

Cover Sheet

**Vermont Endangered and Threatened Species Recovery Plan**

Species: Peregrine Falcon (*Falco peregrinus*) 26 October 2000

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ESC Chair

Signature below indicates acceptance of this Endangered and Threatened Species Recovery Plan by the **Agency of Natural Resources (ANR)**.

signature: Steph Johnson date: 12/15/00  
Secretary, ANR

# **VERMONT PEREGRINE FALCON RECOVERY PLAN**

Margaret R. Fowle  
National Wildlife Federation  
Northeast Natural Resource Center  
Montpelier, Vermont 05602

In conjunction with: Nongame and Natural Heritage Program  
Vermont Department of Fish and Wildlife  
Waterbury, Vermont 05671

## **Vermont Peregrine Falcon Recovery Team:**

Margaret R. Fowle

Steven G. Parren  
Nongame and Natural Heritage Program  
Vermont Department of Fish and Wildlife  
Waterbury, Vermont 05671

Steven D. Faccio  
Vermont Institute of Natural Science  
Woodstock, Vermont 05091

Douglas W. Blodgett  
Vermont Fish and Wildlife Department  
Pittsford, Vermont 05763

and

Job C. Heintz  
Vermont Natural Resources Council  
Montpelier, Vermont 05602

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# VERMONT PEREGRINE FALCON RECOVERY PLAN

## EXECUTIVE SUMMARY

The peregrine falcon (*Falco peregrinus*) is a medium-sized hawk that nests on cliffs throughout Vermont. The peregrine was listed as a federally endangered species in 1970, after a dramatic decline in the mid-1900s due to the deleterious effects of the pesticide DDT. Peregrines were listed as a Vermont endangered species in 1972, when there were no longer any peregrines nesting in the eastern U.S. Peregrine falcons were removed from the federal Endangered Species List in August, 1999.

This recovery plan outlines the status and life history of Vermont peregrine falcons and reviews current monitoring, management, and public education efforts. A recovery goal of 24 territorial pairs averaged over 5 consecutive years, with sufficient productivity to maintain population stability (average 1.5 fledglings per territorial pair) is recommended to allow consideration of this species for delisting statewide.

Historically, there were 32 cliffs documented with photographs and/or notes where peregrines were known to breed in Vermont, although there were as many as 59 different sites that may have been used at various times during the late 1800s and early 1900s. The Vermont population suffered declines before the DDT era, due primarily to egg collection. DDT was used widely in Vermont in the 1940s. The last documented nesting occurred in southeastern Vermont in 1957, and the last sighting of a wild peregrine in the eastern US was in northeastern Vermont.

Recovery efforts began in Vermont in the 1980s, and 93 captive-bred birds were released from 3 hack sites from 1982-1987. The first successful natural nesting attempt occurred in 1985 at Mount Pisgah, and since then the population has increased steadily, with a current population of 23 territorial pairs. The average rate of productivity of peregrines in Vermont is 1.6 fledglings per territorial pair. Ongoing conservation efforts, including monitoring, protecting breeding sites, research, and public education, have helped to promote positive population trends. Current availability of suitable breeding habitat is believed sufficient to support the statewide recovery goal of 24 pairs.

The recovery of Vermont's peregrine falcon population requires a combination of monitoring, enforcement of legal protection, management, research, education, developing and maintaining partnerships, and fundraising. This plan outlines and prioritizes the specific strategies designed to achieve the recovery goals. Many of these have already been implemented and are ongoing. The cooperation and active participation of numerous interest groups and individuals will be essential

to achieving the recovery goals. Continued and expanded education of all groups whose activities overlap with or potentially impact the species will be critical to the successful recovery of peregrines in Vermont.

## **1. INTRODUCTION**

The peregrine falcon (*Falco peregrinus*) has returned to the eastern U.S. and its recovery in Vermont is well underway. Peregrines were removed from the federal list of endangered and threatened species on August 25, 1999 because they had met or exceeded their regional recovery goals. Currently, peregrine falcons are federally protected from hunting and other forms of “take” by the Migratory Bird Treaty Act. The state of Vermont continues to list the peregrine falcon as a state endangered species, under the protection of the Vermont Endangered Species Act.

Many challenges remain to ensure that the recovery of the peregrine falcon is sustained in Vermont and the region. The responsibilities now fall on the States to manage peregrine falcon populations locally and regionally, and it is necessary to develop an appropriate program that continues to monitor, manage, and protect breeding sites in Vermont.

Although federal recovery goals have been met for peregrine falcons in the Northeastern Recovery Region 2, which includes Vermont, Vermont biologists remain concerned that delisting will significantly reduce USFWS financial support and the public’s concerns for peregrines in the wild. Without adequate funding and the protection of the Endangered Species Act (ESA), our ability to monitor nesting success and properly manage and protect breeding habitat will be limited. Human disturbance at nesting sites could increase with the loss of endangered species status protection, reduced monitoring, and lessened educational effort. Furthermore, we are concerned that peregrine populations in Vermont and the region will also be threatened by removing the current ban on permits for the take of peregrines for falconry. A possible negative effect of the federal delisting of the peregrine falcon is that it conveys the message that the work to recover this species is complete, despite continuing threats to the peregrine’s viability in the wild. We must therefore continue our monitoring, protection of breeding sites and individual birds themselves, and public outreach efforts in Vermont to ensure the peregrine’s sustained recovery.

This recovery plan attempts to address concerns stemming from the recent federal delisting of the peregrine falcon by developing management guidelines and establishing recovery goals for this state-endangered species.

## **2. BACKGROUND**

### **2.1. Species Description**

The peregrine falcon is one of 6 North American species in the genus *Falco* of the family Falconidae in the order Falconiformes. There are 3 recognized subspecies of *F. peregrinus* in

North America: American peregrine falcon (*F. p. anatum*), Arctic peregrine falcon (*F. p. tundrius*), and Peale's peregrine falcon (*F. p. pealei*). The current population in the eastern U.S. is considered an intercross of various American and European subspecies, including *F. p. anatum*, *tundrius*, *peregrinus*, *pealei*, and *brookei* (USFWS 1999).

Peregrine falcons are medium-sized hawks with long pointed wings and streamlined bodies. Female peregrines weigh an average of 950 grams and are larger than the males, which weigh approximately 610 grams. Adult peregrines generally have slate-gray wings and backs and pale undersides with horizontal bars and spots. Their heads are usually black with a black stripe, or sideburn, on each malar area. Their feet, cere, and area around the eyes are bright yellow. Immature birds are generally more brown and have vertical barring on the breast, where adults have horizontal barring. Young falcons retain their immature plumage their first year, and generally molt into adult plumage at 10-12 months (Ratcliffe 1993, USFWS 1998a).

## **2.2. Distribution**

One of the most widespread and cosmopolitan avian species in the world, the peregrine falcon is found on all continents except Antarctica and nests from the arctic regions of North America, Greenland, and Eurasia as far south as South America, Cape Horn, and Tasmania. Peregrines inhabit mountain ranges, river valleys, and coastlines. Throughout their range, these falcons vary a great deal in plumage and body size, and form various races or subspecies (Hickey and Anderson 1969). In North America, *F. p. anatum* occurs throughout most of the continent, *F. p. tundrius* nests in the arctic tundra regions of Canada, and *F. p. pealei* is a non-migratory race that occurs in the maritime regions of northwestern United States and Canada (Hickey 1942, Hickey and Anderson 1969, USFWS 1998a).

## **2.3. Annual Cycle**

Peregrines in northern climates show a great deal of variation in their migratory behavior. Historically, the American Ornithologists's Union (1886) described the winter range of peregrines as the whole of North America. Eastern peregrines may migrate depending on the availability of prey, but are occasionally found in the vicinity of their nesting cliffs throughout the winter (Hickey and Anderson 1969, LaBarr and Rimmer 1990, USFWS 1991). Winter residents were recorded in Pennsylvania, New York, New Jersey, and Massachusetts in the mid-1900s (Schueck et al. 1989), and have been observed in northern New England in recent years (LaBarr and Rimmer 1990, Corser and Rimmer 1993, Corser et al. 1994, 1995, 1996, Fowle et al. 1997). In other parts of their range, southerly peregrines tend to be non-migratory, while northern birds may travel great distances.

## **2.4. Food and Feeding Behavior**

The diet of peregrine falcons consists entirely of birds. Peregrines are specifically adapted for high speed pursuits, and usually hunt their prey in flight. They stoop at speeds estimated up to

200 mph from high altitudes to kill their prey with a direct blow of their closed talons.

Peregrine falcons normally hunt prey on the basis of their availability, and thus prey species vary with the peregrine's geographical location and with the time of year. During the nesting season, northeastern peregrines feed primarily on medium-sized songbirds such as rock doves (*Columbia livia*), mourning doves (*Zenaida macroura*), blue jays (*Cyanocitta cristata*), northern flickers (*Colaptes auratus*), and red-winged blackbirds (*Agelaius tricolor*), ranging in weight from 50 to 100 grams (USFWS 1991, Ratcliffe 1993). A study of prey items collected in Vermont and New Hampshire indicated that mourning and rock doves comprised the majority of peregrines' diets during the breeding season; however, smaller passerines formed higher percentages of the diet of peregrines nesting in the White Mountains than those in other ecoregions in Vermont and New Hampshire (Corser et al. 1999). During migration and in the winter, peregrines feed on passerines, shorebirds, waterfowl, and other larger birds (USFWS 1991, Ratcliffe 1993).

## **2.5. Habitat Requirements**

The basic habitat requirements for peregrine falcons are open areas for hunting, adequate supply of food, and steep rocky cliffs for nesting (Ratcliffe 1993). North American peregrines typically nest on large cliffs, where pairs create a depression, or scrape, on the ledge substrate. In urban areas, peregrines will also nest on the ledges of skyscrapers, towers, and bridges.

