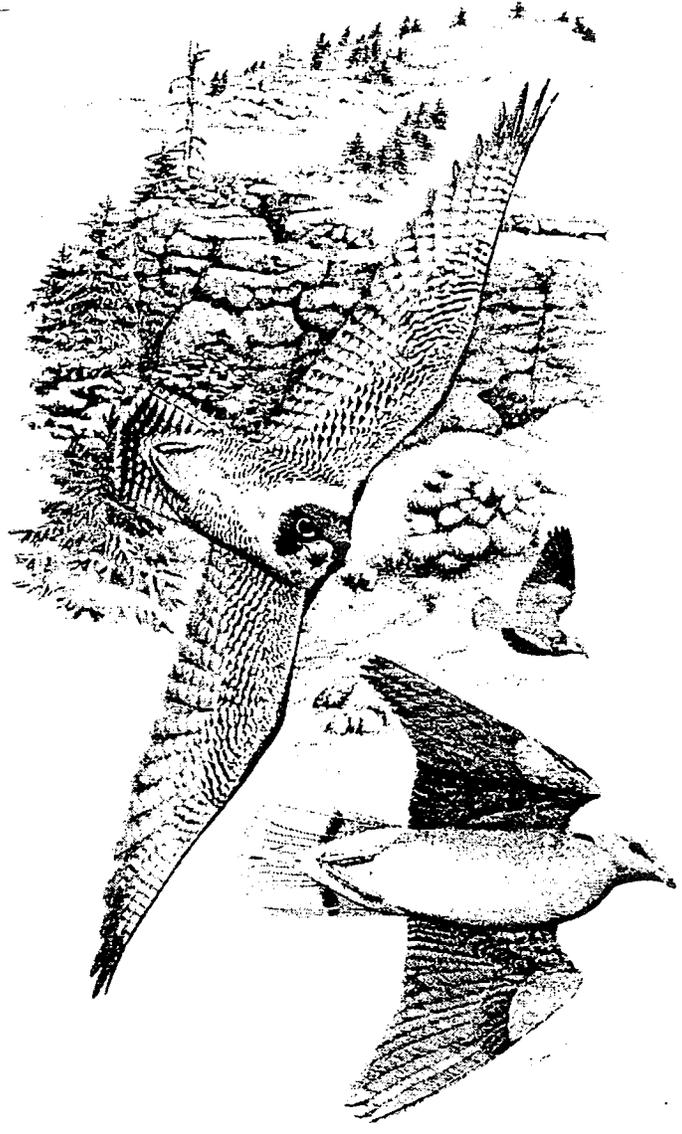


# PEREGRINE FALCON NEST MANAGEMENT, HACK SITE, AND CROSS-FOSTERING EFFORTS -1985-

Including information regarding other field and lab activities

*Droger*

*page 33*



## SANTA CRUZ PREDATORY BIRD RESEARCH GROUP

University of California  
Santa Cruz

Encompassing the activities of the  
Pacific States program of  
THE PEREGRINE FUND

PEREGRINE FALCON  
WILD NEST MANAGEMENT, HACK SITES,  
AND CROSS-FOSTER OPERATIONS

1985

With Information Regarding Other Field And Laboratory Activities

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University of California  
Santa Cruz

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THE PEREGRINE FUND  
in the Pacific states

Edited by

Tery Drager and Janet Linthicum

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## INTRODUCTION

The Santa Cruz Predatory Bird Research Group (SCPBRG), encompassing the Pacific states' activities of The Peregrine Fund Inc., continued and expanded its peregrine falcon management program in the 1985 season. We also began releases of two new species, aplomado falcons and elf owls. Three peregrine management techniques are summarized in this report. They include egg and young manipulations at wild nest sites to increase net productivity, cross-fostering efforts whereby captively bred peregrines are fledged from wild prairie falcon nests, and hacking, which is the process of releasing captively hatched peregrines into suitable habitats in the absence of adult falcons.

The field work began in early March when wild peregrines were first monitored for egg laying and the captive falcons began laying eggs in our breeding facilities on the Santa Cruz campus of the University of California. The field work continued into September when the final hacked peregrine reached independence at Muir Beach. Figure 1 shows the locations of the hack sites, cross-foster sites, and areas where nest management activities occurred. They extend from southern Washington to San Diego, California and east to Ruby Lakes, Nevada.

