other, also a sign of hunger)

### **Adult markings:**

Head is usually black with a black stripe, or sideburn, on each "cheek"  
Back and wings are dark to slate gray; tail is long and tapered  
Breast, belly, and underside of wings is white or light brown with dark bars or spots  
Feet and areas around the eyes and beak are bright yellow

### **Immature markings:**

Heads and back are brownish; some have blond patches at back of head  
Underside is darker and brown, with vertical streaking on breast

### **Flight patterns:**

Dive at speeds up to 200 mph from high altitudes to hunt prey in flight  
Soar with wings flat and tail spread wide  
Fly with rapid wing beats

### **Nest sites:**

Area below the nest site is often covered with whitewash droppings  
Do not build nests, but lay eggs on cliff ledge; sometimes will use abandoned raven nests

\$13.00

**"A landmark. The first book dealing with a new aspect of birdwatching — the holistic method."**

— Roger Tory Peterson

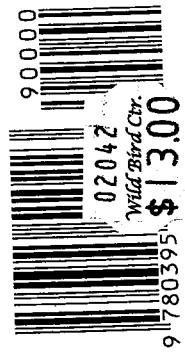
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*Hawks in Flight* covers the twenty-three most common diurnal raptors of North America, including buteos, accipiters, falcons, kites, eagles, vultures, and the osprey and harrier.

**Pete Dunne**, author of *Tales of a Low-Rent Birder*, is director of natural history information for the New Jersey Audubon Society. **Clay Sutton** is an environmental consultant in Cape May, New Jersey. **David Sibley** is a noted bird artist.

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ISBN 0-395-51022-8



HOUGHTON MIFFLIN

*Hawks in flight*

PETE DUNNE AND DAVID SIBLEY CLAY SUTTON

# Hawks IN Flight

PETE DUNNE  
DAVID SIBLEY  
AND  
CLAY SUTTON

6-84879



MERLIN SUBSPECIES. The Richardson's or Prairie Merlin (*F. c. richardsoni*) is larger, paler, and more finely marked than the nominate race. It is a prairie specialty, breeding in Alberta, Saskatchewan, Montana, and North Dakota and wintering extensively in Oklahoma and the Texas panhandle.

The female is pale gray-brown above and streaked with tan below — very unlike the darker eastern Merlin but not so dissimilar as to lack the characteristic Merlin field marks. Large females appear almost as big as male Prairie Falcons (though no overlap occurs). Size, coupled with the common traits of pale plumage and the habit of blasting low across prairies, makes it easy to confuse the female Richardson's Merlin with Prairie Falcons. Male Richardson's are pale powder blue above and tan with reddish streaks below, an eastern Merlin overexposed by two stops. Immatures are uniformly chocolate brown.

The Black Merlin (*F. c. stueleyii*) is found in the forested coastal regions of British Columbia and Vancouver Island. It winters to central California.

Although the Black Merlin is slightly larger than the nominate race, and considerably darker, it is not always readily distinguished from *F. c. columbarius*. Females are virtually black above and dark brown and heavily streaked below. Males are charcoal gray above and on the average are darker below than the birds of the nominate race.

#### Peregrine Falcon

The Peregrine Falcon, a medium-sized raptor, has long been a source of inspiration. At one time, during the Middle Ages, it denoted social status; only lords could fly a Peregrine from the fist. More recently, the bird has served as a rallying point and as evidence of the impact of pesticides on the environment. Other considerations aside, the Peregrine Falcon is a creature whose awesome mastery of its element sets new standards for the word "perfection." Few works of nature or man equal the sight of a Peregrine in the wind.

All three North American races are cliff-nesting raptors. The arboreal race, *F. p. anatum*, once commonly nested east of the

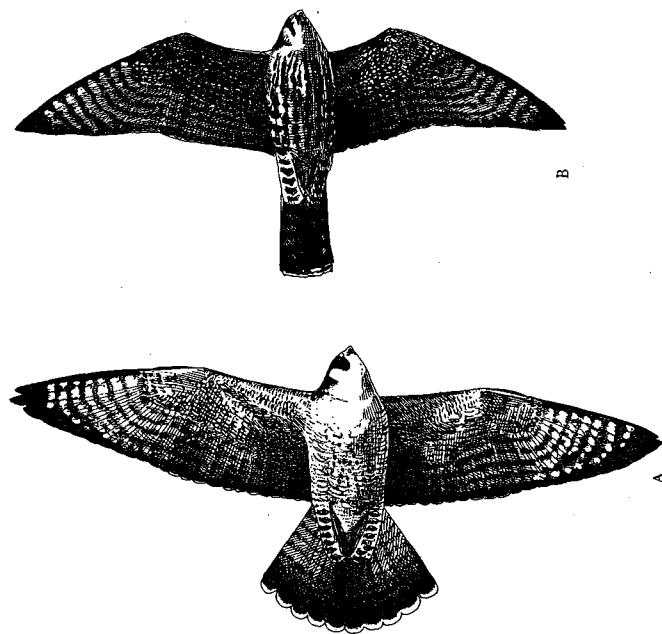
Adult Peregrine flapping.

Mississippi and lived well on the Passenger Pigeon, its principal prey item. No one knows how many Peregrines occupied how many ledges 150 years ago, but it seems safe to assume that, after the demise of its once-abundant source of food, the Peregrine population declined. An inventory published in 1941 found a total of 212 nest ledges occupied east of the Mississippi. By 1970, the Peregrine had been functionally (if not totally) exterminated by DDT in its eastern strongholds, and its numbers had been seriously reduced in the Rockies. The arctic populations were reduced by half.

At present, the breeding range of Peregrine Falcons in North America is limited to arctic regions of Greenland, Canada, and Alaska (*F. p. tundrius*), the Bribilof Islands off the coast of Alaska (*F. p. pealei*), and several river systems in Alaska, the Yukon, and the Northwest Territories (*F. p. anatum*). These populations are healthy and increasing. The bird also nests in the Rockies and along the West Coast. For better or worse, restocking attempts have been made in the East. The Peregrine has gained a foothold in coastal marshes in New Jersey and beneath major bridge structures.

Peregrines winter along the Atlantic Coast, from New York through South America. On the Pacific Coast, Peregrines winter from the Alaskan panhandle to points south. Tundra birds, the most migratory, winter in Central and South America.

The Peregrine's diet is almost exclusively avian. Its preferred modes of hunting include the long tail-chase over open country and the long power-stoop. The target of such a specialized mode of hunting most often wears feathers, but Peregrines are not



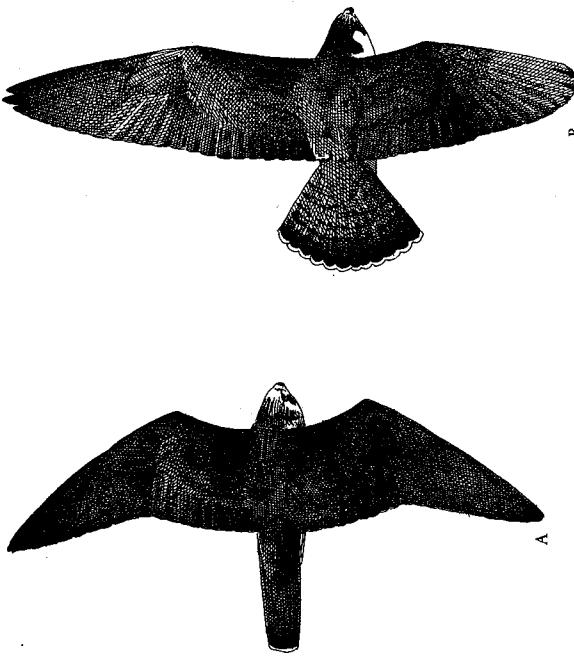
Peregrine Falcon, underside.

(A) Immature

Medium to large bird; long-winged and fairly long-tailed. In soar, wings are held straight with evenly curved edges, tail fanned broadly; wings may appear blunt-tipped in soar but at all other times are sharply pointed. Variable. Males can be small, slim, and buoyant; the largest females are broad, heavy, and powerful. Adults are light-chested, with fine barring on belly, heavy black mustache; immatures are streaked on body (some heavily, some lightly) and have distinct brown mustache, sometimes very thin in pale *tundrius* birds. In all plumages the wings and tail are dark and clean-edged.

(B) Adult

Peregrine Falcon, upperside.  
(A) Immature (*F. p. tundrius*)  
(B) Adult  
Adult slaty slate, palest on rump (males paler and bluer), with dark wing tips, tail tip, and head markings, but uniformly dark. Immature is uniformly dark brown except for some fine light edges on scapulars and pale buffy crown on *tundrius*, as illustrated.



Peregrine Falcon, upperside.  
(A) Immature (*F. p. tundrius*)  
(B) Adult

land, where populations were severely reduced as well, the recovery of the bird is now complete. Concern for the North American Peregrine continues and will do so as long as DDT is applied in the tropics where the bird winters. Given time and the absence of human folly, the bird may again populate the nest ledges of its historic range.

**IDENTIFICATION.** The Peregrine is a medium-to-large falcon with a wide range in size between the small male and the larger female. Adults and immatures differ in plumage. Young birds have brown backs, heavily streaked underparts, and a buff-colored chest and throat. Adults are uniformly blue-gray above and heavily barred

avere to taking bats during daylight hours. Nor are they above pirating a Harrier's mouse if the opportunity presents itself. The reduced use of DDT in North America, together with the proliferation of the species's most resistant individuals, has recently brought a dramatic and rapid recovery in the Peregrine populations occupying tundra and northern river areas. In Eng-

below, with a gleaming white chest and throat. Immature birds of the tundra subspecies, the one most likely to be seen in migration in the East, also have a blond crown and nape. Both adults and immatures have a bold, distinct mustache mark.

The Peregrine is an extremely long-winged and fairly long-tailed falcon. Immatures have longer tails than adults. The body is heavy and broad, and the wings seem narrow. The tail, when closed, is still very broad.

A soaring bird has wings that are tapered both fore and aft, so that they resemble long, tapered candles or an elongated lancet arch. The outer tail feathers, when fully fanned, form a semicircle and nearly touch the trailing edge of the wing.

The wing beat is fluid, rhythmic, elastic, and whiplike. The flap, which looks very shallow, seems to roll down the long wing in undulating pulses. In cadence and execution the wing beat is not unlike that of a Common Loon.

Though they are usually solitary, Peregrines often migrate in pairs.

Curiously, the bird most often confused with the Peregrine is not even a falcon. The Northern Harrier is, in fact, similar in size, but its long wings lack the Peregrine's broadness and taper. The Harrier's tail is also much longer than that of a Peregrine.

A soaring Peregrine also bears an uncanny likeness to a soaring Broad-winged Hawk. The broad tail of the Peregrine offsets or masks the wing length, producing a silhouette very much like that of a Broad-winged Hawk (and very unlike the picture of a falcon).

**PEREGRINE SUBSPECIES.** In North America, three different subspecies of Peregrine Falcon are recognized. The *F. p. anatum* now nests only in the western half of the United States (west of the plains) and north through Canada and Alaska to the tree line. The eastern breeding population has disappeared, though the bird probably occurs as a fall migrant along the East Coast.

The adult *anatum* Peregrine is dark gray to black above and heavily barred below except for a pure white upper chest and throat. The lower chest and belly commonly bear a rufous wash, so that the bird has a subtle orange or pinkish cast when seen

from below. The dark upperparts extend helmetlike onto the head and face. The black mustache stripe is sharply defined, bold, and obvious. Immatures are generally dark chocolate below; some boast a faint rusty wash.

The tundra Peregrine (*F. p. tundrius*) is a comparatively pale bird. This arctic subspecies, wintering in the tropics, is the bird most commonly seen in migration and is distinctly paler than most *anatum* birds. Adults are light gray above. Some individuals show a blue-gray cast on the back and tail. The paler tones, coupled with a more restricted facial pattern, mute the bold helmeted or capped appearance of the *anatum*. The barring on the underparts is faint and fine — almost a vermiculation. On some birds, particularly adult males, the barring may be so fine that even individuals seen at moderate heights appear to have pure white underparts. The rusty wash is absent.

Plumage on immature tundra birds is highly variable. Underparts range from chocolate to tan. Some individuals are almost as pale above and below as a Prairie Falcon. Almost all immature tundra birds have a distinct blond crown.

Whether they are adults or immatures, tundra birds appear to have longer wings and tails than *anatum* Peregrines. Tundra birds look ranger. Though the birds have similar measurements, the *anatum* Peregrine *appears* stockier (perhaps because of the relative width of the wings or the tail).

The third North American Peregrine, the Peale's race (*F. p. pealei*), is a bird of Pacific Northwest coastal reaches. It is not nomadically inclined and usually winters no farther south than central California. This subspecies shares with the Gyrfalcon both size and plumage traits; the two are easily confused.

The adult Peale's is dark gray to black above and heavily barred below. The rusty wash of *anatum* is absent. The cap is full. Adults are easily recognized as Peregrines; the immature plumage is the source of difficulty. Upperparts range from dark brown to black in some birds; streaking on the underparts is often so heavy that it fuses into a solid, dark mass. The mustache stripe, the hallmark of a Peregrine, spreads to form a solid, dark face. The bird is a Gyrfalcon look-alike.

Restricted range and sedentary nature reduce the identification problem. Be aware, however, that artificial introduction programs have established pure Peale's and Peale's hybrids (not to mention a few exotic Peregrine subspecies) in the East. As a result it is exceptionally difficult to identify the subspecies of Peregrines breeding in the East.

If you see a large dark falcon, wing shape, body bulk, tail length and shape, manner of flight, and the time of year will help you differentiate the Gyrfalcon from immature Peale's Peregrines.