Peregrine falcons use a variety of nesting cliffs. Suitable nesting cliffs have been defined as those that are usually at least 30 meters high, steep, have adequate horizontal ledges, and offer protection from mammalian predators, weather, and human disturbance. Historically, peregrines preferred the most remote and tallest cliffs; in general, height and protection from frequent human disturbance appeared to determine a cliff's suitability for annual occupation (Hickey 1942, Ratcliffe 1993). Hickey (1942) classified nesting cliffs into 3 classes, with the first class being the highest and longest span of cliff, usually situated over water, and the third class the smallest and most vulnerable to human disturbance. Hickey (1942) noted that peregrines consistently chose first class cliffs no matter how many nest attempts failed or were disrupted by disturbance, or how many adults were lost. Low levels of disturbance, however, may be enough to cause abandonment of third class cliffs. With the recent expansion of the North American peregrine population, however, peregrines appear to be choosing to nest cliffs considered third class, including many more human-made structures, and their tolerance to human presence is highly variable (Ratcliffe 1993).

Cliff nest ledges should be large enough to hold 4 nestlings and may have some low vegetation, an overhang to protect from harsh weather and falling rocks or ice, and steep faces above and below. Peregrines tend to use ledges that have been used previously by other peregrines, and will often use old common raven (*Corvus corvax*) nests, which are usually located under large overhangs (Ratcliffe 1993).

Humans on or above a cliff may interrupt incubation and can cause peregrines to desert their

nest. Peregrines nesting on the steepest and tallest cliffs appear to be less affected by human presence below the cliff than peregrines nesting on smaller cliffs (Hickey 1942, Ratcliffe 1993, Cade et al. 1996). Compared to the western U.S., nesting cliffs are less remote in the East, and eastern populations of nesting peregrines are especially vulnerable to human disturbance.

## **2.6. Nesting and Chick-rearing**

Generally, peregrine falcons reach sexual maturity at 2 years of age, but yearlings occasionally nest successfully. In the northeastern U.S., peregrine falcons begin their nesting season in late winter. Often the same pair of falcons will use the nesting cliff year after year. Pairs will actively defend their nesting sites and will aggressively chase away large birds such as ravens, hawks, turkey vultures (*Cathartes aura*), and osprey (*Pandion haliaetus*). Once a ledge is chosen, the female lays a clutch of 2 to 4 eggs, which hatch in approximately 30 to 35 days. Both members of the pair share in incubating the eggs and caring for the young. The female performs most of the incubation, while the male provides food and incubates when the female eats and rests (USFWS 1991, Ratcliffe 1993).

In Vermont, nesting usually begins in mid- to late April, but has been documented as early as late March and as late as late May. If a pair's nesting attempt fails in the early stages of incubation, it may renest about 3 weeks later. Renesting rarely occurs after first clutches are incubated for the full term or young are lost (Ratcliffe 1993).

Most peregrine chicks hatch in mid-May in Vermont. Adults brood their young for their first 2 weeks of life and then perch nearby to guard the ledge from potential predators. Once the nestlings are about 3 weeks old, they begin to grow their flight feathers (Cade et al. 1996). Young generally fledge at approximately 40 days old, and remain dependent on their parents for food for several weeks after fledging (Ratcliffe 1993, Cade et al. 1996). Nestling mortality may result from disease, birth defects, starvation due to inadequate parental care, severe weather, accidents at the eyrie, competition with other nestlings, and predation (Ratcliffe 1993).

Typically, in years when peregrines are not subject to human disturbance or pesticide poisoning, approximately 1.0 to 1.5 peregrines are produced per territorial pair per year (Newton 1988). In addition, adverse weather, age and experience of breeding adults, and density dependent factors can all affect the productivity of peregrine falcon populations (Corser et al. 1999). Fledglings experience the highest mortality rate in their first year, with only 50% estimated to survive into their second year (Ratcliffe 1993); once peregrines have fledged, however, they rarely succumb to disease and are no longer vulnerable to predation (Newton 1988).

## **3. POPULATION TRENDS**

### **3.1. History of the American Population and Its Decline**

Peregrine falcons suffered significant declines beginning in the 1940s, due to the indiscriminate

use of the pesticide DDT. Before 1940, there were an estimated 3,875 pairs of breeding peregrine falcons in North America (USFWS 1998b). As many as 350 pairs were estimated to hold territories in the eastern U.S. (Hickey 1942).

In 1800s and early 1900s, prior to the DDT-induced decline, eastern peregrine populations began to decline primarily due to egg collection, nestling collection by falconers, and intentional shooting (Herbert and Herbert 1969). In most areas, shooting of adult peregrines was thought to have caused the most significant mortality (USFWS 1991). Rice (1969), however, estimated that egg collectors reduced Pennsylvania's peregrine population by 33%. In Vermont, 53 clutches of eggs were collected from 1920 to 1934, and many of Vermont's nesting cliffs were deserted by 1940 (Hickey 1942). In Massachusetts, at least 49 clutches were taken from 1 eyrie from 1864 to 1931, and as many as 3 clutches were taken in 1 breeding season (Rice 1969).

Beginning in the late 1940s, all eastern populations were showing significantly reduced productivity and high rates of nest site abandonment, due primarily to the use of DDT. The trend continued so that by the mid-1950s, eastern populations had decreased significantly, and by 1964 were almost extinct. By 1970, the *anatum* and *tundrius* races were nearly extirpated, with only 10 to 20% of the historical population surviving. Although the decline was nearly global, the eastern U.S. and European populations suffered the greatest declines. The last known nesting attempt in the East occurred in 1957, and the last young falcons were observed in the upper Mississippi River area in 1962 (USFWS 1991). In 1964, Hickey organized a survey to document the decline in North America and did not find a single occupied cliff in the eastern states or Canadian maritime provinces. The last known sighting of a wild adult peregrine at an eastern nesting cliff occurred at Mount Pisgah in Vermont in 1970 (Laughlin and Kibbe 1985).

The *anatum* and *tundrius* subspecies of the peregrine falcon were listed as federally endangered in 1970, and the *anatum* subspecies was listed as a state endangered species in Vermont in 1972. Listing the peregrine falcon as an endangered species under the federal Endangered Species Act (ESA) set the stage for recovery. With the banning of DDT, and with extensive captive breeding and reintroduction programs developed by the Peregrine Fund and USFWS under ESA recovery plans, peregrine falcon populations were reestablished in the U.S. and Canada.

Under the ESA, the U.S. Fish and Wildlife Service (USFWS) and its recovery teams produced 4 regional recovery plans for the peregrine falcon in the Alaskan, Pacific Coast, Southwest and Rocky Mountain, and Eastern regions of the United States, and the Canadian Wildlife Service produced a recovery plan for the *anatum* subspecies in Canada. Each region developed recovery objectives specific to the region, but all included the release of captive-bred young to historic nesting sites (excluding Alaska), the protection and enhancement of critical breeding habitat, identification and preservation of wintering habitat, increasing and maintaining productivity in the wild, preventing human disturbance to nesting sites, and identifying causes of mortality and reduced productivity (USFWS 1998c). The combined breeding population goal for the United States and Canada was 631 pairs. Section 6 of the ESA allocated funds to implement the plans (USFWS 1999).

### **3.2. Historic Population in Vermont**

Historically, there were as many as 59 different sites that may have been used at various times by peregrines in Vermont during the late 1800s and early 1900s (Laughlin and Kibbe 1985), and there were 32 cliffs documented with photographs and/or notes where peregrines were known to breed (Spofford 1975, Faccio and Corser 1995). Historic peregrine nest sites are located in all of Vermont's biophysical regions, which include the Champlain Valley, Northeastern Highlands, and Northern and Southern Green Mountains, Northern and Southern Vermont Piedmont, the Taconic Mountains, and the Vermont Valley. These sites have been well documented by egg collectors and falconers.

The Vermont population suffered declines before the DDT era. Due to egg collection, the Rutland County population was reduced by 30% in the 1930s (Laughlin and Kibbe 1985), and there were many deserted eyries in Vermont by 1940 (Hickey 1942). Pesticides were commonly used in Vermont during the 1940s. The last documented nesting occurred in the Taconic Mountains in southeastern Vermont in 1957, and a male peregrine seen at Mount Pisgah in Westmore in 1968 and 1970 may have been the last wild member of the eastern population (Laughlin and Kibbe 1985).

### **3.3. Current Population Trends**

Recovery efforts began in Vermont in the 1980s. Ninety-three captive-bred birds were released from 3 hack sites in Vermont from 1982 to 1987. The first successful natural nesting attempt occurred in 1985 at Mount Pisgah in Westmore, and since then the population has increased steadily (Figs. 1&2). In 1999, Vermont's population reached a post-DDT high of 23 territorial pairs, nearly doubling the 1991-1996 population of 12 pairs. The average rate of productivity in Vermont is 1.61 fledglings per territorial pair (Table 1).

Since 1984, the number of young fledged per year in Vermont has fluctuated a great deal, due to a variety of reasons. There is much variation in the suitability of nesting cliffs and in the levels of human disturbance at each nest site. In addition, turnover of members of pairs and extreme weather conditions have affected nest success. The 1996 and 2000 nesting seasons, which had some of the coldest springs on record, had 75% and 82% nesting success rates, respectively (Corser et al. 1996) (Table 1), whereas 1994 and 1999, both mild years, had 100% and 90% success rates, respectively (Corser et al. 1994, Fowle et al. 1999). In some years, there has been a predominance of subadult pair members, which generally show poor nesting success (Ratcliffe 1993). New pairs are often inexperienced, and it is possible that there is a high rate of chick predation at some sites. However, the average rate of productivity of 1.61 fledglings per territorial pair is high enough to sustain the population. A population with a rate below 0.7 fledglings per pair is considered at risk of decline (Cade et al. 1997).