The primary rationale for this major reintroduction and management effort rests on direct evidence that wild peregrines in the region continue to lay thin-shelled eggs and that DDE residue levels remain high. Many incubating adults accidentally break their thin-shelled eggs or embryonic death occurs due to desiccation or improper gas exchange. By continuing to ensure that a large percentage of the wild peregrine population successfully fledge offspring each year, we help the population expand in numbers and distribution.

Extensive field surveys of potential peregrine nesting habitat indicate that we now know the locations of most peregrine nest sites in California. We surveyed over 80 active or historic nesting locations in 1985. There were 78 sites with pairs, at least 62 of which laid eggs. 48 of the pairs fledged at least one young, 33 without manipulation. 15 pairs fledged captively hatched young.

Oregon and Washington remain less surveyed. However, the peregrine populations in these states are expected to be small. Wild-produced falcons and falcons produced through

our efforts combine to build the foundation for a significant population expansion and stabilization. This foundation will be maintained until the primary causes of the peregrine falcon decline are eliminated and the status of this endangered species is secured.

In the eastern United States, The Peregrine Fund has established at least 40 pairs of falcons through its hacking program. In 1985, 47 young were fledged from established pairs and 117 young were released (73 hacked and 4 fostered). In most cases, the released falcons are utilizing artificial structures such as the towers from which they are released, as well as highway bridges in urban areas. In the Rocky Mountain region, The Peregrine Fund released 138 peregrines this year. Combined with the 62 peregrines released in the Pacific States, over 317 young peregrines were released during 1985 in The Peregrine Fund's national effort to reintroduce this endangered species.

The relatively large number of released falcons in these regions coupled with the large number of mature falcons now in the population has proven hacking to be a successful technique when implemented for more than five consecutive years. The result is a rapid expansion of nesting peregrines in a relatively small geographic area.

As noted above, there are three management techniques being implemented in the Pacific states region. By maximizing the productivity of the wild population and supplementing it with the captive-bred offspring, we are able to significantly bolster the annual productivity over a wide geographic area. We are unable, in most cases, to identify most of the banded falcons that appear at nesting sites as having originated from a hack site, from a cross-foster site, from manipulation of a wild nest site, or banded wild young. We do, however, have examples of successfully breeding adults produced by all three methods.

Concentrated recovery efforts from Santa Barbara to the Monterey Bay region have brought the population from one known pair in the early 1970s to 10 sites in 1985. Many of these adults are banded. While this increase in active sites is encouraging and indicative of the potential expansion through our techniques, eggshell thinning and high DDE residue levels show that without continued manipulations this population will rapidly decline again.

We plan to continue management at all of the 1985 sites and to expand the program to several new ones to the extent that young falcons are available through captive breeding and maximization of wild nest productivity. We are beginning to see the effects of intensive management and are well on our way to meeting our objectives.

The success of the 1985 field season required the participation of nearly 50 field biologists, observers, and rock climbers. Most of these people are students representing a wide range of colleges and universities in several states. We are proud of the effort and dedication each of these people put into the difficult and challenging task of maintaining a hack site or a wild nest site. Without their help, the peregrine falcon management program would not be possible. The following lists credit the 1985 staff, field team, and cooperating agencies and organizations.

#### SCPBRG STAFF

Brian James Walton, Coordinator, SCPBRG  
Lee Aulman, Release Specialist  
Victor Apanius, Release Specialist  
Karen Burnson, Raptor Breeding Assistant  
Gail Naylor, Raptor Breeding Assistant  
George Patracuola, Raptor Breeding Assistant  
John Moran, Raptor Breeding Assistant  
Tery Drager, Administrative Assistant  
Sheree Aulman, Office Manager  
Carl Thelander, Assistant to the President (TPF)  
Patricia Zenone, Research and Education Specialist  
Diane Patracuola, Food Production Assistant  
John Sutton, Food Production Assistant  
Janet Linthicum, Assistant at Large  
Craig Himmelwright, Assistant at Large