**General categories of behavior and activities to look for (see more detailed descriptions in attached excerpts of *Guide to Management of Peregrine Falcons at the Eyrie*):**

**Daily Behaviors:**

- Hunting
  - Note any hunting from cliff.
    - fast dives after prey
  - Identify prey species when possible.
- Eating
  - Note where and which adult (when possible) is eating. If possible, identify prey species.
  - If the male is plucking feathers off prey without eating very much, FOLLOW his activities closely. He may be bringing food to the incubating female.
- Preening
  - Note preening activity by either adult.
    - Females generally preen for a long time after they have eaten or are taking a break from incubating.
- Perching
  - Note location of perching tree or ledge.
    - If this becomes a favorite ledge of either adult, please note and SKETCH its general location on the cliff.
- Vocalizations
  - “wail”
    - long ascending “waaa waaa waaa . . . ”
    - used in many ways, often between adults during incubation exchanges
    - fledglings wail when hungry
  - “cack”
    - very loud “cack cack cack . . . ”
    - usually response to disturbance
  - “eechup”
    - repetitious “eechup eechup . . . ”
    - usually during courtship and when feeding young

**Courtship Behavior (mid- to late-March through mid-April):**

- Displays
  - aerial: touching talons, swooping, vocalizing
  - on cliff ledges: scraping, head bowing, usually vocalizing with “eechup” call
- Copulations
  - on cliff, male on top of female (this is a good way to distinguish between the sexes)
- Vocalizations
  - “eechup” is common courtship vocalization
- Food transfers
  - male brings plucked food to female

**Territorial and Defense Behavior (mid-March throughout breeding season):**

- Chasing off raptors, ravens, turkey vultures, and crows

- usually call, or "cack" loudly
- Note any interactions with other species (see codes)

#### **Incubation Activity (early or mid-April to mid or late-May):**

- Incubation exchanges
  - Male brings food to cliff, female leaves nest ledge to retrieve food and flies to perch. Male enters nest ledge. Usually both adults vocalize by wailing. \*\*\*\* IMPORTANT: follow male to nest ledge to confirm location of nest ledge. SKETCH its location on cliff.
  - Female returns to nest site after eating, preening, and/or dozing. Male exits eyrie and female enters. Female will often "wail" before entering and will "eechup" when she reaches the nest ledge.
  - It may take 4-5 hours of waiting at a site to confirm an incubation exchange.
- Incubation lasts about 30 days
  - Once incubation is first confirmed, subsequent visits should confirm that incubation continues.

#### **Hatching of Young (mid-late May):**

- Incubation exchanges
  - After 3 weeks of incubation, start looking for slight change in exchanges when male brings food to female
    - If the eggs have hatched, the female will take food from the male and may eat a portion of it, but soon after she will RETURN TO THE EYRIE WITH PREY. Adults usually "eechup" when they enter the nest ledge with food.
    - \*\*\*IMPORTANT: When a hatch is suspected, follow the adult WITH FOOD after the exchange occurs.
- Feeding young
  - 10 - 14 days after hatching, nestlings are old enough to be alone on the nest ledge. Both adults may be perched on the cliff at the same time, but usually one is near enough the ledge to keep an eye on the chicks.
  - Observations should confirm that young are still on the ledge by waiting for one of the adults to bring food to the chicks.

#### **Nest Failure (any time after incubation has been initiated):**

- Hard to confirm. Both adults will be on cliff and will pay little to no attention to nest ledge
  - Often female is very vocal.
  - May observe courtship behavior.
  - No food will be brought to nest ledge.

#### **Fledging (early to mid-July):**

- Count number of fledged young on cliff.
- Best to wait until adults bring food to cliff to confirm total number of fledglings; all chicks will try to eat food.
- Chicks are very vocal, usually wail hoarsely and chase adults.
- Fledglings are brown with vertical streaking on the breast, a less distinguished facial pattern, and a distinct white band at the tip of the tail

The scope of the monitoring program will include 5 geographical regions representing the types of landscapes inhabited by the peregrine falcon throughout its range; surveys will be conducted in index areas within each designated region. The peregrine falcon monitoring program will begin in the spring of 2001 and end in 2013. During the 13-year period, surveys will be conducted every 3 years for a total of 5 surveys. The designation of a 13 year monitoring period encompasses approximately 2 generations of peregrines in the wild which should be sufficient in length to detect an inability of the population to be self-sustaining. Monitoring will include the collection of information on territory occupancy, nesting success, and contaminant exposure. At the end of each tri-annual monitoring period and at the conclusion of the 13 year monitoring program, we will review all available information to determine if relisting, continuation of monitoring, or termination of monitoring is appropriate.

**29. Will the Service allow take for falconry purposes now that the species has been delisted?**

Once the American peregrine falcon is removed from the endangered species list, take of peregrines is no longer prohibited under the Endangered Species Act. That will leave management of the species solely to the Migratory Bird Treaty Act and to state wildlife programs. We are working with the states to develop a proposal for management of take of nestlings and passage birds for falconry and for raptor propagation. We plan to use that proposal as the basis for an agreement with the authorities in Canada and Greenland to set preliminary limits for take of migrating young-of-the-year peregrines. Once we do, we must then complete an environmental assessment on the take of nestlings and passage birds, solicit public comment on the proposal, and publish the final criteria in the Federal Register. Until the final criteria are published in the Federal Register, take will be prohibited. This includes take for falconry, captive propagation, and scientific research. Once we reach agreement with the other government entities, take of peregrines for falconry and for raptor propagation will be authorized according to the criteria we agree upon. The allowed take of peregrines likely will be very small.

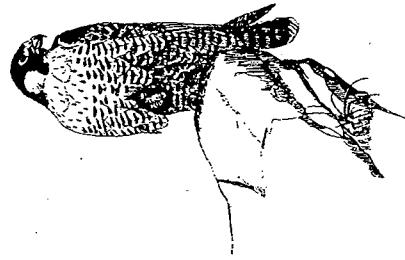
**30. Will the take of peregrine falcons for falconry or for captive propagation create an additional threat to the species?**

The Migratory Bird Treaty Act governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. Implementing regulations (50 CFR 20 and 21) include provisions for the taking of migratory birds for educational, scientific, and recreational purposes. Special regulations pertaining to raptors are found in 50 CFR 21.28 to 21.30. These regulations allow for the use of raptors for falconry and for captive propagation. Take from the wild for these activities must not threaten wild populations (50 CFR 13.21(b)(4)). Permit regulations require that issuance of permits not threaten wild populations of wildlife (50 CFR 13.21(b)(4)). The Service, in cooperation with the states, will develop biological criteria to govern the take of peregrine falcons prior to authorizing take for falconry and raptor propagation under the MBTA.

The taking, possession, transport, sale, purchase, or barter of raptors for falconry is permitted

**GUIDE TO MANAGEMENT OF  
PEREGRINE FALCONS AT THE EYRIE**

Edited by



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This is the Vermont Institute  
of Natural Resources' first credit for  
looking after the Peregrines in  
New England. Many thanks.  
I do think the funds of money of  
expenses in VT & NH could have been  
for some use to the work being done so  
in the future, if only Tom Cade  
This publication is made possible  
by a grant from Abdulla Masaood.

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## I. INTRODUCTION

Tom J. Cade

### History of Recovery Effort

Captive-produced Peregrine Falcons (*Falco peregrinus*) were first released in the USA in 1974, when The Peregrine Fund hacked two youngsters from a campus building in New York State and fostered two nestlings into a wild eyrie in Colorado. By 1994, more than 4,600 Peregrines had been released in the USA by hacking, fostering, and cross-fostering in four regional programs: (1) by The Peregrine Fund in the East, (2) by The Raptor Center at the University of Minnesota in the Midwest and Great Lakes region, (3) by The Peregrine Fund in the Rocky Mountain states and Pacific Northwest, and (4) by the Santa Cruz Predatory Bird Research Group in the Pacific Coast states of Washington, Oregon, California, and Nevada. At the same time Canadian workers released over 1,500 young Peregrines in their country. As a consequence of all this work, by the mid-1990s there were about 160 pairs of falcons known to be again occupying eyries from the Mississippi River eastward where none had existed by the mid-1960s, about 120 pairs had been reintroduced in the Rocky Mountain states, and more than 150 pairs again existed in California, Oregon, and Washington. In addition, there has been substantial natural recovery of wild populations, particularly in Arizona, New Mexico, and southern Utah, where there are probably more than 250 occupied eyries, but also in other parts of the western USA. Overall, the known population in the USA south of Canada in 1994 exceeded 800 occupied eyries, with a conservative estimate of over 1,000 pairs (Enderson et al. 1995).

From the beginning, personnel from various state and federal agencies have been involved in the release work and other field aspects of the recovery program. Some, such as the Colorado Division of Wildlife, had major roles but most worked under the guidance of staff from The Peregrine Fund or one of the other primary Non-Government Organizations (NGOs). As need for the further release and reintroduction of captive-produced Peregrines and for other highly manipulative procedures comes to an end, NGO involvement becomes less important, and the relevant state and federal agencies should assume direct responsibility for the routine monitoring and management of Peregrine populations within their respective jurisdictions. The commitment of the NGO groups to the welfare of the Peregrine remains strong, however, and they will continue to be available for consultation and contractual work based on need.

### Purpose of the Manual

In the spirit of cooperation that has always characterized the recovery effort for the Peregrine Falcon in North America, we offer this manual as a guide for those agency personnel and others who may need information about the techniques and procedures, and the biological and practical considerations, involved in the management and care of Peregrine Falcons at their eyries. It should be kept in mind when considering hands-on management that specific state and federal permits are required.

Some may be tempted to think that because it was once an "endangered species," the Peregrine Falcon will henceforth always require intensive

management to maintain its numbers, but we do not agree. Intrusive and manipulative procedures will be needed mainly during the continuing build-up of breeding populations to accelerate the rate of growth and to correct problems that may be adversely affecting adult survival or reproductive success at specific eyries. Once the breeding populations have reached environmental carrying capacity, and the "serviceable breeding locations" (SBLs, Hunt 1988) are all as serviceable as they can be made, monitoring and some regulation of human activities around eyries are all the management that should be necessary. We should remember that for centuries Peregrines existed and occupied their traditional eyries year after year with no management at all and, indeed, often in the face of heavy human persecution. Wherever they are tolerated and left alone, and are not incidentally poisoned by chemical pollutants in the environment, Peregrines can survive and reproduce quite well in close association with human beings and their activities. This happy circumstance again prevails in many parts of the Peregrine's once depleted range.

## II. MANAGEMENT GOALS

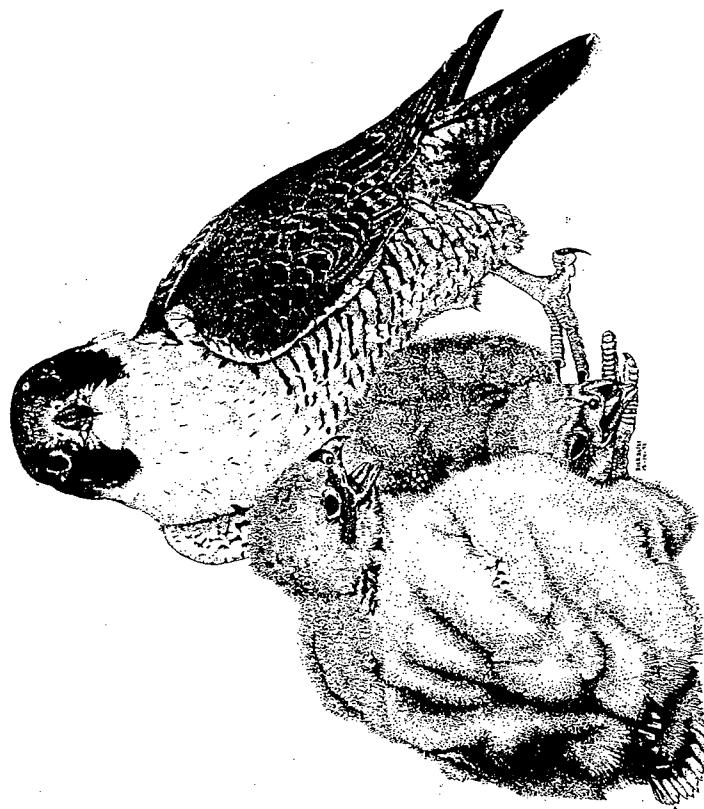
Tom J. Cade

There is one short-term goal, one essential long-term goal, and two other desirable long-term goals. The short-term goal is to complete the process of recovery and population increase. Various ends are attainable, depending on local or regional situations. Breeding populations, measured by eyrie occupancy, can be allowed to reach whatever number the current environmental carrying capacity will sustain, based on the number of SBLs available (Hunt 1988). Since we now have the ability to increase or decrease the carrying capacity of some environments by artificial means, e.g., by constructing or removing artificial eyries, within limits we can manipulate populations to whatever level is determined to be desirable. Each management jurisdiction will have to decide what its population goal should be.

Further population increase can occur passively by allowing the wild birds to increase by natural processes, or by manipulating the reproductive capacity and dispersal of the wild falcons to promote range expansion and eyrie occupancy. Methods for accomplishing the latter procedures are described in Chapter VII.

The essential long-term goal involves systematic inventories to assess population status, the safety, health, and reproductive capacity of established pairs, and the biological fitness (suitability) of their SBLs. These topics are dealt with in Chapters III and VI. The time frame for inventory work will vary depending on circumstance and need to know. In some situations surveys may be required annually during the breeding season, especially when there are perceived problems relating to survival or reproductive success. For example, a recent amendment to the Endangered Species Act requires five years of monitoring following the delisting of an endangered species. In other circumstances biennial, five-year, or ten-year survey intervals may provide sufficient information. In practice, it is likely that intensive, annual monitoring will occur for selected small or sample populations while more extensive regional surveys will take place at longer intervals. The National British Peregrine Survey, which has occurred at ten-year intervals since 1962, has proved to be quite adequate for monitoring the recovery and expansion of this island population of Peregrines, which now numbers over 1,200 occupied eyries in Great Britain (Crick and Ratcliffe 1995).

The minimum kinds of information needed to determine population status and reproductive health are (1) eyrie occupancy and (2) number of young reaching fledgling or near-fledgling age. The presence or absence of adult falcons at known eyries should be determined during the egg-laying or incubation periods if possible, as this timing will give the best indication of the maximum number of pairs that settle to breed in a given population. Later surveys may miss pairs that fail during incubation. Sufficient time should be spent to determine whether a single bird or a pair is present. Ideally the eyries should be visited a second time when the young are about ready to fly, between five and six weeks post-hatching. In practice, if the young are to be banded when they are at the optimum age of three weeks, they may be counted as "fledged." Other desirable information includes clutch size, number of young hatched, causes of egg or nestling mortality, collection of eggshell fragments and addled eggs, and details on food type and delivery rates to the young. Since such data usually require climbing into the eyrie and are obtainable



only through intensive work at a limited number of eyries, they are not likely to be collected during extensive surveys. Surveyors should record both the presence and apparent absence of Peregrines during surveys of potential nesting territories. This can help later surveys to address whether new pairs are real or result from increased search effort.