Since recovery efforts began, we have observed some loss of breeding adults either in recoveries

of injured birds or in the replacement of pair members at breeding territories. These losses, however, do not appear to be preventing the expansion of the population. In 1992, for example, when the population increased by 4 pairs, 3 territorial peregrines were replaced at nesting territories (Gaine and Rimmer 1992). Similarly, in 1999, when the population increased by 4 pairs, 3 adult pair members were replaced either by adults or subadults and 3 adults were recovered injured (Fowle et al. 1999), suggesting that although there may be adult mortality in the population, it does not appear to be preventing population growth.

#### **4. THREATS AND LIMITING FACTORS**

Current potential threats to peregrines are direct human disturbance to nesting birds, environmental contamination, predation, and loss of habitat (USFWS 1991). Of these, human disturbance appears to be the primary threat to peregrines nesting in Vermont.

##### **4.1. Human Disturbance**

Human disturbance may take on a number of forms, including recreational hiking and climbing, illegal shooting, egg collecting, take for falconry, wildlife photography, private and military aircraft flights, logging, and ridgeline development. In Vermont, most disturbance is caused by human recreational activity at the tops of nesting cliffs. Human presence on or near a cliff during the nesting season causes interruptions in the breeding process; regular disturbance to nesting pairs can cause nest abandonment and thereby reduce productivity.

There have been disturbance issues recorded at 13 Vermont sites since recovery efforts began, although many had visible trail closure signs posted at the tops of cliffs. Disturbance has been documented at Bald Mountain, Bolton Notch, Brousseau Mountain, Deer Leap, Fairlee Palisades, Haystack Mountain, Marshfield Mountain, Mount Horrid, Pond Mountain, Nebraska Notch, Rattlesnake Point, Red Rock, and Smuggler's Notch. We are concerned that human disturbance has contributed to failed nesting attempts at several of these sites, and we suspect that disturbance occurs at most Vermont sites. Human disturbance, however, has not prevented the expansion of Vermont's peregrine population.

There has been 1 known shooting incident since recovery efforts began. A female, presumably from Bone Mountain in Bolton, was found shot in Richmond at the end of the breeding season in 1991 (Gaine and Rimmer 1991). In addition, a lead slug was retrieved from an eyrie at Deer Leap in Bristol in 1991, but it could not be correlated with the presence of peregrines (Gaine and Rimmer 1992).

##### **4.2. Environmental Contamination**

There has been occasional evidence of elevated levels of pesticides and significant eggshell thinning in Vermont and other northeastern states. High levels of PCB's and DDE were found in

peregrine eggs in 1991 at a failed nest site, and greater than 20% eggshell thinning was documented at 2 sites in Vermont and 2 in New Hampshire in 1992 (L. Kiff, unpubl. data). The average shell thickness in 21 samples collected in Vermont from 1990-1998 was 10% thinner than the estimated thickness for the current eastern peregrine falcon (USFWS, unpubl. data). Of these samples, 3 were considered “critical” (greater than 17% thinning) (Kiff 1988); however, these eggs hatched successfully.

Although the effects of these contaminants are probably less than those before the ban on DDT, pesticide residues may have a significant impact in some areas, and may be compounded by the impacts of other threats, including environmental toxins. The steady peregrine population growth in Vermont indicates that current pesticide loads do not appear to be preventing the expansion of the state’s population.

### **4.3. Predation**

Predation on young by great horned owls (*Bubo virginianus*) has been documented for eastern peregrine falcons, especially during initial reintroduction efforts (USFWS 1991). There is 1 record from Marshfield Mountain of predation by great horned owls during reintroduction efforts in 1984 (Barclay and Gilroy 1984). In addition, we have seen evidence of raccoons on nest ledges (*Procyon lotor*) as well as possible predation on eggs and small chicks by common ravens (Gaine and Rimmer 1990, R. Durand, pers. com.).

### **4.4. Habitat Loss**

Changes in habitat have occurred at some historic nest sites in Vermont, and it is likely that peregrines will not recolonize these areas. Increasing development pressure, especially on ridgelines, may further prevent recolonization of historic sites. Furthermore, reforestation and erosion of cliff faces may reduce the suitability of some historic nesting sites. Nest sites on federal and state lands are protected from development but are threatened by high levels of human activity.

### **4.5. Availability and Suitability of Nest Sites**

Peregrine falcon populations appear to be regulated by the number of nesting cliffs that are available and suitable for nesting (Hunt 1988). Large cliffs are favored by peregrines because they offer the best protection from predators, and they provide a good vantage point for hunting and territorial defense. In most areas, certain territories are occupied every year, while other territories are occupied less regularly (Hickey 1942).

Of Vermont’s 32 known historic nesting sites, 11 have been reoccupied, 10 have the potential for reoccupancy, and 9 are no longer considered suitable for nesting peregrines. Twelve of the 23 occupied territories in 1999 were not mentioned in historic records. Those sites that are considered to have potential for reoccupancy have been divided into 2 groups, based on their

suitability. Most of the sites considered unsuitable are small, poor quality cliffs that may have supported nesting peregrines for only 1 season in the past. Many of these cliffs have become overgrown with vegetation (Faccio and Corser 1995).

Vermont peregrine falcons have exhibited a great deal of variability in their choice of nesting cliffs, and have not followed the guidelines for suitable nesting habitat set by biologists such as Hickey (1942) and Ratcliffe (1993). They have colonized some small, poor quality Vermont cliffs, including a road cut in Barnet and reoccupied 1 historic site previously considered unsuitable because several homes were constructed at the top of the cliff (Fowle et al. 1998). It is difficult to predict the maximum number of breeding peregrines Vermont can support, but it appears likely that the number of cliffs and their potential as suitable nest sites will limit the maximum size of the breeding population.

#### **4.6. Food Supply**

Some peregrine populations may be regulated by the amount of food resources. Rarely will populations deplete their food supply, because territorial behavior and the availability of suitable nesting cliffs tend to limit peregrine breeding density more than the availability of food (Newton 1988, Ratcliffe 1993). Peregrines appear to balance themselves in relation to prey availability; thus, in areas where there are numerous nest sites, peregrine pairs generally space themselves widely. In areas of the peregrine's range where there are relatively few nest sites, such as in the Northeast, however, the number of sites appears to limit breeding densities. Furthermore, the size of a cliff may be linked to the accessibility of prey for peregrines, with larger cliffs facilitating visual location of prey. This link may explain why peregrines in forested areas tend to nest on large cliffs, and peregrines in open areas will also use small cliffs (Newton 1988).

In some areas, the species of prey available may affect the productivity rate of nesting peregrine falcons. In the Northeast Recovery Region, prey analysis studies indicated that a lower productivity rate in the White Mountains of New Hampshire may be related to the peregrines' dependence on omnivorous passerines (e.g., common grackles and blue jays), versus rock and mourning doves, which comprised over 75% of the diets in the more productive areas of the region. Doves, as granivores, tend to accumulate lower contaminant levels than omnivorous songbirds (Corser et al. 1999).

### **5. PEREGRINE MONITORING AND MANAGEMENT IN VERMONT**

Recovery efforts of peregrine falcons in Vermont are part of a cooperative effort among the U.S. Fish and Wildlife Service (USFWS), Vermont Department of Fish and Wildlife's (VDFW) Nongame and Natural Heritage Program, game wardens, and district staff, the Vermont Institute of Natural Science (VINS), the National Wildlife Federation's Northeast Natural Resource Center (NWF), the Green Mountain National Forest (GMNF), Vermont Department of Forests, Parks, and Recreation (VFPR), The Nature Conservancy (TNC), and numerous volunteers.

The USFWS recovery goals for the eastern population of peregrine falcons, which were revised in 1987 and updated in 1991, were 2-fold: (1) to downlist the species to threatened by establishing a minimum of 20 to 25 nesting pairs in each of the 5 recovery subregions, sustained over a minimum of 3 years; and (2) to delist the species by meeting objective (1) and establishing a minimum of 175 to 200 naturally nesting pairs in the entire region that demonstrate sustained and successful nesting. The size of the projected population represented approximately 50% of the size estimated in the early 1940s. The overall recovery goal for the lower 48 states was to reach a population size of 543 naturally nesting pairs (USFWS 1998c). At the time of delisting, the Pacific Coast and Southwest and Rocky Mountain regions had met or exceeded their recovery goals and the Alaskan region had met all but one recovery goal (USFWS 1999). The Eastern region had not met all of its original recovery goals for downlisting, but it had nearly met the goals for delisting.

To accomplish its recovery goals, the USFWS identified 5 broad categories of recovery tasks in the *Peregrine Falcon Eastern Population Recovery Plan*: 1) reintroduce peregrines into the wild through captive breeding programs; 2) identify and protect essential habitat; 3) monitor breeding and wintering peregrine populations; 4) provide federal protection; and 5) educate and inform the public about peregrine falcons.

The initial objective of reestablishing the species in the wild through captive breeding programs involved introducing offspring from adults of various subspecies. The adult breeders in the eastern reintroduction program included the following subspecies: *pealei*, *anatum*, *brookei*, *tundrius*, and *peregrinus*. A panel of experts agreed in 1974, “that every effort should be made to bolster existing wild stocks by all available techniques, but the program should include from the start, a basis for introducing the most promising, ecologically-preadapted stock into eastern sites. Nature will then ‘select out’ this stock to recreate a viable ‘new’ race in the region lost by the original population. It won’t be a rock peregrine, but still a proper peregrine, adapted to today’s environment (White et al. 1974).”

The recovery plan for the eastern population divided the region into 5 subregions. Vermont is part of the Northeast Recovery Region 2, which includes Maine, New Hampshire, Vermont, Massachusetts, and the Adirondack region of New York. Recovery efforts began in these states in the late 1970s.

Past and current management practices for peregrines in Vermont include:

- Reintroduction of captive-reared peregrines;
- Monitoring of peregrine falcon reproductive status and success, including coordination of annual cliff survey;
- Collection of prey remains, eggshells, and unhatched eggs for dietary analysis and pesticide testing;
- Nest site enhancement measures;
- Public education of peregrine population status and conservation needs;

- Placement of interpretive and/or cliff closure signs at nesting sites;
- Enforcement of laws protecting peregrines by VDFW game wardens, USFWS Law Enforcement Division, and GMNF staff.

### **5.1. Reintroduction Efforts**

Peregrines were reestablished in Vermont through an extensive reintroduction program that was initiated by the Peregrine Fund, Inc. and the USFWS. In Vermont, hawk sites were established in the Green Mountain National Forest at Mount Horrid in Goshen and White Rocks in Wallingford, and in Groton State Forest at Marshfield Mountain in Marshfield,. From 1982-1987, 93 young were released from these sites. In 1984, a territorial falcon pair occupied the cliffs at Mount Pisgah in Westmore. This pair returned the following year and nested successfully (Laughlin and Kibbe 1985).

### **5.2. Current Breeding Season Monitoring and Management Program**

VINS and VDFW have closely monitored the peregrine recovery since Mount Pisgah's reoccupancy in 1984. NWF joined the monitoring project in 1999. With a network of volunteers, NWF, VINS and VDFW determine the location of territorial pairs, breeding chronology, and nesting success of peregrines in the state. Steve Parren, coordinator of the Nongame and Natural Heritage Program (NNHP), and Doug Blodgett, Wildlife Biologist for the Pittsford District of the VDFW, oversee, coordinate activities, and set expectations for the project. Margaret Fowle, NWF's wildlife biologist and the state peregrine biologist, coordinates the monitoring and management program with Steve Faccio, VINS conservation biologist, who organizes the annual statewide cliff survey and bands nestlings. Summary information on each occupied territory in Vermont is listed in Appendix B.

#### **Monitoring**

To locate territorial pairs, VINS coordinates an annual statewide cliff survey. Volunteers, and NWF, VDFW, and VINS staff watch historical and prospective cliffs for at least 3 hours over the first 2 weeks of April. A standardized data form is used to record peregrine activity at each monitored site.

To determine the breeding chronology and status of territorial peregrine falcon pairs in Vermont, occupied cliffs throughout the state are monitored from mid-April through mid-July. Monitoring equipment includes binoculars and a spotting scope. A Questar spotting scope with 80 and 120 power lenses is occasionally used in an attempt to read alphanumeric bands on adult peregrines. Observation distances generally vary depending on the proximity of cliffs to natural or created openings (i.e., roads, fields, water bodies, talus slopes) and sensitivity of the falcons to observer presence.

Staff from NWF, VINS and VDFW, and various volunteers monitor most occupied territories on a weekly basis, but some of the more remote sites are visited less

frequently. All courtship and breeding behaviors are recorded and interpreted during each visit. At each site, we determine eyrie location, onset of incubation, hatching and fledging dates, and number and sex (when possible) of young fledged. Breeding chronology at each site is often not precisely known, but is interpreted from behavioral observations. Banding of a subset of nestlings occurs at 3 to 4 weeks of age, during which time any unhatched eggs are collected for pesticide analysis, and prey remains are collected for later analysis. A technical rock climber assists with banding at all sites. We attempt to determine the banded status of all territorial adults and to read alphanumeric bands when possible.

### **Public Education**

Education of the public usually occurs informally while monitoring nesting cliffs. We regularly communicate with private landowners to educate and inform them about nest site protection measures needed during the breeding season.

We have developed a slide show and regularly present public slide lectures and lead field trips to nesting sites. We widely distribute the annual report, fact sheets, and breeding season summaries. In addition, newspaper articles and press releases are issued annually. The Vermont conservation license plate features a peregrine falcon, which works to increase awareness about peregrines and endangered species.

We summarize the results of each breeding season in an annual technical report. The report is distributed throughout Vermont to landowners of occupied nesting cliffs, local conservation groups, and federal and state agencies in the region.

### **Cliff Access Restrictions**

Interpretive signs and legal closures are posted to protect those sites that are heavily visited by recreationists. Cooperation with private and public landowners ensures the protection of nesting peregrines at these sites. Cliffs that have been posted annually with interpretive signs are Fairlee Palisades in Fairlee, Bald Mountain in West Haven, Deer Leap in Bristol, Smuggler's Notch in Cambridge, and Pond Mountain in Wells. Mount Horrid and Rattlesnake Point, both in the GMNF, are posted with legal closure signs from April through July each year. In addition, all aircraft are requested to maintain a 1500 foot minimum distance above and 1 mile minimum horizontal distance from occupied cliffs.

### **Law Enforcement**

GMNF, USFWS Law Enforcement (USFWS-LE), VDFW, NWF, and VINS staff all play a role in peregrine protection. The state peregrine biologist contacts all Vermont state game wardens in the spring with the location of occupied nesting territories. Wardens monitor human disturbance at some sites, and report any incidents of harassment. In addition, the USFWS investigated the

shooting of a peregrine in Bolton, and GMNF staff regularly patrol sites within the forest boundary during holiday weekends to cite any violators of cliff closures.

## **Rehabilitation**

Injured peregrines are brought to the VINS Raptor Center and cooperating rehabilitation centers for diagnosis and rehabilitation. If deemed releasable, rehabilitated peregrines are released in appropriate habitat near where they were originally found. Peregrines with extensive injuries and little hope for recovery are euthanized, and permanently injured birds may be used for educational purposes. USFWS-LE handles the disposition of euthanized birds, which are then made available for use as educational mounts.

## **6. STRATEGIES FOR RECOVERY**

### **6.1. Goals for Recovery in Vermont**

The primary goal of this recovery plan is to establish a stable breeding population of peregrine falcons in Vermont at a population level that will justify removing the species from the Vermont list of endangered and threatened species. We have developed 2 specific recovery goals:

#### **1) Downlisting Goals:**

Downlist the peregrine falcon in Vermont to state-threatened status if (on average), for 5 years, there are at least 16 territorial pairs and at least 1.50 fledglings per territorial pair or, if greater than 16 territorial pairs, produce a minimum average of 24 fledglings per year.

As of 1999, the recovery goals for downlisting in Vermont had been met, with an average of 16.4 pairs and 25.2 fledglings from 1996-1999 (Table 1).

#### **2) Delisting Goals:**

Delist (remove from the Vermont Endangered and Threatened Species List) the peregrine falcon in Vermont if (on average), for 5 years, there are at least 24 territorial pairs and at least 1.50 fledglings per territorial pair or, if greater than 24 territorial pairs, produce a minimum average of 36 fledglings per year.

#### **3) Relisting Goals**

Relist the peregrine falcon in Vermont as a state-threatened species if (on average), for 5 years, the population is reduced to less than 24 but at least 16 territorial pairs, and either less than 1.50 fledglings per territorial pair or between 24 and 36 fledglings are produced per year.

List the peregrine falcon in Vermont as a state-endangered species if (on average), for 5 years, the population is reduced to less than 16 territorial pairs and either less than 1.50 fledglings per territorial pair or less than 24 fledglings are produced per year.

These goals are the inverse of the down- and delisting goals stated above.

## **6.2. Justification for Goals**

We believe that the historical number of peregrine falcons breeding annually in Vermont was at least 32 pairs, based on those sites having supporting documentation such as photographs, collected eggs, and written observations (Faccio and Corser 1995), although up to 59 cliffs may have been used (Laughlin and Kibbe 1985). Due to human development, some historical sites are unlikely to be recolonized by peregrines. We have set the downlisting goal at 50% of the 32 minimum historical territories (16) and the delisting goal at 75% (24). The goal of 1.50 fledglings per territory is based on previous studies that have shown that sustaining populations produce between 1 and 2 fledglings per territorial pair (Hickey and Anderson 1969), and on Vermont's 1989-1998 data when the number of falcon territories ranged from 7 to 19 and the peregrine population increased in Vermont. A minimum fledgling count will allow a higher number of territories to achieve the goal, even if each territory's average productivity is less than 1.50 fledglings.

## **6.3. Recommended Actions for Recovery**

The protection of Vermont's peregrine falcon population requires a combination of monitoring, enforcement of legal protection, management, research, education, developing and maintaining partnerships, and fundraising.

Each of these categories is listed below with actions listed in order of priority. It is important to note, however, that in case of limited resources, we consider the essential actions to be the following:

- Monitoring to include locating occupied territories, determining the number of nesting pairs, and counting total number of fledglings;
- Management to include protecting nesting sites during the breeding season;
- Education and outreach to include continuing and expanding public education efforts;
- Research to include recording and reporting banded status of adults at nesting sites.

We expect the following actions to continue for the 13-year post-delisting monitoring period designated by the USFWS. We will review and reevaluate the need for this level of monitoring and protection at the completion of the post-delisting monitoring period, in 2013.

### **Monitoring**

We propose to continue monitoring at the same level as in previous years to: 1) follow the guidelines set by the federal *Peregrine Falcon Eastern Population Recovery Plan* until the post-delisting monitoring guidelines are in place; 2) continue to document human disturbance at nesting cliffs; and 3) to monitor human activities at nesting sites to note any changes following the federal delisting. Monitoring actions are listed in order of priority.

1) Monitoring efforts should continue to include the following actions:

- Locate territorial pairs;
- Determine which pairs are nesting, and determine their eyrie location, onset of incubation, hatching and fledging dates, and number and sex (when possible) of young fledged;
- Monitor non-nesting pairs and unoccupied high priority cliffs on a regular basis;
- When possible, determine causes for nesting failure.

2) Continue to dedicate a biologist position to coordinate site monitoring efforts, compile field data, and produce annual technical report on the status of Vermont peregrines for each breeding season (April - July) (see Appendix A for description of responsibilities).

To best monitor and manage peregrine falcons in Vermont, it is important to have continuity of staff from year to year. In past years, there was a high level of turnover when the peregrine biologist position was temporary and seasonal. Retaining dedicated staff each year will facilitate building long-term relationships with landowners and volunteers and provide continuity from year to year. Therefore, we recommend dedicating a biologist position to coordinate the field component of the project full time during the breeding season and commit at least 25% of a position during the rest of the year to complete the annual report, recruit and train volunteers, update educational materials, and conduct regular public outreach.