Another aspect of long-term monitoring involves the identification and resolution of specific local conflicts that may arise because Peregrines are predators. These conflicts may involve real or perceived threats to domesticated animals, especially to homing pigeons and other free-flying breeds, or to endangered forms of wildlife, especially to other birds such as Roseate Terns (*Sterna dougallii*), Least Terns (*Sterna antillarum*), and Piping Plovers (*Charadrius melodus*). Although predation by Peregrines is not likely to be a significant factor in the region-wide control of prey numbers, statements to the contrary notwithstanding (e.g., Paine et al. 1990), locally a pair of Peregrines, or even a single resident bird, can have a significant impact on the number of prey when the falcons become specialists on one or two especially vulnerable species (Cade 1960, Nisbet 1992). Depending on the circumstances and the prey species in question, it may be necessary to remove the offending falcon or pair. Trapping and translocating a single migrant Peregrine that was causing problems at a tenery was easy and effective (Nisbet 1992), but the removal of a nesting pair of Peregrines is a more serious act because, in effect, it requires the destruction of an eyrie. Also, breeding birds may be far more motivated to return to the area than translocated migrants. Some artificially constructed eyries (towers) can be easily dismantled and moved, but once established on cliffs and buildings, Peregrines cannot be easily dissuaded from using them. It is worth noting that in Salt Lake City a pair of Peregrines nested on the old Hotel Utah from 1986 to 1990. When the building underwent exterior renovation in 1991, the falcons moved to a quarry two miles away and nested successfully there until the site was demolished in 1994. The falcons then moved back to the newly finished hotel building (now the Joseph Smith Memorial Building) and, after failing in 1994, nested successfully in 1995 (Walters 1995).

A second long-term goal related to monitoring and survey work is basic research on the Peregrine. Although research is often considered to be a separate activity from management, the two are, in fact, closely intertwined, and this has been especially true of work on the Peregrine Falcon during the past 25 years. On the one hand, informed management cannot proceed without basic biological information on the species to be managed, and on the other hand, the logistics and procedures involved in management can greatly aid basic research.

Although the Peregrine Falcon has become one of the most intensively studied birds of prey in the world, there are still many aspects of its population biology and ecology that are poorly understood and that, if known, could aid in the development of better management practices (see discussions in Cade et al. 1988). Some of the relevant subjects include: (1) better statistics on survival rates of different age classes, (2) factors determining dispersal and new eyrie establishment (acquisition of new SBLs or reoccupation of historical ones leading to increased breeding density or range expansion), (3) the relative size of the "surplus" non-breeding adult population to the breeding population and the environmental factors limiting the number of non-breeders, (4) age of first breeding in relation to

population density, (5) potential demographic importance of interference by supernumerary adults at eyries under saturated population conditions, (6) lifetime reproductive performance of females in relation to quality of SBL and/or quality of male as food provider, (7) how physical and biotic characteristics of nest site and territory influence survival of adults and young, (8) importance of prey abundance and availability to reproductive output at eyries, and (9) the influence of weather on reproduction.

Management authorities should consider integrating specific research projects to answer these and other major questions into their long-range protocols for the Peregrine. In some cases this work could be carried out by agency personnel; in others, the work could be contracted to universities or other research organizations with the relevant skills to do the job.

A final long-term goal could be to manage the Peregrine Falcon as a renewable and usable natural resource for falconry under regulations promulgated pursuant to provisions of the Migratory Bird Treaty Act and relevant state laws. The Peregrine has had a long history of use in falconry, and it is the species most closely identified with the sport worldwide. A regulated take of wild Peregrine Falcons for falconry is fully parallel in historical, social, and ethical justification to the take of waterfowl and game birds by gun hunters.

The biological justification for regulated take hinges on the concept of "harvestable surplus." Once a breeding population reaches the limit imposed by the number of SBLs in a given region, reproduction results in a surplus of birds above the number required to replace losses in the breeding population. The size of this surplus varies depending on the ratio between overall natality and mortality, the latter possibly related to environmental limitations outside the SBLs; but in well-adjusted, saturated populations the non-breeders can equal or exceed the adult breeding population (Newton 1988, Hunt 1988). A limited harvest established on a state by state basis would be a reasonable proposition in the near future.

If the Peregrine were regulated as a usable resource, avenues of federal and state funding for its management would open up that otherwise would not be available. In the long run such funding might prove to be more dependable and adequate than sources formerly derived from nongame and endangered species programs.

## Observing Breeding Behavior

### *Janet Linthicum*

It is important that suspected nesting areas be adequately checked, especially early in the breeding season. In areas where reproductive success is being monitored, all territories should be checked at least twice during the nesting season. More frequent visits may be necessary to determine exact timing or outcomes if precise information is needed, for example in manipulation efforts. Visits are usually most productive if they occur at dawn or dusk, because behaviors such as food and nest exchanges are highly likely to occur at these times. During other parts of the day, more time may be required at a site to get the same information.

All sites should be documented in such a way that a later researcher can easily find them. Directions to the site, photographs, and sketches are all extremely helpful, and should be put on file (confidentially) in case the current researcher is not available for future survey work.

### Timing

**INCUBATION.** Mid-March (April or later in northern areas or high elevations). Determine whether the territory is occupied by one or two falcons. Record presence of falcons, age, courtship, incubation behavior, nest location, band status, etc. If no falcons are seen, the site should be visited again, and possible alternate sites checked, as Peregrines can be very hard to detect during incubation. First-time layers often lay eggs later than expected for their region. Incubation lasts approximately 33 days.

**NESTLINGS.** Late April to June in temperate latitudes. Determine whether adults are still attending the nest where eggs were laid, and whether young have hatched. If there is nest failure, the pair may have relocated and laid another clutch on a different ledge. If it is possible to see into the nest from the observation point, record the number of young.

**FLEDGING.** Late May to mid-August. Depending on previous nest chronology, young should be ready to fly near this time, roughly 40 days after hatching. Recycling after egg failure can cause nest departure to be delayed from the "expected" date by a month or more. Record number and sex of fledged or near-fledged young. At sites where the observer cannot see into the nest, young must be counted after fledging. The resulting number should be considered a minimum, as some young could go undetected or have died or dispersed before the visit.

### Behavior

This information is intended to help in determining reproductive status at eyries where the observer cannot see into the nest, and so must ascertain status based on behavior. It is written primarily for those watching nests intensively, for example if manipulation is planned; but may also be useful for individuals with limited experience. It is helpful if observers use this information to describe vocalizations and behaviors in a standardized way. For example, reports of Peregrines "peeping" or "calling" do not convey useful information to the reader. Detailed descriptions of behavior can be found in Cramp and Simmons (1980), Sherrod (1983), and Ratcliffe (1993).

### **COURTSHIP BOWING.** A general display used in many situations, especially as part of courtship.

**MALE OR FEMALE LEDGE DISPLAY.** The falcon stands over the nest depression (scrape), leaning forward (bowing) and "ee-chupping." The male often stares at the female during a male ledge display. Ledge displays are often accompanied by:

**SCRAPING.** Either bird can do this. The falcon runs its breast through the substrate or nest depression, pushing out with its legs behind. The bird is forming the nest cup (scrape), but this is also part of courtship. Scrapes may be made at several potential ledges before one is finally chosen for laying.

**MUTUAL LEDGE DISPLAY.** Often this is precipitated by a male or female ledge display. The other bird joins the first on the ledge and both bow and "ee-chup" over the scrape, sometimes touching bills. This can also happen outside the eyrie.

**FOOD TRANSFER.** The male offers food to the female by approaching her or standing near, with food in talons or beak, "ee-chupping." The female takes the food from the male, usually "ee-chupping" or walling. This can happen in the air or perched. The male often signals the female that he has food by walling as he approaches the cliff.

**LANDING DISPLAY AND HITCH-WING POSTURE.** (male). A pre-copulatory display in which "shoulders" are held high, as if in a shrug, and male often prances as if on tip-toe.

**COPULATION.** The female leans forward and moves her tail to one side. The male rests on his tarsi on her back, flapping his wings, and presses his tail underneath the female's. Copulations are usually accompanied by walling on the female's part, and chittering or "ee-chupping" by the male. When the male departs, the female usually "ee-chups" a few times, and often rouses (shakes her feathers).

**OTHER BEHAVIORS.** CACHING. Peregrines sometimes store uneaten food for later retrieval. They usually have several favorite cache spots on the cliff or elsewhere in the territory.

**CASTING.** The falcon hangs its head and wags it from side to side with mouth open. Eventually a pellet (casting) of non-digestible material is expelled.

**VOCALIZATIONS.** EE-CHUP. A repetitive, staccato "ee-chup ee-chup ee-chup" sound. Males have a higher-pitched "eechip." Variations include a slower "chip chip chip," usually during ledge displays and while feeding young. "Ee-chup" usually implies social recognition, but a very similar sound, louder and more staccato, is given as a response to vagrant raptors, usually Peregrines.

**CACKING.** Very loud "cack cack cack" — A response to disturbance, either a raptor or other animal (including the observer) too near the eyrie.

**WAILING.** A long, slow, ascending "waaaaaa waaaaaa waaaaa." Sometimes connotes hunger, but also used in a variety of circumstances. Youngsters have a more insistent variation of this call, which is often referred to as hunger screaming.

**CHITTERING.** Like "ee-chupping" but quicker and less defined. Usually used by birds in proximity, often when one bird is being made uncomfortable by some aspect of the interaction, or during play by fledglings.

### Behavioral Chronology

**PREF-LAYING.** Both birds are visible for extended periods outside the nest. This can happen when there is a partial clutch.

**PAIR FLYING.** Both birds engage in high speed aerobatic displays, with no apparent hunting or territoriality involved. This indicates that the female is probably not lethargic with eggs yet. Sometimes males engage in spectacular flight displays while the female watches.

**TANDEM HUNTING.** Self-explanatory. Again, the female is probably not laying eggs yet.

**LEDGE DISPLAYS.** See above. **NOTE:** Sometimes the falcons concentrate courtship in one spot, then suddenly lay eggs in a different, often more cryptic location. If both birds are suddenly no longer seen together, or activity at the expected nest subsides, suspect that the birds have moved and that they might have eggs.

**FOOD TRANSFERS.** These occur, male to female, in the air or at a perch throughout the nesting season. As incubation approaches, concentrate on the male after the transfer. He is often the key to incubation as described later.

**COPULATION.** Before and during egg laying, Peregrines copulate frequently. When the clutch is complete they rarely copulate.

**EGG-LAYING.** LETHARGY. Just before and during the period of egg laying (approximately eight days for four eggs) the female becomes lethargic. She can look "dumpy," including fluffed-up feathers while perched, hanging her vent feathers (the feathers in front of the cloaca, underneath the tail) to an unusual degree, leaning slightly forward while perched, waddling when walking, dozing with one or both eyes closed for long periods, and generally remaining near the nest by being inactive. She might also spend considerable amounts of time in the nest by herself. After laying an egg, she may have periods of being more active, but lethargy is a general demeanor to note. Those without much previous experience with Peregrines should be aware it is comparative and subjective.

**PARTIAL CLUTCH.** The falcons usually begin incubating after the second or third egg, even if a fourth is to be laid. Before incubation starts, they often "guard" the eggs, standing in the nest or within sight of the eggs. This is an indication that at least something is in there. Again, the male is the key. After a food transfer or nest exchange, watch the male. If he enters the nest for a while (even a long while) then comes out and perches out of the nest while the female also remains outside, you are fairly safe in assuming that full incubation has not started.

**INCUBATION.** During the normal course of incubation, one of the adults is nearly always on the nest. Exceptions are during disturbance, for short periods on particularly warm days, or for a few minutes during food exchanges. The female does the majority of incubation. The male brings food to her several times daily, or sometimes simply relieves her and takes a turn on the eggs while the female eats, preens, and relaxes. When she returns to the nest to relieve the male, he usually appears on the ledge when she disappears; an unaware observer may think only one bird was involved in a brief visit to the ledge. A common mistake is failure to realize that the bird leaving a spot is not the same bird that just arrived there (i.e., nest exchange as opposed to just perching briefly). This is why it is important to be able to distinguish sexes. During food exchanges the male arrives with food, often wailing or ee-chupping and passing in front of the eyrie where the female can see him. She then exits the eyrie and takes the food, either at a perch or in the air. This exchange gives a good opportunity for locating the nest. The best way to determine that incubation is occurring is to train your attention intently on the eyrie and be

certain that the attending falcon remains in the nest until relieved by the other adult. This can be very tedious, but is worth the trouble because otherwise it is impossible to see a lot of behavior, and yet not determine what is happening. Observation of several sequences in which an adult attends until a nest exchange occurs indicates that incubation is underway.

If the observer is unable to see the eyrie opening, other behaviors may be helpful. For example, voluminous excretion has been used to determine incubation in coastal California, where the observer sometimes cannot see the cliff face that the eyrie is on. When a nest exchange is occurring (e.g., the male brings in food and disappears toward the nest, and soon thereafter the female appears coming from that area) watch the female. After she perches, she soon slowly leans forward and emits a large quantity of excreta. This can also occur while flying. This behavior indicates that the falcon has been unable to defecate for a prolonged time (i.e., has been incubating). Also watch for rousing (shaking of all feathers in a relaxing manner), stretching, and preening intensively. All of these are normal behaviors, but tend to be exaggerated after a stint of incubation.

**EGG FAILURE.** Some pairs lose their eggs to breakage, weather, or other factors. If this occurs while laying is still underway, they may relocate to a different ledge and attempt to complete the clutch there. If the clutch has been completed and incubation is underway, and the eggs are then lost, the first egg of the second clutch is usually laid approximately fourteen days later if recycling occurs. Sometimes, falcons exhibit the "lost look" after failure, returning to the scrape repeatedly but not staying, and wailing frequently. The falcons usually change ledges after failure, sometimes quite a distance away (possibly an alternate cliff), so do not assume they have given up if they are not in the usual places. Re-nesting may occasionally occur after loss of a young brood, or even after a second set of eggs is lost.

**YOUNG.** As hatching approaches, the adults often become more aggressive. During the early nestling stages the young require almost constant brooding, which can be hard to distinguish from incubation. The main difference is that after a food exchange, the female takes the prey into the nest rather than eating outside (she may pluck it before entering the eyrie). During the early nestling stage most females do the majority of feeding. Males provide food, and may brood young during the female's absence.