3) Continue to conduct annual state-wide cliff survey.

VINS will coordinate the annual cliff survey each year. Volunteers and staff will monitor all known and prospective nesting sites during the first 2 weeks of April and report any sightings to VINS and NWF.

4) Further utilize VDFW district biologists to monitor sites and coordinate monitoring efforts in respective districts.

As peregrine numbers have grown, it has become increasingly necessary to shift more responsibility to district staff for weekly monitoring efforts. In 1999, Smuggler's Notch was monitored regularly by NNHP staff, Skitchewaig Mountain was monitored regularly by Springfield district staff, 4 sites in northeastern Vermont were checked periodically by St. Johnsbury district staff, and Bird Mountain in central Vermont was checked periodically by Pittsford. To help increase district biologist involvement in the future, we will provide field training when appropriate.

5) Increase network of volunteer monitors to assist in weekly monitoring and protection of nesting peregrines.

We plan to continue to build on the informal network that currently exists. We recruited 3 new volunteers and conducted 2 training sessions in the beginning of the 1999 nesting season, and 4 sites were monitored consistently by volunteers in 1999. Other volunteers assisted in cliff survey and occasional monitoring, totaling over 30 volunteers in 1999. As peregrine numbers continue to grow and federal funding decreases, monitoring will likely need to shift further towards volunteers. The challenge will be to recruit and train qualified observers who have access to a spotting scope and are able to commit to monitoring sites on a weekly basis throughout the nesting season.

### **Management**

Our strategy for management and protection of peregrine nesting habitat will work to reduce the impacts of human disturbance at nesting cliffs. Management actions are listed in order of priority.

1) Continue to implement site protection measures on public and private land.

Working with landowners, we will continue to manage activities within 0.25 miles of each nest site. To minimize human disturbance at nesting cliffs, we will post legal closures and interpretive signs on public and private lands with landowner consent. If necessary, we will continue to request that aircraft maintain a 2-mile minimum distance from nesting cliffs.

2) Continue to work with state game wardens and USFWS Law Enforcement Division to continue law enforcement efforts that limit harassment/killing of peregrines according to state and federal law.

The state peregrine biologist will contact local and federal game wardens once peregrine pairs have been located each year. We will encourage state game wardens to patrol nesting sites and assist in our outreach efforts.

3) Explore options for habitat acquisition and/or landowner agreements/incentives to provide long-term protection of peregrine nesting cliffs.

We will work with cooperating landowners to develop appropriate agreements for long-term protection of breeding sites. In cooperation with local land trusts, we will explore the appropriate options, which may include: conservation lease agreements; formal cooperative management agreements with landowners and regulatory agencies; voluntary easements; small landowner grant programs; habitat reserve programs; tax credits/deductions; estate tax deferrals; creating buffer zones; and zoning ordinances. We plan to begin this process by consulting experts to

develop the best strategy for protecting peregrine breeding habitat on private land, and we will discuss various options with landowners with whom we have well-established relationships. We hope to use this program as a pilot for other state-listed species.

4) If cooperative landowner agreements are not sufficient to meet delisting goals, urge the Endangered Species Committee to advise and encourage the Secretary of the Agency of Natural Resources to use the appropriate legal avenues to protect peregrine breeding habitat.

Work with the Endangered Species Committee and interested parties to explore effective legal means to restrict human access to areas around peregrine falcon breeding sites, e.g., restricted access to cliffs for hikers and climbers, and restrictions on logging operations and road maintenance near nesting cliffs during the breeding season.

5) Prohibit take of Vermont's wild peregrines for falconry.

We will work with the USFWS and the State of Vermont to prohibit any future take of wild peregrines for falconry. Prohibiting the take of wild peregrines should not limit falconers in Vermont; currently there is an adequate supply of captive-bred peregrine falcons available for falconers, and the more abundant red-tailed hawk (*Buteo jamaicensis*) is available for the take for falconry in Vermont. Currently, the proposed post-delisting management plan will not include the northeastern states in its permit for the harvest of wild passage peregrines. We will revisit this issue and reevaluate our position on a regular basis.

6) Improve eyrie conditions when necessary and possible.

Limited eyrie improvements, such as placing gravel in the nest scrape to improve drainage, or removing large rocks that may limit clutch size, may be necessary at some sites that have a limited number of ledges suitable for nesting.

7) Improve interpretative signs to provide a clear and concise educational message.

We plan to develop signs that restrict access at appropriate sites. Signs will include educational information about peregrine natural history, the need for protection during breeding season, etc. Partnerships with local organizations and climbing groups will also be included.

### **Education and Outreach**

Past outreach efforts have been somewhat limited, and we plan to increase and expand these efforts to best reduce the threat of human disturbance at nesting sites. Education and Outreach actions are listed in order of priority.

1) Continue and expand outreach and educational efforts including slide show presentations, news releases, newsletter articles, media coverage, and fact sheet and report distribution.

To increase educational efforts, we will work with VDFW outreach staff to develop an outreach plan for Vermont peregrine falcons. Educational materials will be updated and improved to incorporate information about avoidance of human disturbance to breeding peregrines. Media coverage may be used to address human disturbance issues at nesting cliffs.

2) Continue to write and distribute annual technical report and 1-page summary (updated annually).

## **Research**

Research actions follow guidelines set in the federal *Peregrine Falcon Eastern Population Recovery Plan*. We will revisit the justification for these actions with any future changes in USFWS' involvement in peregrine monitoring. Research actions are listed in order of priority.

1) Continue to record and report banded status of adult peregrines at nesting sites.

When possible, we will continue to attempt to read bands on territorial peregrines. In recent years, this effort has been extremely time consuming with little success, due primarily to the fact that we have only had limited access to a high powered spotting scope. To increase our success rate, we will need to purchase and otherwise secure the use of Questar (or similar high powered) spotting scope.

2) Continue banding at a subset of nesting sites, as funding permits.

In accordance with the *Peregrine Falcon Eastern Population Recovery Plan*, we plan to continue banding at a subset of Vermont sites. The Peregrine Biologist will coordinate the timing of banding and will work with the VINS biologist and professional rock climbers to continue banding approximately 30-50% of the nestlings each year, depending on funding, timing, and accessibility of eyries.

3) Continue eggshell thickness and contaminant studies (dependent on 2 above).

In accordance with the *Peregrine Falcon Eastern Population Recovery Plan*, we will continue to collect unhatched eggs and eggshell fragments for contaminant and thickness testing when banding young. If banding discontinues, it is likely that we will rarely access eyries for egg collection.

4) Continue prey analysis by collecting prey remains from nest ledge when banding (dependent on 2 above).

We will collect prey remains from eyries when banding young falcons. These remains will be analyzed on a periodic basis.

## **Partnerships**

As federal funding and protection decreases, it may be useful to expand the Vermont peregrine monitoring and management project to include additional partners. Actions are listed in order of priority.

- 1) Continue to establish and expand partnerships with government and non-government organizations in Vermont and region.

Partnerships with private landowners, local conservation organizations, climbing groups, and state and federal agencies will help ensure the long-term protection of nesting cliffs.

- 2) Work with USFWS to ensure the sustained recovery of peregrine falcons after delisting.

We plan to provide input into the USFWS' development of a post-delisting monitoring plan and regulations regarding the take for falconry. We will work to ensure that the plan adequately protects nesting sites and provides sufficient funding, and we will not support permits to take wild peregrines for falconry purposes in the region as long as the species is state-listed.

## **Fundraising**

- 1) Increase fundraising efforts.

We will increase our efforts to secure funding for the monitoring and management of peregrines each year. To prepare for an eventual uncertainty in Section 6 funding, we will work with partners to seek funds from private foundations and other sources to provide the resources necessary to adequately monitor and protect the state's peregrine population.

### **6.4. Factors Potentially Limiting Recovery Efforts**

We have identified the following factors that may limit the success of our recovery efforts in the near future. We will need to overcome these factors to ensure the long-term success of peregrine falcon recovery efforts in Vermont.

- 1) Decrease and eventual elimination of federal funding.

It is not yet clear what the USFWS' role will be in providing funding to monitor and manage peregrine falcons now that they have been removed from the federal endangered species list. We assume funding will decrease over the designated post-delisting monitoring period and that it will eventually cease. USFWS funding has provided the majority of funds to monitor and manage the Vermont peregrine population since recovery efforts began. A lack of funding will significantly limit our ability to monitor and manage Vermont's peregrine population. In the case

of significantly limited funds, we have identified actions essential to the peregrine’s recovery in Vermont in Section 6.3.

For the past 5 years, federal funding from the USFWS through Section 6 of the ESA has supplemented our project costs up to 50%. The estimated annual cost for the Vermont peregrine project from 1995-2000 are below. These costs do not include volunteer time from volunteers, non-profit groups such as the Nature Conservancy, and other in-kind contributions from agencies such as the GMNF, the VDFPR, the Massachusetts Division of Fisheries and Wildlife, or the USFWS. We estimate that these costs would add approximately \$5,000 to the estimated total costs below. In addition to the direct Section 6 funds, the USFWS has invested staff time, provided funds for climbing equipment, bands and technical climbing support for banding young peregrines, and paid \$20 per egg for shell thickness tests and \$400 per egg for contaminants analysis.

<u>Year</u>	<u>Project Cost</u>	<u>Section 6 Funds</u>	<u>Comments</u>
2000	unknown	\$13,000	NWF supplemented >\$8,000
1999	\$35,346	\$13,000	NWF joined project
1998	\$20,910	\$11,500	No GMNF contribution
1997	\$27,560	\$10,000	Last GMNF contribution
1996	\$23,930	\$10,450	
1995	\$21,720	\$12,000	

2) Changing legal authority to protect nest sites.

Although peregrine falcons are protected from hunting by the Migratory Bird Treaty Act, there is currently no legal protection of their habitat. With the recent federal delisting, we will have less legal authority to close and protect nesting cliffs during the breeding season, which may have adverse effects on the productivity of the population.