After approximately two weeks, depending on ambient temperature and number of chicks, the young no longer need constant brooding. Therefore, both adults are often outside the nest for extended periods. This is easily mistaken for nest failure. Depending on size of prey and number of young, the nest may only be visited a few times a day by the adults. Clues to presence of young include continued territoriality by adults, absence of courtship behavior, frequent hunting attempts, sometimes hunger screams of young, and, of course, prey deliveries. As the young age, they begin eating on their own, and sometimes a prey delivery is extremely brief. Also, late in the nestling stage the female hunts, and the male as well as the female feeds young. Some males are absent from the immediate nest area most of the day, either hunting or perched out of sight, except when delivering prey. Clues to failure include either adult eating full meals without delivering food to the eyrie, decreased territoriality and presence at the cliff or resumed courtship behavior if recycling is occurring, and frequent wailing.

**DISTURBANCE.** Observers should find an observation site with optimal visibility, but where their presence does not interfere with normal falcon behavior. In some cases distant locations can provide a better overall view of the cliff and falcons coming and going. However, those with little observation experience with Peregrines may find them difficult to spot from a distance, and vocalizations can be very helpful. The falcons respond more to an observer above the nest than to one below or across from it. Cackling birds are sufficiently disturbed that observers should retreat and find another location immediately. Signs of lower-level disturbance can include soaring above the cliff silently (watching the observer), perching where they can watch the observer rather than engaging in normal behavior, and sometimes displacement aggression such as assaulting a cormorant, gull, or other large bird in the cliff vicinity. Generally, if a falcon seems to be watching the observer(s), consider retreating to a more distant location. Even if the birds are not disturbed, they may be less inclined to engage in the behavior the observer is there to see if they are distracted. Before beginning observations, find a spot from which to observe for extended periods without becoming uncomfortable, distracted, or eager to depart.

**ADDITIONAL INFORMATION.** Ideally, observers should learn to distinguish the male from the female, preferably while both are still visible simultaneously. The best indication of sex is size, females being larger than males. However, it can be extremely difficult to sex a single bird on this basis, and experienced observers often err. If there are identifying aspects of individual falcons, they can be very helpful once incubation has begun and the observer rarely sees both birds at once. In many pairs, the female looks darker overall on the breast and farther up toward the neck, and may have a darker, slightly brownish tinge to the back. The male looks more white on the breast from a distance, and more silver on the back and especially in the rump area in flight. Some males are vividly orange around the cere (fleshy portion of beak) and feet (as opposed to bright yellow or yellowish-orange). There is much variation among individuals, so get to know the pair if possible. Male voices are higher-pitched, and in flight their wings are more narrow with sharper ends. Peregrines molt their flight feathers during the breeding season, with females usually beginning to molt before males. Differences in the gaps in wings and tail can be helpful in distinguishing individuals during a given day's observation.

Occasionally, one of the pair is a yearling. Yearlings have bleached considerably during the year and may appear "blond" rather than brown, and could be confused with an adult at a distance. A good method of checking is to note whether the marks on the breast are vertical streaks or horizontal bars. Occasionally, one may encounter a yearling that has already molted partially by its first spring, or a two-year-old that molted incompletely its first year. These birds may breed successfully, although many do not.

Recently fledged young are brown with vertical streaks on the front, and may appear somewhat larger than adults of the same sex, because their flight feathers are slightly longer. Their wing tips in flight are more rounded than those of adults. They often flap their wings while perched (exercise), land clumsily, and engage in mock combat, tumbling and playing together in the air. When an adult is in view, they hunger-scream, and often chase the adults. In begging while flying, they sometimes appear to flap their wings quickly (flutter). Seen from above, powder

down may cause young in flight to appear bluish, leading to confusion with adults; however young of the year have conspicuous light tips on the tail feathers. For future reference, notes should contain a description of the adults, especially of bands (color and leg) and any unusual characteristics if possible. This can help future observers to determine longevity, continued occupancy, etc. Some Peregrines have alpha-numeric bands in addition to U. S. Fish and Wildlife Service bands. These bands usually have two characters, numbers or letters or both, that are meant to be read at a distance. When one of these bands is read, it is necessary to draw the band as it appears on the leg for reporting purposes. This is because there are several combinations of the same characters in existence, and the arrangement of the characters on the band is important for identifying it. For example, characters can be horizontal and/or vertical, and may have a line between them. Some bands are more than one color.

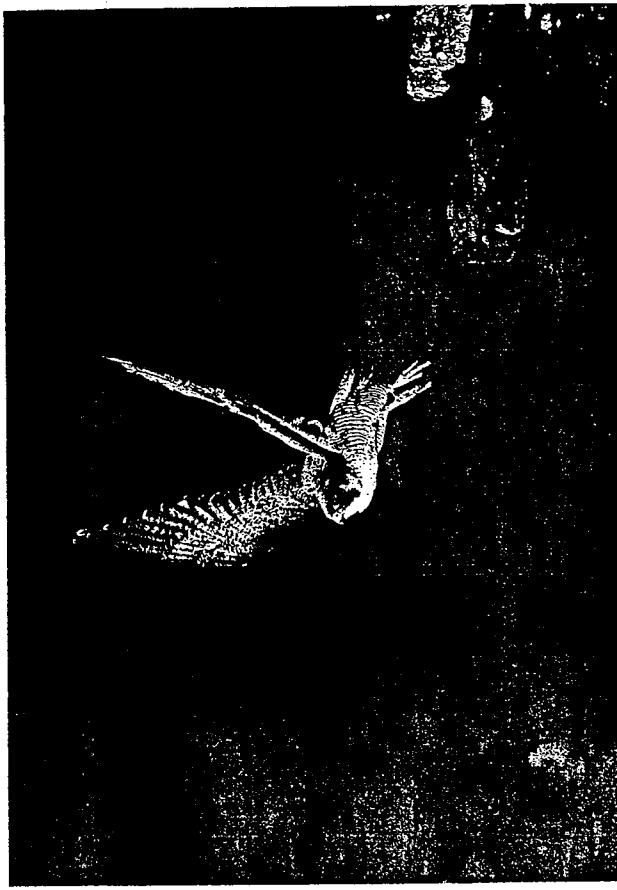


Figure 5. Adult female leaving perch.  
Courtesy of Rick Kline



**FOSTERING.** The placement of captive-reared or translocated young into a foster nest has proved to be an effective way to supplement the productivity of wild pairs (Cade, et al. 1988). It is probably a more cost-effective way to establish young falcons in the wild than hacking, but it depends on the presence of a wild breeding population and does not help to establish Peregrines in vacant range, except to the extent that it may provide an increased number of "dispersers" that settle to breed beyond the geographic limits of their local population. Fostering is most justified for breeding populations that have abnormally reduced productivity (e.g., birds affected by DDE-induced eggshell thinning) with smaller than normal broods. It is probably not justified as a management technique for populations that are reproducing normally, although experimental studies with artificially increased broods to determine the influence of brood size on rates of survival and development of young, and the limits of food provisioning by parents, would be interesting. In addition, the influence of supplemental feeding on survival of artificially enlarged broods would be useful to know and could have some application for management.

**CROSS-FOSTERING.** Like hacking, cross-fostering has the potential for re-establishing Peregrines in vacant range. To date it has been used most effectively in California, where Prairie Falcons now occupy cliffs and habitat formerly used by Peregrines (Walton and Thielander 1988). At 14 to 28 days old the young Prairie Falcons are removed from their eyrie and fostered elsewhere, and a brood of 14 to 17-day old Peregrines is substituted. The parent Prairie Falcons readily accept the fostered young and have no difficulty rearing them. Early fears that cross-fostered Peregrines might become abnormally imprinted or otherwise dysfunctional in their behavior as adults have not been borne out, as cross-fostered Peregrines have bred successfully in California both at territories reclaimed from Prairies and at other sites. Apparently, as long as young Peregrines are reared together in groups, they do not become sexually imprinted on the parent Prairie Falcons. It is wise to take a conservative approach by placing only two or three Peregrines into a cross-foster site (never only one). Peregrines eat a diet rich in bird species which not all Prairie Falcon parents provide. This technique could be applied advantageously in several other western states where Prairie Falcons now nest in suitable habitats for Peregrines. Cross-fostering requires observation of the Peregrine nests to assess age, and also several Prairie nests in order to have not only a recipient nest for the Peregrines, but also one or more for the displaced Prairies. Since Prairie Falcons often have five young, and recipient foster nests for them need to have fewer than that, it is necessary to know the status of several Prairie nests in the vicinity.

In Germany young Peregrines have also been successfully reared and fledged by Goshawks (*Accipiter gentilis*), Common Buzzards (*Buteo buteo*), and Common Kestrels (*Falco tinnunculus*), but it is unclear whether any of these cross-fostered Peregrines have survived to reproduce (Saar 1988). The tree-nesting species have been used as foster parents in an attempt to re-establish the lost tree-nesting populations of Peregrines that once existed on the Baltic plain of Germany and Poland. The technique could have some potential for re-establishing a tree-nesting population in the Mississippi River drainage system, or elsewhere in the USA, possibly by using the Red-tailed Hawk (*Buteo jamaicensis*) as the foster parent.

## VIII. CONCLUSIONS

Tom J. Cade

What is to be said of the Peregrine Falcon in the final years of the Twentieth Century? It is no longer an endangered species in North America (Enderson et al. 1995). While this manual was being written, we have seen the northern *tundrius* race officially downlisted to "threatened" and finally delisted in 1994. In June of 1995 the U.S. Fish and Wildlife Service published a notice in the Federal Register to delist the *anatum* subspecies, and it is likely that the populations subsumed under that name will be officially removed from the list soon, or at least downlisted to "threatened".

We can thank this remarkable recovery of the Peregrine to the courage and determination of the first Administrator of the Environmental Protection Agency, William Ruckelshaus, who, against the ruling of his own hearing examiner and the intense lobbying of many pro-pesticide advocates, banned the use of DDT for nearly all purposes in 1972. This action, more than any other human intervention, made it possible for the surviving remnant populations in the wild to increase their numbers and reclaim vacated eyries throughout much of the former range. It also made possible the successful reintroduction of captive-produced falcons in southern Canada and the coterminous United States.

Managers need to remember the central role of DDT and other organochlorine pesticides (especially dieldrin) in the decline of the Peregrine Falcon, because there is now a tendency after 30 years of endangered status for some people to think of the Peregrine as a fragile species that will always require a lot of care and intensive protection. Like some other top predators, the Peregrine just happened to have a peculiar sensitivity to the eggshell thinning effects of DDE and, consequently, experienced profound reproductive impairment during the worst years of contamination, as well as probable increased mortality from the more potent compounds such as dieldrin.

Otherwise, historically the Peregrine was known to be a remarkably adaptable and resilient species, able to survive most of the "slings and arrows of outrageous fortune." From the Eighteenth Century right into the early decades of the Twentieth Century, the Peregrine was relentlessly persecuted by gamekeepers, gunhunters, egg and museum skin collectors, pigeon fanciers, and vandals of all sorts. These human enemies accounted for the destruction of many thousands of Peregrines and their eggs and young in both Europe and North America, but the falcon populations of these continents remained little changed by these human causes of death.

Breeding populations, reflected by the number of occupied eyries, changed little over spans of time measured in decades and centuries, except for localized regions where human uses of land reduced the abundance of prey below densities that can sustain nesting falcons or made specific eyries unacceptable.

The explanation for this population resilience lies in the widely spaced pattern of breeding dispersion adopted by pairs and in the production of a reserve of adults above the number that can find places to nest within the rather rigid, territorial system. These surplus adults — or "floaters" — are available to replace lost or

moribund breeders rapidly at the eyries. In a healthy Peregrine population that is at the environmental carrying capacity for number of pairs, these floaters may equal or exceed the number of breeders, depending on the rate of reproductive success and survivorship (Hunt 1988, Newton 1988). The importance of floaters in Peregrine population dynamics has not received as much recognition among biologists and managers as it deserves, and we still need to develop more direct ways to study this segment of the population.

Because of this population resilience to natural causes of mortality and the continent-wide reductions in the use of organochlorine pesticides, the foreseeable future of the Peregrine looks bright. The species has reclaimed most of its original distribution and abundance in the boreal and arctic regions of Greenland, Canada, and Alaska, and throughout much of the western United States as well, particularly in California, Arizona, Utah, Colorado, and New Mexico, as well as farther south in Mexico. In these less human-populated regions, little or no hands-on management should be needed in the future. Occasional surveys or inventories of eyries in selected regions should be sufficient to keep managers aware of general trends in population dynamics and viability.

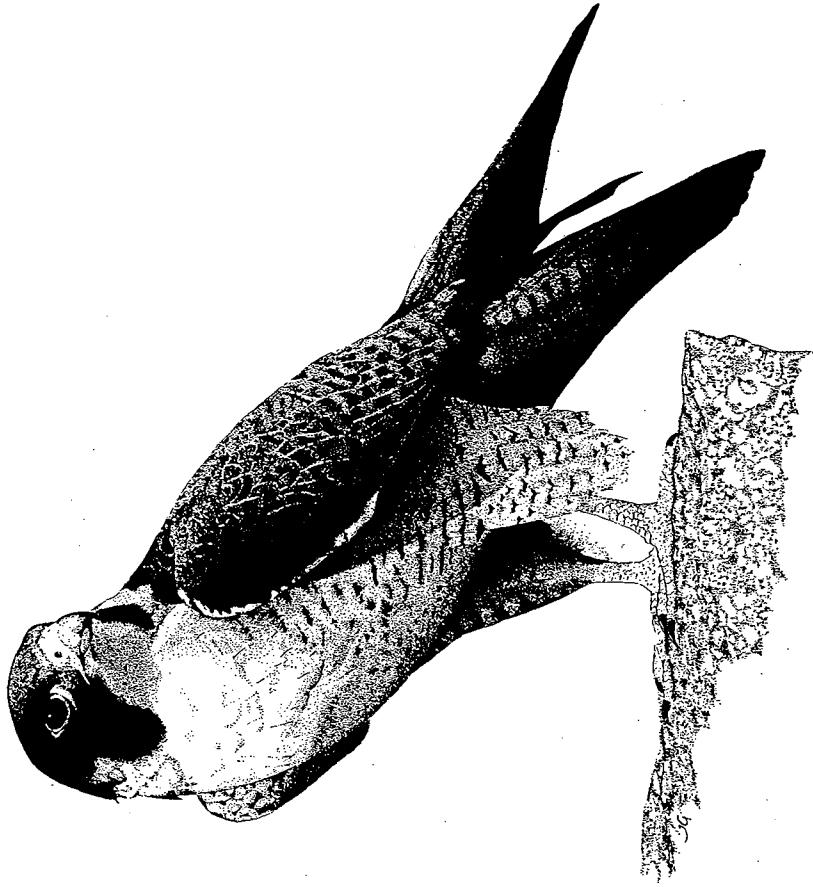
In addition, captive propagation has made it possible to ensure a continuing supply of birds for falconry as well as for reintroduction where locally desirable (Cade in press). The techniques of reintroduction make it possible to establish nesting Peregrines virtually anywhere humans want them. One of the surprising aspects has been the ease with which captive-reared and released falcons have adjusted to new and novel environmental situations, as shown by their acceptance of man-made structures as nest sites and willingness to live and breed in urban settings. Today Peregrines nest on skyscrapers, church steeples, bridges, decommissioned ships, silos, power plant smokestacks, and on specially constructed nesting towers. In 1993 at least 88 pairs of Peregrines were present in 60 urban areas of Canada and the United States (Cade et al. 1995), and the number has continued to grow.