3) Reduced public support of federally delisted species.

Public perception of peregrine falcons will likely change now that the peregrine falcon is delisted. We suspect that the public’s concern will decrease in future years, and we will need to develop a strong outreach program that maintains public awareness and concern. We expect that we will need to focus our outreach efforts to convey the message that although peregrines have been delisted federally, state recovery efforts are not complete, and we need to proceed with caution by continuing to protect and monitor peregrines in Vermont to ensure their recovery is sustained.

4) Reduced agency support.

The U.S. Forest Service, U.S. Park Service, and other agencies that are driven by federal budget allocations and priorities will likely reduce financial support and protection efforts of peregrine falcons as other listed species become a greater priority.

5) Unsustainable take for falconry purposes.

Falconry groups, such as the North American Falconry Association, may put increasing pressure on the USFWS and state agencies to allow the take for falconry.

## **6.5. Actions Not Recommended**

1) Additional hacking or reintroduction efforts.

## **7. ACKNOWLEDGEMENTS**

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## **9. FIGURES AND TABLE**

**Fig. 2. Number of peregrine falcon pairs and fledglings in Vermont, 1984-2000.**

Table 1. Peregrine Falcon population size and reproductive success in Vermont, 1984-2000.

YEAR	PAIRS				FLEDGLINGS		
	Terr	Nesting	Successful	Success(%)	Number	#/succ pair	#/terr pair
1984	1	0	0	0	0	0	0
1985	1	1	1	100	3	3	3.0
1986	1	1	1	100	2	2	2.0
1987	4	3	3	100	9	3.00	2.50
1988	5	4	3	75	7	2.33	1.40
1989	7	6	3	50	6	2.00	0.86
1990	7	6	3	50	6	2.00	0.86
1991	8	7	5	71	13	2.60	1.63
1992	12	9	7	77	17	2.43	1.42
1993	12	10	9	90	21	2.33	1.75
1994	12	11	11	100	31	2.82	2.58
1995	12	12	10	83	24	2.40	2.00
1996	12	8	6	75	17	2.83	1.42
1997	16	14	9	64	21	2.33	1.50
1998	19	15	11	73	24	2.18	1.26
1999	23	19	17	90	40	2.35	1.74
2000	23	22	18	82	40	2.22	1.74
Total	175	148	117	79	281	2.40	1.61

## 10. APPENDICES

### 10.A. Major Duties of Vermont Peregrine Biologist (Adapted from *Guidelines for VINS Field Biologists*)

These guidelines are intended to define the responsibilities of the Peregrine Biologist. The success of the project requires that procedures outlined below are carefully followed. Communication is the key. The project involves a diverse array of cooperators at different levels – NWF, VINS, and VDFW are the principal players, but other participants include the GMNF, USFWS, TNC, VDFPR, various logging companies and private landowners, volunteers, and the general public. It is critical to know who to contact in which circumstances, and to actively maintain close communication at all levels of the project.

The Peregrine Biologist is expected to maintain a close working relationship with the VDFW Project Coordinator and the VINS Biologist. All work closely together in a formal partnership to administer the project. The VDFW Project Coordinator's primary roles will be to coordinate activities (e.g., posting of peregrine cliffs, chick banding) with landowners and other interested parties, and to deal with regulatory issues (e.g., cliff closures). The VDFW Project Coordinator may suggest actions for the Peregrine Biologist to take, and the Peregrine Biologist will be expected to keep in close contact, both in written weekly reports and frequent oral communication.

Early in the field season, the Peregrine Biologist should make phone contact with each local game warden whose district includes a nesting or territorial site that will be monitored. The Peregrine Biologist should introduce him/herself and inform the warden of the status of each site and the planned monitoring activities there. Whenever an activity other than routine monitoring (e.g., banding) is planned, the warden should be contacted first. Game wardens often receive calls from the concerned public and need to know if the actions being reported are attributable to expected monitoring activities or other, possibly illegal actions. Violations of Fish and Wildlife Law, whether witnessed by or reported to the Peregrine Biologist, must be communicated to the local warden as soon as possible. The warden district map and phone directory should be kept accessible at all times. If immediate, direct contact with a warden is necessary but not possible, the state police dispatch number should be called. This number is listed in the Fish and Wildlife Law Digest. The warden on duty will then be contacted by radio.

The VDFW Project Coordinator will send a letter of contact to known landowners at the beginning of each field season. The Peregrine Biologist may subsequently need to contact landowners to address field monitoring and management issues. People often want to know who the biologist is and to develop a working dialogue. If there is doubt about who should be contacted and in what situations, the VDFW Project Coordinator should be consulted.

The Peregrine Biologist is the on-the-ground coordinator of field activities and is responsible for all field aspects of the project. A crucial role will be to provide guidance to volunteers, VDFW biologists, and others assisting in the project, which is especially critical for those individuals who are responsible for monitoring specific sites. The Peregrine Biologist must make early season contacts with these individuals and work out a mutually agreed upon scheme for monitoring. It will be the responsibility of the Peregrine Biologists to track the progress of each site-specific monitor, to ensure that he or she is kept “in the loop,” and to collect all monitoring data at season’s end.

If a management problem (e.g., low-flying aircraft or nearby logging job) arises, the Project Coordinator should be contacted immediately. If he or she is not available, there is a list of alternate contacts (with phone numbers) available for each specific situation. The Peregrine Biologist should keep this list accessible at all times.

For reasons of both safety and timely communication, it is important that the whereabouts of the Peregrine Biologist are known as accurately as possible. It will be necessary to check in via phone or email 2-3 times per week to inform others of schedule. On days that visits to remote sites (e.g., Bone or Brousseau Mountains) are scheduled, the Peregrine Biologist should arrange to contact someone after returning from each site. That person should have a list of emergency contacts. The Peregrine Biologist should carry a first aid kit at all times.

An annual project report and 2-page fact sheet should be completed by September 30 of each year. The Peregrine Biologist will be the principal author, and the VINS biologist and VDFW Project Coordinator will contribute as coauthors. Summary data should be collected from site monitors no later than August 1, and subsequent updates should be obtained as needed. A first draft should be ready for review by August 15. The format of the report should follow that used in previous years. The annual report is to be the primary factual reporting of the year’s events – speculation should be limited and clearly justified.

The Peregrine Biologist is the most visible spokesperson for the project. He or she will need to make a concerted effort to inform the public through personal contacts, presentations of slide lectures, posting of informational signs, contribution to press releases, and other means. Good PR is important to NWF, VINS, VDFW, and all organizations involved in these projects. If an exciting or newsworthy event takes place during a project, the Peregrine Biologist should check with the VDFW Project Coordinator to determine whether a report of that event should go out to newspapers and other public information sources. Education is an extremely important part of the Peregrine Biologist’s job.

In all public outreach activities, the partnership between NWF, VINS, and VDFW should be emphasized, and the project's connection with the Nongame Wildlife Fund highlighted. NNHP is part of the VDFW, and should be recognized as such. Contributions of other organizations (e.g., GMNF, USFWS) and individuals should also be acknowledged. The Project Coordinator should be consulted if clarification is needed about the specific roles of various contributors.

Tasks and duties specific to the project will be reviewed prior to the beginning of the field season. The Peregrine Biologist should not hesitate to seek guidance on any aspect of the project (e.g., priorities, expectations, protocols) at any point during the season. At the conclusion of field work, the Peregrine Biologist, VINS biologist, and Project Coordinator will meet to evaluate the project's strengths, weaknesses, and overall successes, and to discuss recommendations for future efforts.

In addition to these guidelines, the Peregrine Biologist should refer to Attachment A of the Vermont Fish and Wildlife Department contract for the project, which is the Specifications of Work to be Performed. A copy of this will be provided to the biologist.

#### **10.B. Summary Information on Occupied Sites** (as of 2000)

Landowner and game warden contact information is subject to change. Information is current to the year listed above.

##### **1. Arrowhead Mountain** (Milton)

- **Site Description**
  - West facing
  - Old raven nests
  - Lowland site in Champlain Valley
- **Landowner**  
Type: Private
- **Game Warden Contact:** Lawrence Rosenberger
- **Historic Use**
  - Record of territorial pair in 1944
- **Year of Recolonization:** 1997
- **Nest Success:** 6 fledglings/4 years
- **Potential/Known Impacts/Threats**
  - Hikers at top of cliff
  - Climbers
  - All terrain vehicles
- **Past Management**
  - Landowner contact, education
  - Informal requests for landowners to restrict access to climbers and hikers to western side of cliff

- **Future Management Needs**
  - Possible cliff closure/educational signs
  - Landowner agreement
- 2. Bald Mountain (West Haven)**
  - **Site Description**
    - South facing
    - Many terraces and ledges
    - Well-vegetated
    - Ravens nest on western end of cliff
    - Lowland site overlooking lower Lake Champlain and Poultney River
  - **Landowner**
    - Type: Private, non-profit conservation organization
    - Owner: The Nature Conservancy of Vermont
  - **Game Warden Contact:** Rob Sterling
  - **Historic Use:**
    - No known records
  - **Year of Recolonization:** 1992
  - **Nest Success:** 17 fledglings/9 years
  - **Potential/Known Impacts/Threats**
    - Timber rattlesnake research on talus and at top of cliff
    - Hikers at top of cliff
    - All terrain vehicles at base of cliff
  - **Past Management**
    - TNC closes cliff to hikers from April - August
    - Signs posted around base of cliff
    - Timber rattlesnake research restricted to before and after the nesting season
  - **Future Management Needs**

**3. Barnet (Barnet)**

- **Site Description**
  - East facing
  - Road cut on Rte 5
  - Small cliff, rises up from road
  - Few ledges
  - appears to provide easy access to predators and/or humans
  - Overlooking additional road cuts on Rte 91 and Connecticut River
- **Landowner**
  - Type: Public, State
  - Owner: State of Vermont, Department of Transportation
- **Game Warden Contact:** Ken Denton
- **Historic Use:**