What more should be done? Peregrines still need some special care in eastern North America, where the re-established population has only a limited but so far encouraging hold on the land. The species could use more help in the northern Great Plains, where further releases could increase the still diminished number of nesting pairs, and the falcons in California should be watched carefully over the next five years to make sure they can produce enough offspring to maintain existing numbers and to increase in the face of continuing chemical contamination of their environment, without further augmentation with released birds. The same is true for parts of eastern North America. Complacency has no role in the modern world: We had better be prepared to anticipate new and unexpected hazards for Peregrines in the future, as well as to make doubly certain the old problems are truly gone.

Locally, management should include maintenance and improvement of nesting sites. At man-made locations these actions will include maintaining and building towers and removal of other species (owls) using the sites. On buildings and bridges, construction or replacement of nest boxes will be needed from time to time, as well as some coordination of structural maintenance schedules to reduce conflicts with the falcons' breeding season. Where pairs experience poor reproduction or failure at natural eyries, nest ledges on cliffs can be modified to

improve breeding success by enlarging ledges, adding better substrate, increasing drainage, and reducing access by predators; or superior, new sites can be constructed on the cliff to replace poor ones.

Additional management may need to include monitoring human activities in the vicinity of eyries, particularly in areas of high use by hikers, rock-climbers, photographers, and sightseers. Seasonal restrictions on climbing and trail-closures may be necessary in some places, but the draconian regulations that have been imposed on human access to Peregrines and Peregrine habitats in Great Britain (Ratcliffe 1993) should not be necessary in North America and probably would not be tolerated by the American public.



## TIPS FOR SURVEYING PEREGRINES

1. Work in teams of two or more, if possible. The more pairs of eyes present at a site, the better the chances of locating Peregrines. This will also allow each observer to have periodic rests.
2. If possible, acquaint yourself with the cliff before the Peregrine watch day. Determine which direction the cliff faces and thus the time of day for best observation. For example, if the cliff faces east you should time your watch to begin in early morning. If the cliff faces west you may wish to adjust your watch from early afternoon to dusk, so as to avoid the morning glare. Peregrines tend to be most active in the very early morning and late afternoon, so it would be best to concentrate on those times.
3. One member of the team should scan the cliff with the naked eye while the other rests or studies any suspicious looking object on the cliff. More often than not, you will first catch a silhouette of a bird above the skyline before zeroing in on it with binoculars. If the bird is silhouetted, look for a rapid wing beat, long pointed wings, and tapered tail.
4. If it is a sunny day with the sun behind you, watch for shadows of birds along the cliff. In flight, shadows on the cliff face are often larger than the birds themselves and are thus more easily seen.
5. Often one can determine if Peregrines are using a cliff by searching for "whitewash" (i.e. excrement) on the cliffs. Usually a few such marks, up to 6 feet in length, can be found extending downward from favorite perches, often under an overhang. A spotting scope often makes it possible to see single marks which are less discernible than large concentrations of "whitewash" under a favorite perch. Sites that have been (or were) active for long periods often have growths of orange lichen growing on the nutrient-rich "whitewash" -- these are typically quite distinctive and should also be looked for.
6. Ravens, vultures, and other raptors flying in the vicinity of a potential Peregrine eyrie should be kept in sight since Peregrines often, though not always, attempt to drive off such intruders.
7. Depending on how close you are to a cliff and how much background noise exists, you may often hear Peregrines long before you see them. Listen closely for the territorial "kak, kak, kak", the squealing "wail" (which can be given by a bird on the nest) and the "ee-chup" calls of the birds.
8. It is essential that you be comfortable during your cliff watch. Fatigue will greatly decrease your alertness. Warm clothes are a must. A cap with visor and/or sunglasses may be useful. Bring plenty of food and fluids -- you'll burn up a lot of energy just being out there. It is worth considering bringing a lawn chair or some other type of structure (e.g. ensolite or foam pad) to sit or lie on. You'll be craning your neck skyward a lot, and that may become uncomfortable.

GOOD LUCK!

## PEREGRINE NEST SITE MONITORING PROTOCOL

### **Information Needed**

Below is information you should try to gather at your site visits over the course of the breeding season. Expect to feel confused often, however, so don't worry if you aren't exactly sure of the falcons' activities every time you check on your site. You will most likely confirm what is going on at your next visit. If you continue to be confused, please contact Margaret to schedule a time when you can go to the site together):

- Presence of one or both adults, and distinguish male from female if possible – do this on your first visits of the season, making notes of plumage differences, band status, etc (use individual peregrine forms if that helps)
- Nesting activity – attempt to confirm incubation or hatch of young based on behavioral observations on EACH visit (see behavior section). You may also see signs of nest failure, and may have a pair that never nests.
- Feeding activity – note any prey transfers and feeding behavior
- Location of nest site – confirm at least once during breeding season, and either sketch a map or draw on site photo given
- Territorial behavior – note any interactions with other raptors, ravens, or vultures
- Human disturbance and/or violation of cliff closures – note any human activity on or near the cliffs and any effect it may have on the birds (see contact information page for reporting closure violations)

### **Data Collection Methods**

You may use the included data forms or keep notes in your own field notebook, and email a summary of your sightings after each visit. We recommend that you keep somewhat detailed notes of your observations to help us interpret any confusing behavior. At a minimum, we request that you report the following:

- Date, time, and length of your visit
- General behavioral observations, and any activity confirmed (ie, courtship, territorial behavior, prey exchanges, nest exchanges, hatching, fledging, nest failure, etc.)
- Any band information on adults, if possible (eg, which adults are banded, and the color and type of band on each leg)
- Disturbance and/or cliff closure violations
- If the nest attempt is successful, number (and sex, if possible) of young fledged

### **Suggested codes for various species:**

BAEA - bald eagle  
GOEA - golden eagle  
OSPR - osprey  
NOHA - northern harrier  
GOSH - northern goshawk  
COHA - Cooper's hawk  
SSHA - sharp-shinned hawk  
TUVU - turkey vulture

RTHA - red-tailed hawk  
RSHA - red-shouldered hawk  
BWHA - broad-winged hawk  
PEFA - peregrine falcon  
MERL - merlin  
AMKE - American kestrel  
CORA - common raven  
AMCR - American crow

**Suggested codes for male and female peregrines:**

M or ♂ for male

F or ♀ for female

**Reporting Requirements and Site Visit Frequency**

- Please send data forms or a summary of your observations after **EACH** site visit. Email to [fowle@nwf.org](mailto:fowle@nwf.org) or mail to Margaret Fowle, NWF, 58 State Street, Montpelier, VT 05602. You can also leave a voicemail message at 229-0650 x303. See contact information page for additional contacts.
- Plan to visit your site every 7-10 days for up to three hours per visit. Up to 14 days between visits for most sites is fine. If you are not able to return to a site in less than 14 days, PLEASE contact Margaret well in advance to see if someone can fill in for you.



## 2007 Vermont Peregrine Falcon Volunteer Data Form

(please use only 1 form per visit)

Date: 5/2/07 Site: Hawk Rock Observers: Kathy Wohlfert

Total miles to and from site: 8.34 Travel time (include hiking): 1 1/2 hr one-way

Observation start time: 9am  
Observation end time: 11:30 am

Total Observation time: 2 1/2 hrs

Total time invested (travel + observation): 5

Temperature (5-10 deg. ranges OK, i.e. 50-55F): 60-65

Precipitation (none, fog, drizzle, rain + any descriptors, i.e. heavy, light): haze dry

Cloud cover (choose one)	
overcast = >90% cover	
broken = 50-90% cover	
scattered = 10-50% cover	
clear = <10% cover	X

Wind (choose one)	
0-5 mph = low, calm	
5-10 mph = moderate	X
10-15 mph = strong	
15-20 mph = very strong	
>20 mph not recommended	

Observation Summary (fill in all that apply)		
Observed	Confirmed	Suspected
Single Bird		
Territorial Pair	X	
Courtship/Copulation		
Incubating		X
Hatched		
# Young		
Age of young		
Fledged		
Nest Failure		
Human Disturbance		

Record Observations here. Please use suggested codes for various species (list on other side)

TIME	SPECIES AND ACTIVITY
920am	Obsvd ♀ fly to 2003 eyrie. She rechopped then appeared to sit down.
925am	Obsvd ♂ perched in tree on ridge - dead birch in center of ridge line.
936am -	♂ walked Ax then flew out of sight to north ♀ remained sitting, preened, walked around, picked @ nest many times. She never appeared to sit longer than 2-3 minutes @ a time.
953	

**Observations Continued**

TIME	SPECIES AND ACTIVITY
1038am	♂ returned. Flew in from east, perched on favorite snag over <del>the</del> overhang. Waited a few times.
1046	♀ walk to edge of eyrie. Unbanded on both legs and very brown on breast with a mottled looking head. She looked around then went back to picking @ nest area; being fidgety.

Species Codes	
Bald Eagle	BAEA
Golden Eagle	GOEA
Osprey	OSPR
Northern Harrier	NOHA
Northern Goshawk	NOGO
Cooper's Hawk	COHA
Sharp-shinned Hawk	SSHA
Turkey Vulture	TUVU
Red-tailed Hawk	RTHA
Red-Shouldered Hawk	RSHA
Broad-winged Hawk	BWHA
Peregrine Falcon	PEFA
Merlin	MERL
American Kestrel	AMKE
Common Raven	CORA
American Crow	AMCR

**Remarks:**

Suspect female is @ start of incubation or laying eggs. Her colouring suggests a 1<sup>st</sup> yr. adult.

Please return via post, fax, or email to:

Kathy Wohlfort (Wohlfort@nwf.org) or Margaret Fowle (folwe@nwf.org)