- None
- **Year of Colonization:** 1998
- **Nest Success:** 5 fledglings/3 years
- **Potential/Known Impacts/Threats**
  - Road maintenance/construction below cliff
  - Traffic on Route 5 (fledgling found dead near cliff in 2000)
  - Possible high visitation by humans to view birds from pullout on Route 5
- **Past Management**
  - Restrictions to photographers 1999
  - No cliff closure to-date
  - No banding
  - Attempt to reduce the attention drawn to this site
- **Future Management Needs**
  - Possible closure of cliff, pullout across the road on Rte 5 (evaluate annually)

#### 4. Bolton Notch (Bolton)

- **Site Description**
  - East facing
  - Many cliffs in the area
  - High elevation nest site
- **Landowner**  
Type: Private
- **Game Warden Contact:** Chris Clark
- **Historic Use:**
  - None recorded
- **Year of Colonization:** 2000
- **Nest Success:** 0 fledglings/1 year
- **Potential/Known Impacts/Threats**
  - Climbers (documented)
  - Hikers below cliff (documented)
  - Potential development of land at base of cliff
- **Past Management**
  - Closure signs posted first year of occupancy
- **Future Management Needs**
  - Nature relationship with current landowner
  - Work with local climbing group to spread the word about restricted access to cliff

#### 5. Bone Mountain (Bolton)

- **Site Description**
  - South facing
  - Remote, 1.5-2 hr hike from Rte 2

- High elevation nest site
- Very long east-west expansion
- **Landowner**  
Type: Private
- **Game Warden Contact:** Chris Clark
- **Historic Use:**
  - None recorded
- **Year of Recolonization:** 1989
- **Nest Success:** 21 fledglings/12 years
- **Potential/Known Impacts/Threats**
  - Logging below and above cliff
  - Climbers and hikers
  - Inclement weather
- **Past Management**
  - None; landowner has been approachable in past
- **Future Management Needs**
  - Continue to nurture relationship with current landowner and nearby Bolton Valley Ski Resort
  - Possible restrictions on logging operation to south of cliff

## 6. Bird Mountain (Ira)

- **Site Description**
  - South facing
  - Lowland site in Taconic Mountains
  - One historic eyrie that falcons use every year
- **Landowner**
  - Type: Public, State wildlife management area
  - Owner: State of Vermont, Department of Fish and Wildlife
- **Game Warden Contact:** Don Isabelle
- **Historic Use**
  - Known historic site
- **Year of Recolonization:** 1989
- **Nest Success:** 16 fledglings/12 years
- **Potential/Known Impacts/Threats**
  - Military aircraft (documented)
  - Hikers, hunters at top of cliff
  - Predators can access nest ledge (documented)
- **Past Management**
  - None
- **Future Management Needs**

## 7. Bristol Cliffs (Bristol)

- **Site Description**

- West facing, overlooking farmland of Champlain Valley
- Lowland site in foothills of Green Mountains on western edge of Bristol Cliffs Wilderness in GMNF; 2000 eyrie to south on private land
- Large span of cliff, north to south
- Well-vegetated with many ledges
- Largest talus slope in VT at base of cliff
- Approximately 2 miles south of Deer Leap site
- **Landowner**
  - Type: Public, Federal and Private (2000 eyrie)
  - Owner: Green Mountain National Forest
- **Game Warden Contact:** Robert McKnight
- **Historic Use**
  - No records of historic use
- **Year of Recolonization:** 1999
- **Nest Success:** 3 fledglings/2 years
- **Potential/Known Impacts/Threats**
  - Hikers, geology students on cliff
- **Past Management**
  - None
- **Future Management Needs**
  - Closure signs posted at base of talus

## 8. Brousseau Mountain (Averill)

- **Site Description**
  - South facing
  - Most northern nest site in VT, located in spruce-fir forest habitat
  - Remote cliff overlooking Little Averill Lake
  - Large cliff and talus
  - Complex structure of rock columns
  - High level of raven activity
  - Inclement weather
- **Landowner**
  - Type: Private, logging
- **Game Warden Contact:** Paul Fink
- **Historic Use:** None recorded
- **Year of Recolonization:** 1992
- **Nest Success:** 14 fledglings/9 years
- **Potential/Known Impacts/Threats**
  - High use of trail to top by hikers (disturbance reported)
  - Climbers
  - Logging at top of cliff and to east of talus
- **Past Management**
  - None

- **Future Management Needs**
  - Possible closure of top of cliff and/or relocation of upper lookout

## 9. Crystal Lake (Barton)

- **Site Description**
  - West facing
  - Located in the middle of the eastern side of Crystal Lake
  - Mixture of open rock faces and vegetated ledges
- **Landowner**  
Type: Private
- **Game Warden Contact:** Donald Gregory
- **Historic Use:** None recorded
- **Year of Recolonization:** 1999
- **Nest Success:** no nesting to-date; pair did not return 2000
- **Potential/Known Impacts/Threats**
  - Road within 0.5 miles to south
  - Logging roads north and east of cliff - potential logging in future
  - Possible impacts from recreation on lake
  - Possible predation problems (raccoon seen on cliff in 1999)
- **Past Management**
  - None
- **Future Management Needs**
  - Possible posting of cliff from lake

## 10. Deer Leap (Bristol)

- **Site Description**
  - Eyrie on west-facing portion of cliff
  - Southern end of Hogback Mountains in the foothills of Green Mountains, just north of northern border of GMNF
  - Complex structure of columns
  - Large cliff with both south- and west-facing walls
  - Large talus
  - High level of raven activity
  - 2 miles north of Bristol Cliffs
- **Landowner**  
Type: Private, mixture of private non-profit conservation land and private landowners
- **Game Warden Contact:** Robert McKnight
- **Historic Use:** No known records
- **Year of Recolonization:** 1987
- **Nest Success:** 31 fledglings/14 years
- **Potential/Known Impacts/Threats**
  - Hikers accessing top of cliff from town of Bristol (documented)

- Bonfires at top of cliff (documented)
- Aircraft (documented)
- Climbers (documented)
- Shotgun slug found in nest ledge in 1991
- Ravens?
- **Past Management**
  - Cliff closure from April - August
  - Regular patrol by Randy Durand
- **Future Management Needs**
  - Continue closing cliff with signs and ropes during breeding season

## 11. Fairlee Palisades (Fairlee)

- **Site Description**
  - East facing
  - Large cliff near Rte 91, overlooking Connecticut River
  - Many terraces and ledges
  - High level of raven activity
  - Best viewing from diner parking lot on east side of Rte 5
- **Landowner**  
Type: Private
- **Game Warden Contact:** Evan Eastman
- **Historic Use**
  - Known historic site - last occupied in 1956
- **Year of Recolonization:** 1992
- **Nest Success:** 30 fledglings/9 years
- **Potential/Known Impacts/Threats**
  - Hikers to top of cliff (documented)
- **Past Management**
  - Cliff closure from April through August
    - signs posted at trailheads and near top of cliff
  - Restrictions placed on nearby cliff in 1991 when stabilizing rockfall over Rte 91
- **Future Management Needs**
  - Improved signage to give greater educational message and better discourage hikers from accessing cliff-top
  - Continue to build upon relationship with landowner and diner owners on Rte 5
  - Possible long-term landowner agreement

## 12. Haystack Mountain (Pawlet)

- **Site Description**
  - South facing
  - Lowland site in Taconic Mountains

- Small nest ledge near base of cliff
- Ravens nest on eastern part of cliff
- Well-vegetated
- Difficult to monitor after leaf-out
- Pair appears to alternate between Haystack and Pond Mts (no occupancy 1996)
- **Landowner**  
Type: Private, residential and non-profit conservation
- **Game Warden Contact:** Norm Brown
- **Historic Use**
  - Known historic site
- **Year of Recolonization:** 1994
- **Nest Success:** 7 fledglings/5 years (periodic occupancy; use Pond Mt in other years)
- **Potential/Known Impacts/Threats**
  - Hikers to top of cliff
  - New TNC ownership of eastern cliff, with trail access to top of mountain, which is set back from top of cliff
  - Logging at base?
- **Past Management**
  - None
- **Future Management Needs**
  - Possible landowner agreement
  - Selected cutting of trees near monitoring post, to improve visibility for monitoring

### 13. Jobs Mountain (Westmore)

- **Site Description**
  - East facing
  - Northern, remote site
  - Overlooking Jobs Pond
  - Best viewing from fishing access point at Jobs Pond
- **Landowner**  
Type: Private
- **Game Warden Contact:** Bradley Mann
- **Historic Use**
  - No known records
- **Year of Recolonization:** 1992
- **Nest Success:** 11 fledglings/6 years (no occupancy 1996-1998)
- **Potential/Known Impacts/Threats**
  - No known threats
- **Past Management**
  - None

- **Future Management Needs**

- **14. Marshfield Mountain (Marshfield)**

- **Site Description**

- Southwest facing (?)
- Large cliff
- Remote location in Groton State Forest
- Original hack site

- **Landowner**

Type: Public, State Forest

Owner: State of Vermont, Department of Forests, Parks, and Recreation

- **Game Warden Contact:** Curtis Smiley

- **Historic Use**

- No known records

- **Year of Recolonization:** 1991

- **Nest Success:** 11 fledglings/10 years

- **Potential/Known Impacts/Threats**

- Hikers to top of cliff (documented)
- Climbers

- **Past Management**

- None

- **Future Management Needs**

- **15. Mount Horrid (Goshen)**

- **Site Description**

- South facing
- High elevation nest site
- Large cliff to west and boulder field to east
- Large talus area
- Many historic eyrie locations
- Easy viewing from scenic pull-out on Rte 73

- **Landowner**

Type: Public, Federal

Owner: Green Mountain National Forest, U.S. Department of Agriculture

- **Game Warden Contact:** David Rowden

- **Historic Use**

- Documented historic site

- **Year of Recolonization:** 1988

- **Nest Success:** 23 fledglings/13 years

- **Potential/Known Impacts/Threats**

- Hikers to top of cliff (documented)
- Climbers/boulderers
- Inclement weather

- **Past and Current Management**
  - Cliff closure from April - August
    - posted at trailhead and at top of cliff
  - Educational kiosks at pullout on Rte 73
  - GMNF staff patrolling cliff and trails during busy weekends
- **Future Management Needs**
  - Continued restricted access during breeding season
  - Continued posting of educational displays

## 16. Mount Pisgah (Westmore)

- **Site Description**
  - West facing, with Mount Hor directly across Lake Willoughby
  - Northern site, late ice melt every year
  - Largest nesting cliff
  - Difficult to monitor because of size
  - First site to be reoccupied in Vermont
- **Landowner**  
 Type: Public, State Park  
 Owner: State of Vermont, Department of Forests, Parks, and Recreation
- **Game Warden Contact:** Bradley Mann
- **Historic Use**
  - Records date back to 1800's
  - Site where last reported *anatum* peregrine was seen – a male in 1968 and 1970
- **Year of Recolonization:** 1984
- **Nest Success:** 27 fledglings/17 years
- **Potential/Known Impacts/Threats**
  - Hikers at top of cliff
  - Climbers (ice and rock)
  - Inclement weather
- **Past and Current Management**
  - Occasional closure of trail to top of cliff during early recovery efforts
- **Future Management Needs**

## 17. Nebraska Notch (Underhill)

- **Site Description**
  - South facing (a little east)
  - Remote, high elevation site
  - Well vegetated
  - Few shear cliff faces
- **Landowner**  
 Type: Public, State Forest  
 Owner: State of Vermont, Department of Forests, Parks, and Recreation

- **Game Warden Contact:** Lawrence Rosenberger
- **Historic Use**
  - Documented historic site
- **Year of Recolonization:** 1997
- **Nest Success:** 8 fledglings/4 years
- **Potential/Known Impacts/Threats**
  - Military aircraft (documented)
  - Inclement weather
- **Past Management**
  - None
- **Future Management Needs**

## 18. Nichols Ledge

- **Site Description**
  - West facing
  - Small cliff on eastern end of Nichols Pond
  - Overlooks valley of forest and open fields
- **Landowner**  
Type: Private
- **Game Warden Contact:** Russel Shopland
- **Historic Use**
  - Documented historic site
- **Year of Recolonization:** 1999
- **Nest Success:** No nesting to-date; pair did not return 2000
- **Potential/Known Impacts/Threats**
  - Hikers - popular walking trail to top of cliff
- **Past Management**
  - None
- **Future Management Needs**
  - Possible closure of hiking trail
  - Establish relationship with landowner - explore possible landowner agreement

## 19. Pond Mountain (Wells)

- **Site Description**
  - West facing
  - Lowland cliff in Taconic Mountains
  - Large cliff running north to south
  - Many terraces and ledges
  - Overlooks Little Pond, at southern end of Lake St. Catherine
  - Historic raven nest is used by falcons
  - Sporadic use since 1991
- **Landowner**

- Type: Private
- **Game Warden Contact:** Norm Brown
- **Historic Use**
  - Falcons documented by egg collectors in 1885
  - Pair recorded in 1957
- **Year of Recolonization:** 1987
- **Nest Success:** 9 fledglings/7 years (not occupied 1997-1999)
- **Potential/Known Impacts/Threats**
  - Hikers to top of cliff (documented)
- **Past and Current Management**
  - Cliff closures posted at top of cliff
  - Green Mountain College students near top of cliff with scope
    - educational information, enforced closures, opportunity for public to see nesting falcons
- **Future Management Needs**
  - Future cliff closures and educational efforts if peregrines return to site

## 20. Rattlesnake Point (Salisbury)

- **Site Description**
  - Eyrie on south-facing wall
  - Small cliff at southern end of Mount Moosalamoo, with walls facing south and west
  - Hiking trail up face of cliff
  - Few potential nest ledges
  - Snags favored by adults for perching
- **Landowner**
  - Type: Public, Federal
  - Owner: Green Mountain National Forest, U.S. Department of Agriculture
- **Game Warden Contact:** David Rowden
- **Historic Use**
  - Documented historic site
- **Year of Recolonization:** 1996
- **Nest Success:** 3 fledglings/4 years
- **Potential/Known Impacts/Threats**
  - Hikers to top of cliff (documented)
  - Limited number of suitable nest ledges
    - exposed, close to top of cliff, possibly accessible to avian predators
- **Past and Current Management**
  - Cliff closure from April - August
    - Signs posted at many trailheads near Lake Dunmore, closures clearly marked near top of cliff, information posted at Branbury State Park
  - Patrol of closed trails by GMNF staff during holiday weekends

- Nest ledge improvements
- **Future Management Needs**
- Continue to restrict access to top of cliff during breeding season

## 21. Red Rock (Hinesburg)

- **Site Description**
- South facing
- Small cliff in foothills of northern Green Mountains, on edge of Champlain Valley
- One eyrie used
- Well-vegetated with many perching snags
- High level of raven activity
- **Landowner**
- Type: Private
- **Game Warden Contact:** Chris Clark
- **Historic Use**
- No known historic use
- **Year of Recolonization:** 1997
- **Nest Success:** 3 fledglings/4 years
- **Potential/Known Impacts/Threats**
- Hikers, hawk watchers at top of cliff (documented)
- All terrain vehicle trail to top of cliff
- Logging
- **Past Management**
- Posted closure signs near top of cliff
- Attempt to put gravel on nest ledge, but were denied permission from landowner
- **Future Management Needs**
- Cooperation from landowner (A. Johnson) to restrict access to top of cliff

## 22. Sawyer Mountain (Fairlee)

- **Site Description**
- East facing
- Large north-south span of cliff
- Well-vegetated
- Several ledges
- Red pines on cliff favored by adults for perching
- Lowland cliff along Rte 5 overlooking Connecticut River
- Good viewing from railroad tracks on east side of Rte 5
- **Landowner**
- Type: Private
- **Game Warden Contact:** Evan Eastman
- **Historic Use**

- Well-documented site
- Previously used by turn-of-the-century egg collectors
- **Year of Recolonization:** 1997
- **Nest Success:** 8 fledglings/4 years
- **Potential/Known Impacts/Threats**
  - People at top of cliff
  - Road construction below cliff
  - Possible reactivation of railroad at base of cliff on opposite site of Rte 5
- **Past Management**
  - None
- **Future Management Needs**

### 23. Skitchewaug Mountain (Springfield)

- **Site Description**
  - East facing
  - Lowland cliff near rte 5 and overlooking Connecticut River
- **Landowner**  
Type: Private;
- **Game Warden Contact:** Philip Howland
- **Historic Use**
  - Well-documented site
  - Heavily visited by egg collectors and falconers 1921-1940
- **Year of Recolonization:** 1998
- **Nest Success:** 4 fledglings/3 years
- **Potential/Known Impacts/Threats**
  - Road construction at base of cliff
  - Uncooperative landowner of 2000 eyrie location
- **Past Management**
  - None
- **Future Management Needs**
  - Continue to build upon relationship with landowners (1999 eyrie location)
  - Explore possible landowner agreement (1999 eyrie location)

### 24. Smuggler's Notch (Cambridge)

- **Site Description**
  - Nest sites have been southwest facing
  - Large cliff area on north and south sides of the notch road
  - Many rock formations and hiding places
  - High elevation nest site
  - High recreational use
  - Difficult site to monitor
- **Landowner**  
Type: Private, ski corporation, surrounding lands public, state

Owner: Mount Mansfield Company, Inc.; Vermont Department of Forests, Parks, and Recreation

- **Game Warden Contact:** Dennis Reinhardt
- **Historic Use**
  - Known historic nest site
- **Year of Recolonization:** 1987
- **Nest Success:** 16 fledglings/13 years (no success since 1994)
- **Potential/Known Impacts/Threats**
  - Hikers, climbers (documented)
  - Aircraft - military and private gliders (documented)
  - Inclement weather
- **Past Management**
  - Cliff closure
    - signs at trailheads, base of cliff
  - Aircraft restrictions
- **Future Management Needs**
  - Attempt to determine cause of lack of success in recent years

## 25. Snake Mountain (Addison)

- **Site Description**
  - West facing
  - Long north-south span of cliff with old hotel foundation at center point
  - Lowland Champlain Valley site
  - Popular hiking spot
- **Landowner**

Type: Public, State wildlife management area
- **Game Warden Contact:** Robert McNight
- **Historic Use**
  - Known historic site
- **Year of Recolonization:** 2000
- **Nest Success:** 3 fledglings/1 year
- **Potential/Known Impacts/Threats**
  - Hikers to top of cliff - very popular
- **Past Management**
  - Closed southern end of top of cliff - to south of small pond at top April - August
- **Future Management Needs**
  - Continued closure of top of cliff, near area where birds are nesting
  - Public education programs at top and at trailhead to reduce human disturbance
- 

## 26. Stockbridge (Stockbridge)

- **Site Description**
  - South facing
  - 800 ft cliff with 400 ft of open face
  - Steep forested slope that drops down to White River
  - Private subdivision on top of cliff
  - High level of raven activity
- **Landowner**  
Type: Private
- **Game Warden Contact:** Doug Lawrence
- **Historic Use**
  - Well-documented site
  - Egg collectors and falconers recorded use from 1918-1949
  - Last recorded occupancy in 1949
- **Year of Recolonization:** 1998
- **Nest Success:** 3 fledglings/3 years
- **Potential/Known Impacts/Threats**
  - Further subdivision of land at top of cliff possible
  - Current cooperative landowners might leave
- **Past Management**
  - None
- **Future Management Needs**
  - Continued cooperation from subdivision landowners
  - Continue to respect privacy of current landowners - do not publish name of cliff
  - Explore long-term landowner agreement