National Wildlife Federation

58 State St.

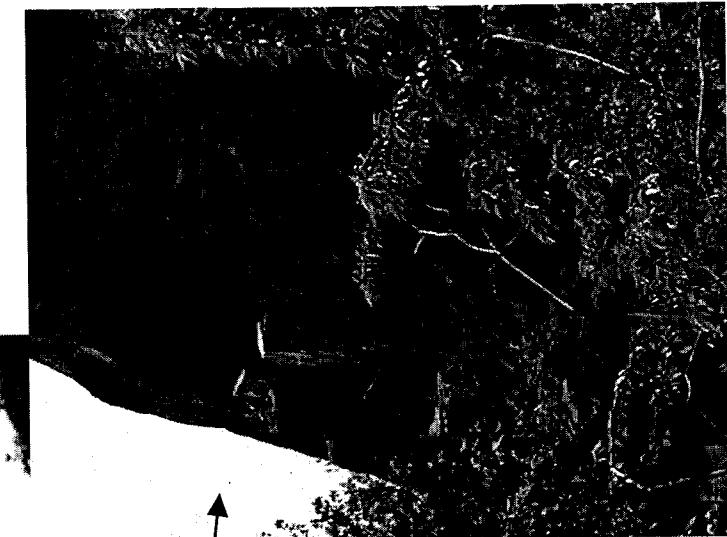
Montpelier, VT 05602

Fax: 802-229-4532



View looking north from Route 2, near Bolton town offices

↑ N

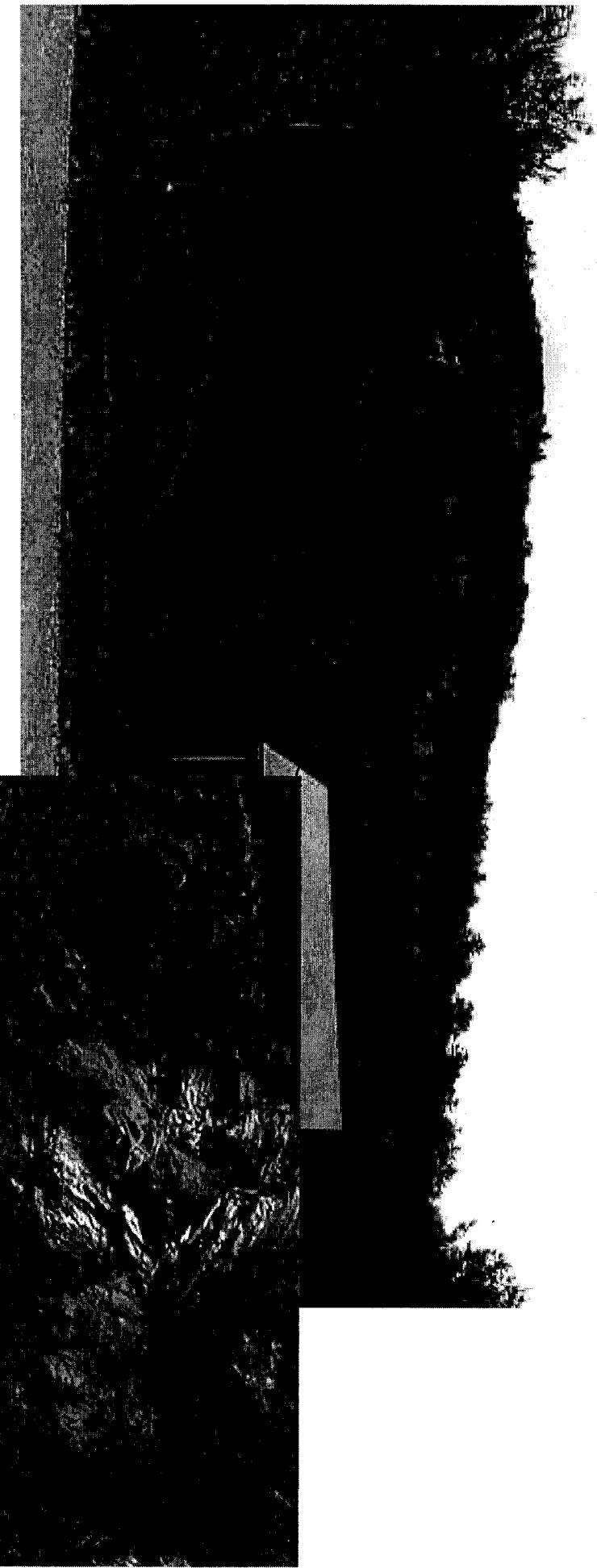


2001 eyrie

View from base of cliff, looking west from boulders at base

**Stimpson Hill (East Bolton Notch)**  
2001 eyrie location

N →



View from Murphy Road

Location of 2001 eyrie - behind rock and  
under overhang

**Wallace Ledge**  
Castleton, VT



Approx location of  
1998 eyrie - grassy ledge  
with cave

Approx location of 1997  
eyrie - open grassy ledge

Approx location of 2000 eyrie -  
large ledge with some cover

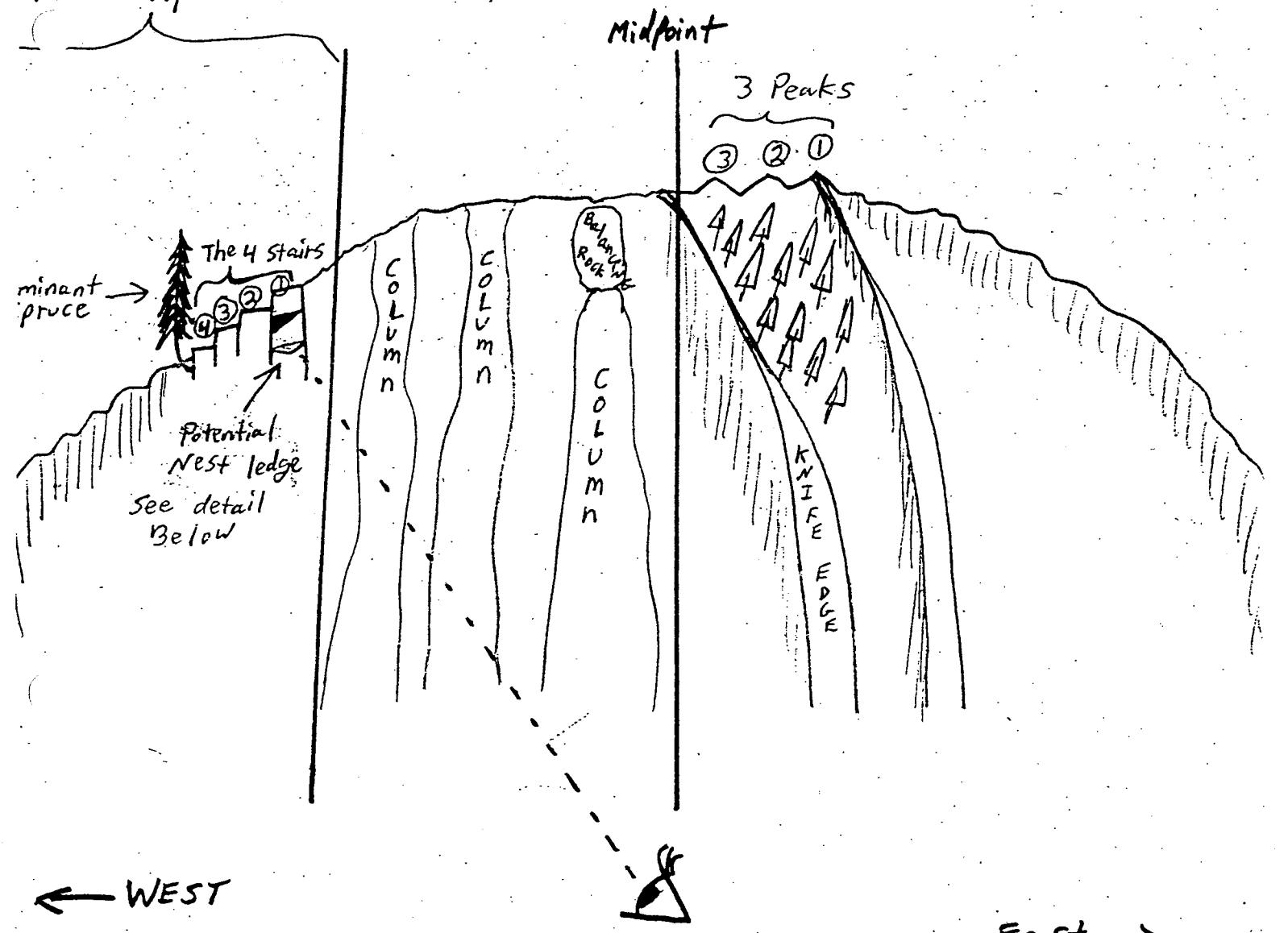
N

View of central and eastern cliff from wetland at base of cliff

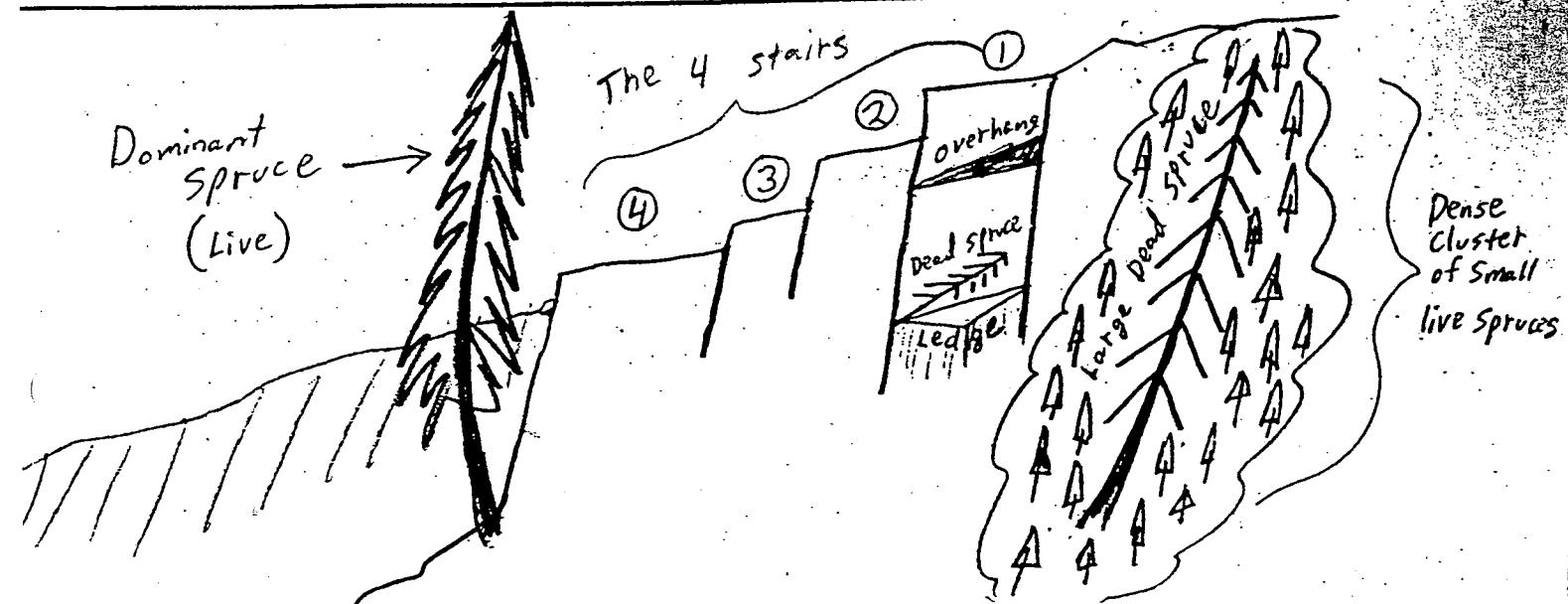
**Nebraska Notch**  
Underhill, VT

Potential Nest Ledge Location, Brousseau Mtn.

West 1/4



Best viewed from midpoint of boulder field looking West.



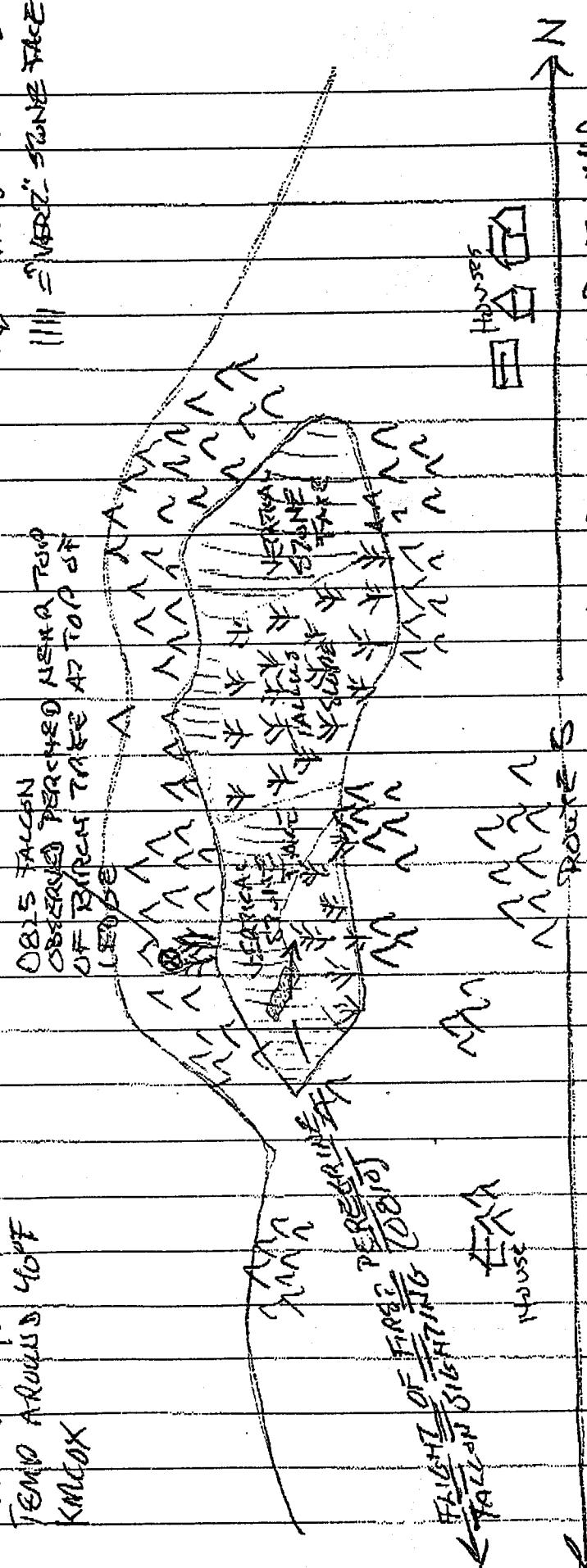
To: Steve F  
Marg. F  
From S. Parcen

# Maps needed for All sites

Sketches Water WMA As Viewed From Old Connecticut River Right

7 April 1998

OBOS - OBO30  
CLEAR SKIES, SUNNY  
TEMP AROUND 40°F  
KNOWX



XMAS TREE ORGANIZATION  
AND TRAILBED CROWN FRIENDS

ALOT OF REURNING DOWZES AND  
CROWN THE CROWN SEEN! ALSO  
SEED DOWZES AND WATER  
AND STEET WATER BUBLES:  
CANADIAN GEESE  
MACARAS  
BLUED DUCKS  
RING-NECKED DUCKS  
GREEN-WINGED TEAL

SAMPLE

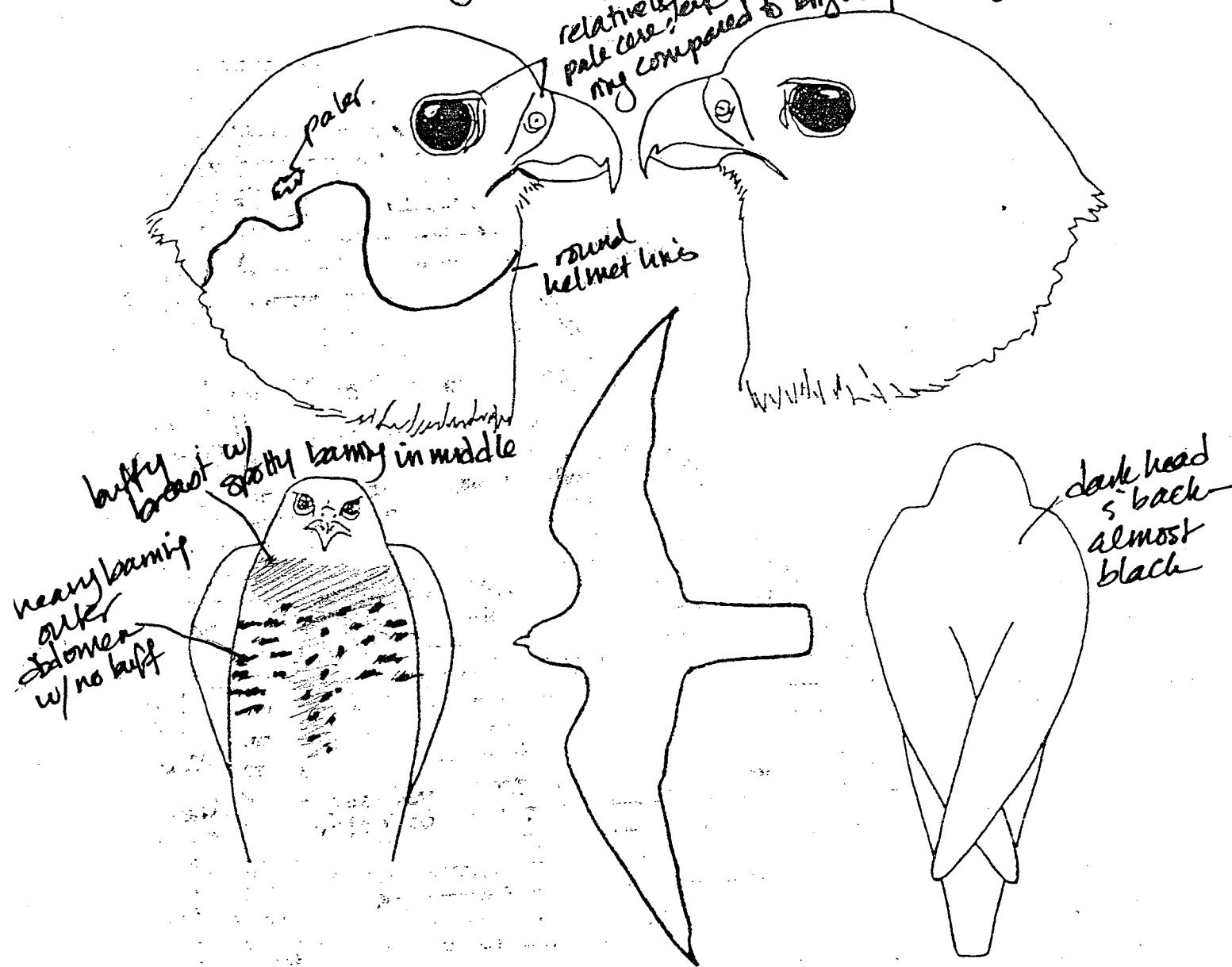
Individual Peregrine Falcon Identification Form

(rev. 3/96)

Location: BIRD MT

Observer: Magnific Falcon

Date(s) observed: Spring → Summer 1997



Plumage:  adult  
 transitional  
 immature

Sex:  male  
 female  
 unknown

Banded:  yes  
 no  
 unknown

Banding detail: right leg         
                    left leg       

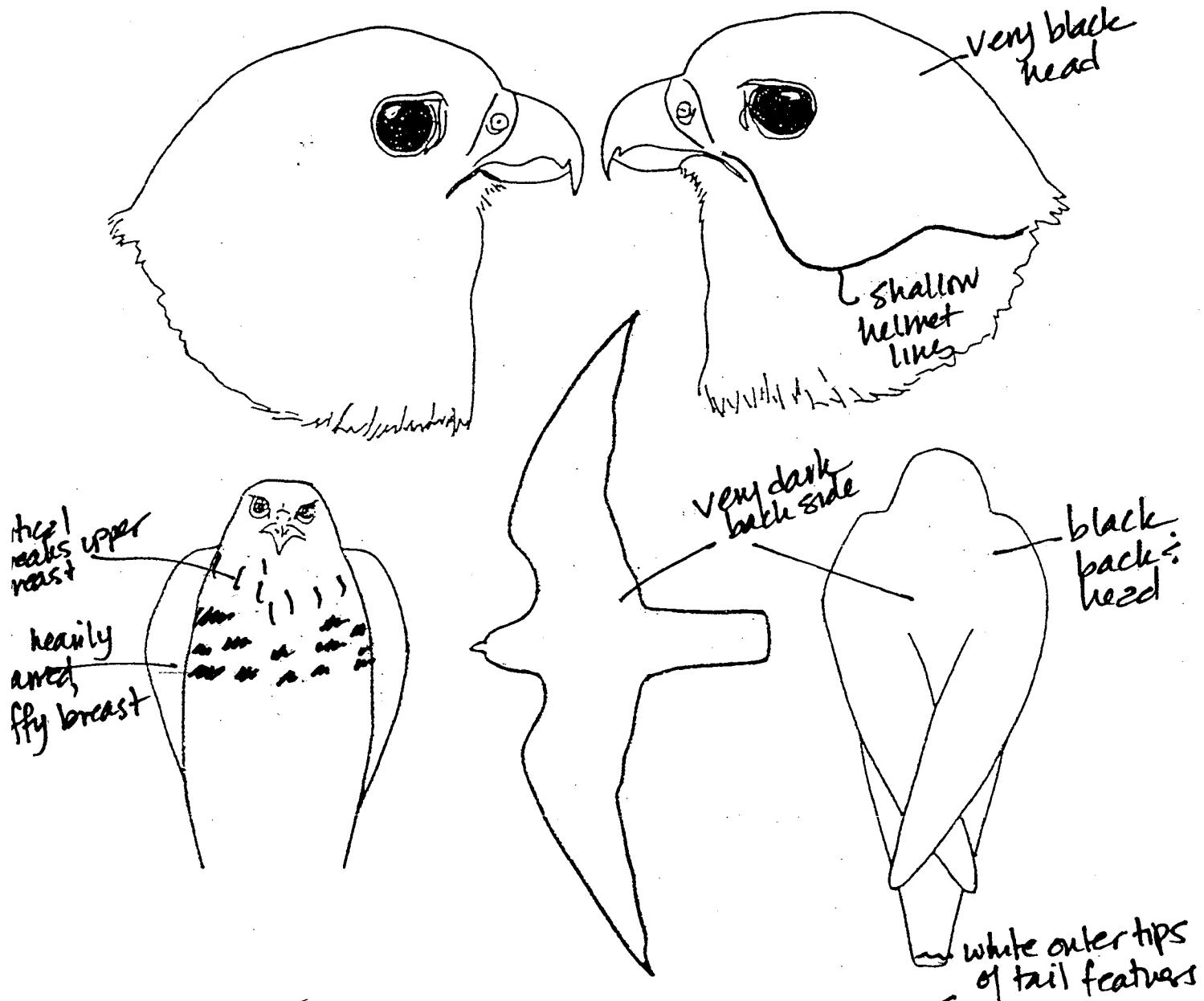
Other identifying characteristics:

# Individual Peregrine Falcon Identification Form

(rev. 3/96)

Location: DEER LEAP Observer: MARGARET FOWLE

Date(s) observed: 7.3.97, 7.17.97



Plumage:  adult  
 transitional  
 immature

Sex:  male  
 female  
 unknown

Banded:  yes  
 no  
 unknown

Banding detail: right leg Silver USFWS band  
left leg Black/red alphanumeric band - seems faded

Other identifying characteristics: Very big bird



Standard USFWS  
Aluminum Band

Alphanumeric Band  
Black "G" over Red "R"  
\*sideways

Standard USFWS  
Aluminum Band

Alphanumeric Black "1"  
over Red "E"  
\*sideways

## **ATTENTION HIKERS & CLIMBERS**

**CLIFF ACCESS **CLOSED**  
BEYOND THIS SIGN**

**March 15 – August 1**

### **Sensitive Species**

#### **NESTING PEREGRINE FALCONS**

Peregrine Falcons are highly sensitive during nesting.

Your presence could lead to abandonment of the young and the death of young falcons. An upset peregrine will fly around the cliff, calling "cack-cack-cack!"

The continued recovery of this species may depend on you.

Please help protect this sensitive species.

*Disturbance of Peregrine Falcons violates federal laws.*

*Penalties may include fines of up to \$15,000 and 6 months in jail.*

*Please report any harassment of nesting peregrines to*

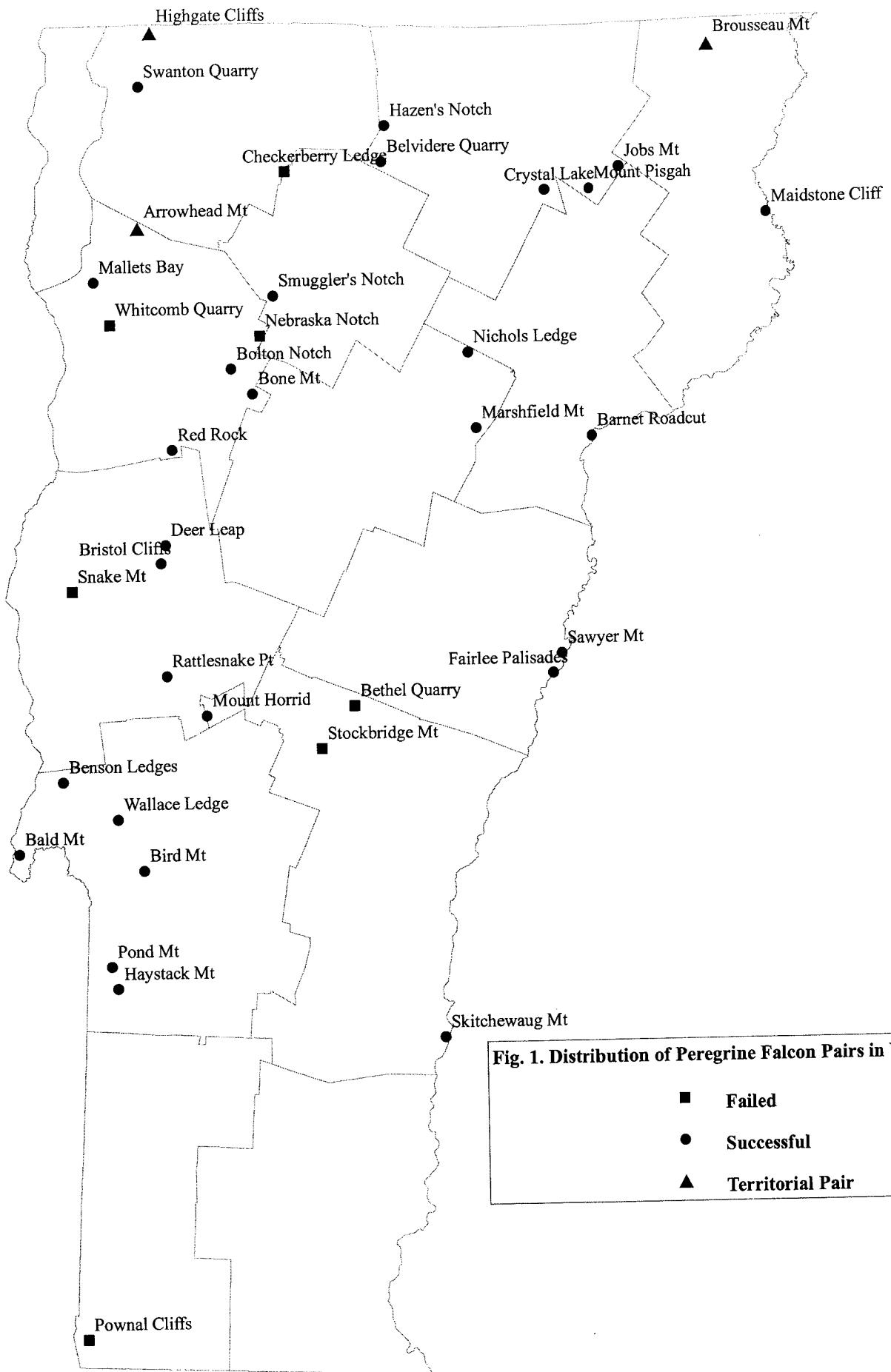
**1-800-75 ALERT as soon as possible.**

Partners in Falcon Protection:

The National Wildlife Federation, VT Fish & Wildlife, U.S. Fish & Wildlife Service



For more information on additional cliff closures in Vermont, please call The National Wildlife Federation (802) 229-0650 or visit [www.vtfishandwildlife.com](http://www.vtfishandwildlife.com)



**Fig. 1. Distribution of Peregrine Falcon Pairs in Vermont, 2009.**

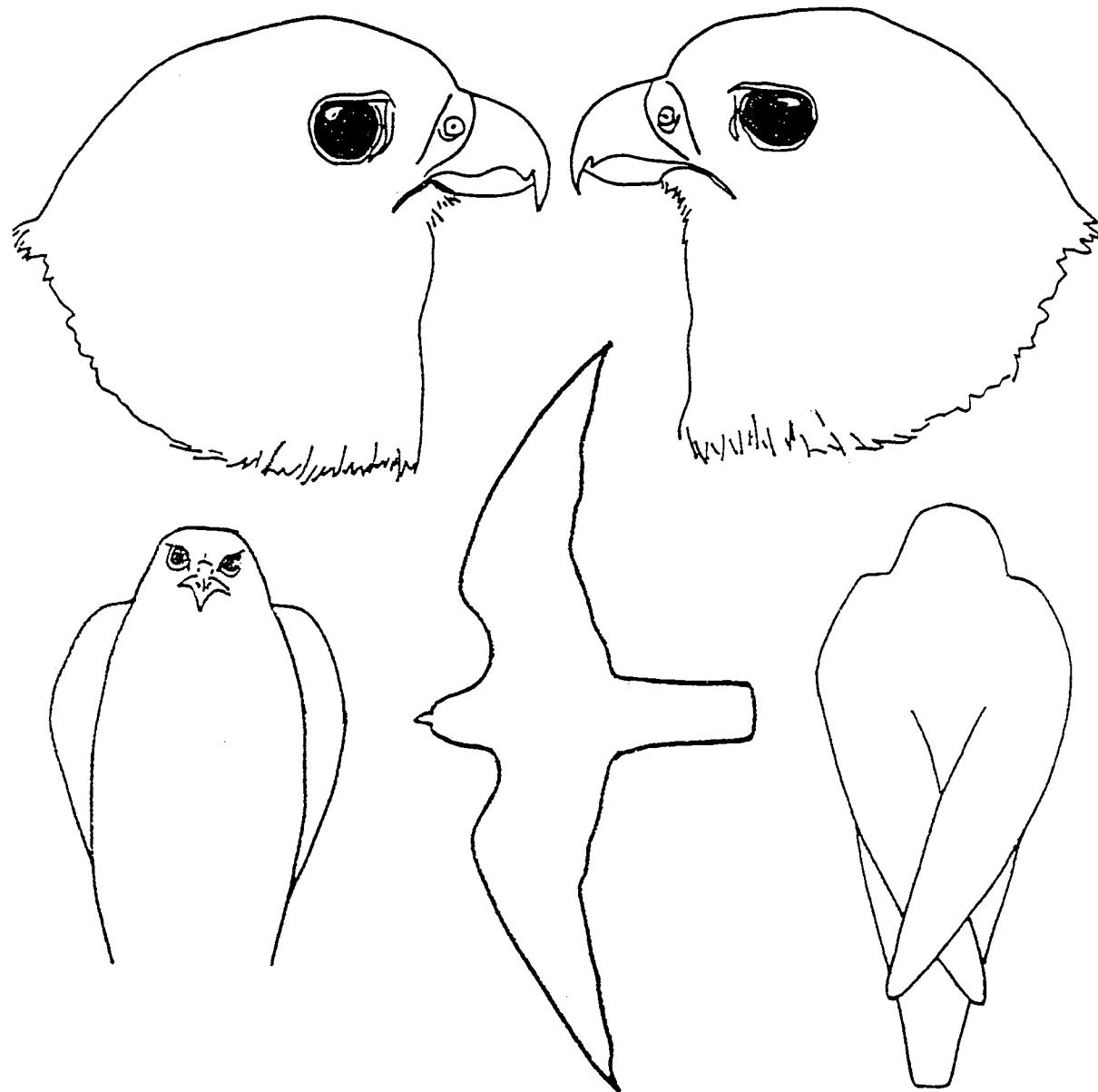
- Failed
- Successful
- ▲ Territorial Pair

# Individual Peregrine Falcon Identification Form

(rev. 3/96)

Location: \_\_\_\_\_ Observer: \_\_\_\_\_

Date(s) observed: \_\_\_\_\_



Plumage:  adult  
 transitional  
 immature

Sex:  male  
 female  
 unknown

Banded:  yes  
 no  
 unknown

Banding detail: right leg \_\_\_\_\_  
left leg \_\_\_\_\_

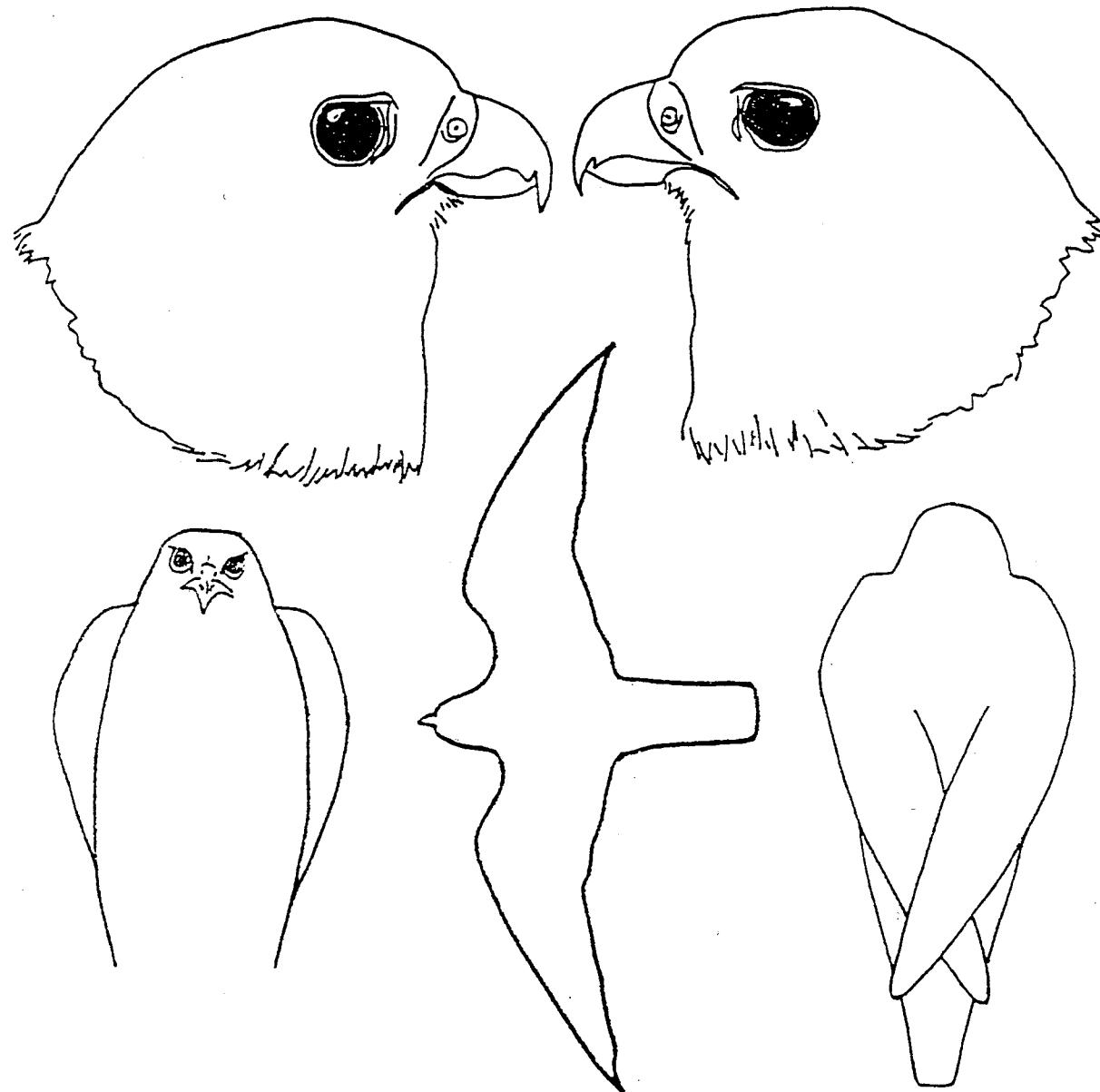
Other identifying characteristics: \_\_\_\_\_  
\_\_\_\_\_

# Individual Peregrine Falcon Identification Form

(rev. 3/96)

Location: \_\_\_\_\_ Observer: \_\_\_\_\_

Date(s) observed: \_\_\_\_\_



Plumage:  adult  
 transitional  
 immature

Sex:  male  
 female  
 unknown

Banded:  yes  
 no  
 unknown

Banding detail: right leg \_\_\_\_\_  
left leg \_\_\_\_\_

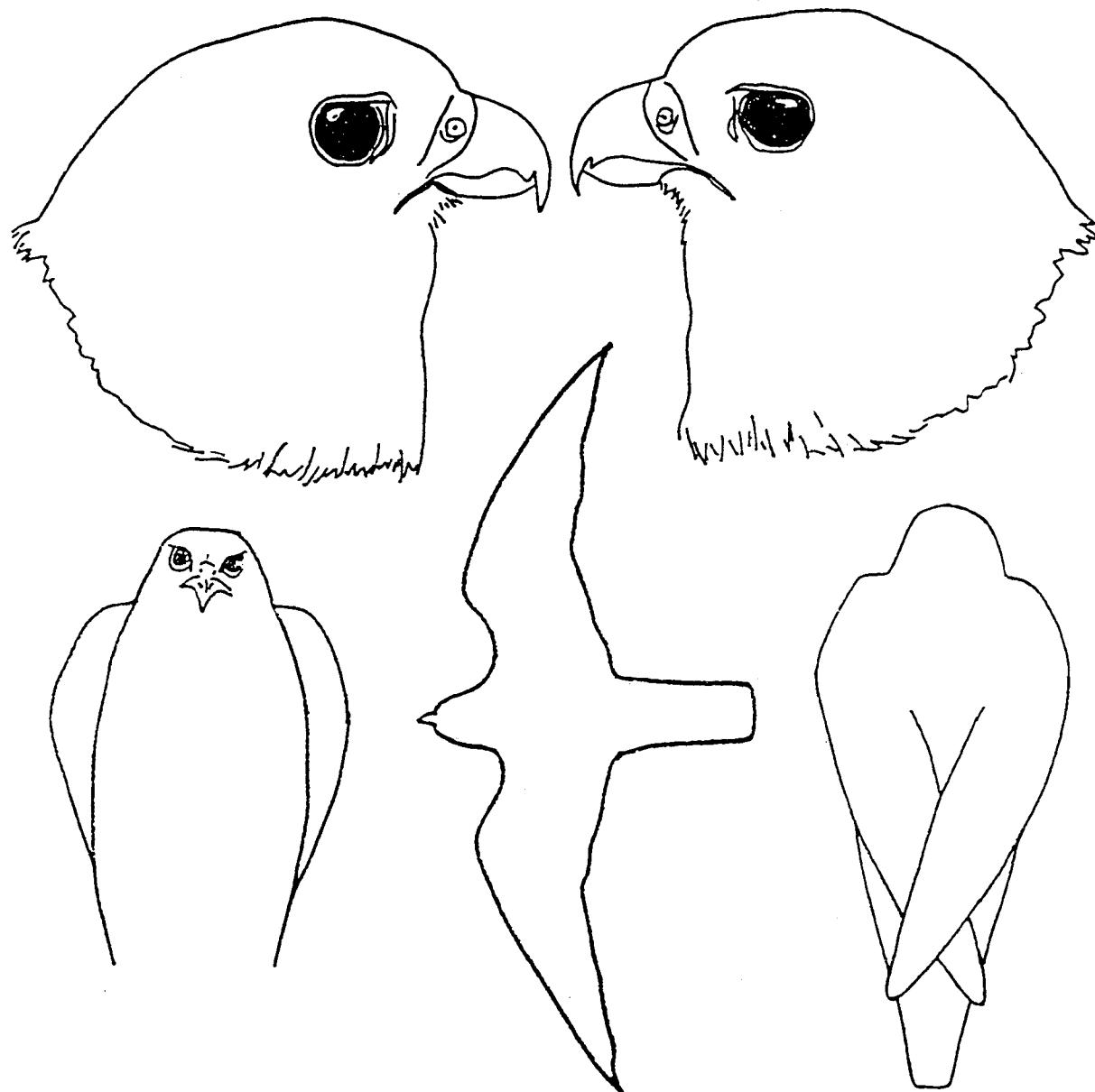
Other identifying characteristics: \_\_\_\_\_  
\_\_\_\_\_

# Individual Peregrine Falcon Identification Form

(rev. 3/96)

Location: \_\_\_\_\_ Observer: \_\_\_\_\_

Date(s) observed: \_\_\_\_\_



Plumage:  adult  
 transitional  
 immature

Sex:  male  
 female  
 unknown

Banded:  yes  
 no  
 unknown

Banding detail: right leg \_\_\_\_\_  
left leg \_\_\_\_\_

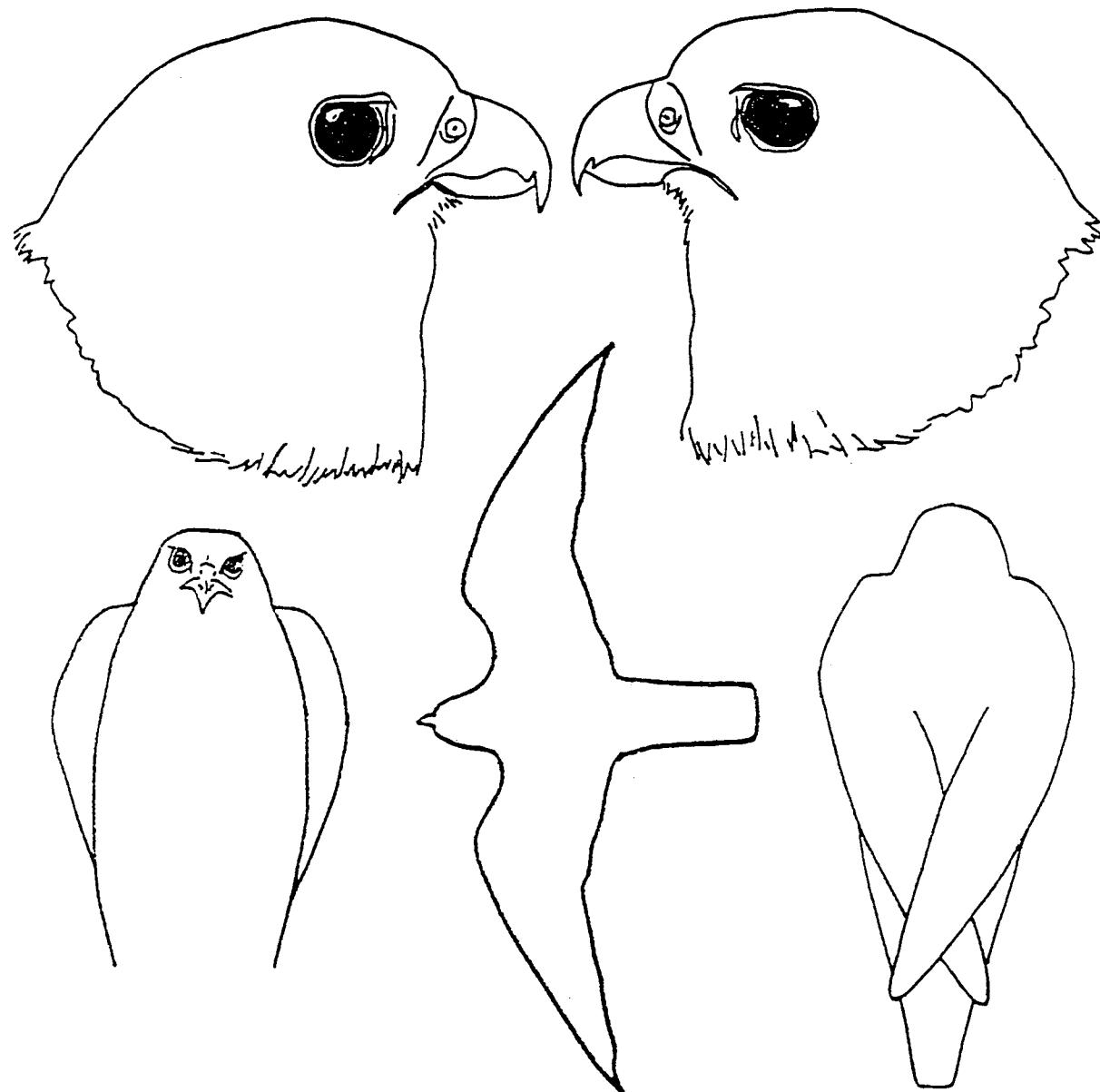
Other identifying characteristics: \_\_\_\_\_  
\_\_\_\_\_

# Individual Peregrine Falcon Identification Form

(rev. 3/96)

Location: \_\_\_\_\_ Observer: \_\_\_\_\_

Date(s) observed: \_\_\_\_\_



Plumage:  adult  
 transitional  
 immature

Sex:  male  
 female  
 unknown

Banded:  yes  
 no  
 unknown

Banding detail: right leg \_\_\_\_\_  
left leg \_\_\_\_\_

Other identifying characteristics: \_\_\_\_\_  
\_\_\_\_\_