ASSISTANTS

Gail Ackerman	
Beth Adams	University of California, Santa Cruz
Mary Apanius	Santa Cruz Predatory Bird Research Group
Yvon Chouinard	Patagonia Software, Inc.
Peggy Cymerys	University of California, Santa Cruz
Joe Didonato	
Elizabeth Donahue	University of California, Santa Cruz
Clay Fletcher	
Brett Gaussoin	
Arnold Gerstell	University of California, Santa Cruz
Bruce Handel	University of California, Santa Cruz
Craig Harris	University of California, Santa Barbara
Craig Himmelwright	University of California, Santa Cruz
Wally Jarman	Bodega Bay Institute of Pollution Ecology
Jim Jennings	Western Foundation of Vertebrate Zoology
Lloyd Kiff	Western Foundation of Vertebrate Zoology
Vicki Jones-Kilpatrick	
Charles Kilpatrick	
D. Ross Laird	Santa Cruz Predatory Bird Research Group
Bill Lehman	University of California, Berkeley
Janet Linthicum	University of California, Santa Cruz
Don Lipoma	University of California, Santa Cruz
Linda Miller	Humboldt State University
Geoff Monk	Santa Cruz Predatory Bird Research Group
Nancy Naslund	University of California, Santa Cruz
Joel E. Pagel	University of Wisconsin - Stevens Point
Diane Patracuola	Santa Cruz Predatory Bird Research Group
John Roach	California Polytechnic State University
Ric Schlexer	
Claire Seminara	University of California, Santa Cruz
Steve Spangle	Humboldt State University
Glenn Stewart	Ventana Wilderness Sanctuary
Sam Sumida	Western Foundation of Vertebrate Zoology
Dean Thompson	California Polytechnic State University
Russell Thorstrom	Washington State University
Brian Woodbridge	Humboldt State University
Paul Young	

## AGENCIES

Arizona Game and Fish Department  
Bureau of Land Management  
California Department of Fish and Game  
California Department of Parks and Recreation  
City of San Francisco  
Cleveland National Forest  
Crater Lake National Park  
Fresno Audubon Society  
Golden Gate National Recreation Area  
Imperial National Wildlife Refuge, Arizona  
Institute for Wildlife Studies  
Inyo National Forest  
Kings Ranch  
Klamath National Forest  
Lassen National Forest  
Los Angeles Audubon Society  
Los Padres National Forest  
Monterey County Fish and Game Commission  
Morro Coast Audubon Society  
National Audubon Society, Western Region  
National Park Service  
Nevada Department of Wildlife  
Oregon Department of Fish and Wildlife  
Picacho State Recreation Area, California  
Plumas National Forest  
Ruby Lakes National Wildlife Refuge, Nevada  
Santa Clara Valley Audubon Society  
Santa Cruz Bird Club  
Santa Monica Mountains National Recreation Area  
Sequoia National Forest  
Shasta-Trinity National Forest  
Six Rivers National Forest  
Tulare Audubon Society  
University of California  
U.S. Air Force  
U.S. Army Corps of Engineers  
U.S. Bureau of Land Management  
U.S. Coast Guard  
U.S. Fish and Wildlife Service  
U.S. Forest Service  
U.S. Marine Corps  
U.S. Navy  
Ventana Wilderness Sanctuary  
Washington Department of Game  
Yosemite National Park

## ORGANIZATIONS

Ahmanson Foundation  
Atlantic Richfield Foundation  
Behr Stain Company  
Biosystems Analysis, Inc.  
Bodega Bay Institute of Pollution Ecology  
California Community Foundation  
Chemtronics, Inc.  
Chevron  
Chouinard Mountaineering  
Crocker Bank Foundation  
Great Pacific Ironworks  
General Electric Company  
Hewlett-Packard  
Mobil Oil Corporation  
Motorola Foundation  
Nathaniel and Margaret Owings Foundation  
Pacific Gas and Electric Company  
Patagonia Software  
Potts and Sibley Foundation  
Seaver Institute  
Silverado Silversmiths  
Standard Oil of California Foundation  
TRW Corporation  
Union Bank Foundation  
Union Oil Refineries of California  
Van Nuys (J.B. and Emily) Charities  
Western Foundation of Vertebrate Zoology  
Wildlife Research, Inc.

TABLE 1

Summary of 1985 peregrine fledgling production at wild nests, hack sites and cross-foster sites in California, Oregon, Washington and Nevada.

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	<u>CA</u>	<u>OR</u>	<u>WA</u>	<u>NV</u>	<u>TOTALS</u>
Number of known nesting pairs	62	0	6	1	69
Number of wild young fledged	76	0	7	?*	83
Number of captively hatched young fledged from wild nests	29	0	0	0	29
SUBTOTALS (fledged)	105	0	7	?*	112
Number of cross-foster sites	1	-	-	-	1
Number of young fledged	2	-	-	-	2
Number of hack sites	7	2	1	1	11
Number of young fledged	20	5	3**	3**	31
Total captively hatched young fledged	51	5	3	3	62
Total wild young fledged	76	?	7	?	83
Total of known fledged peregrines	127	5	10	3	145

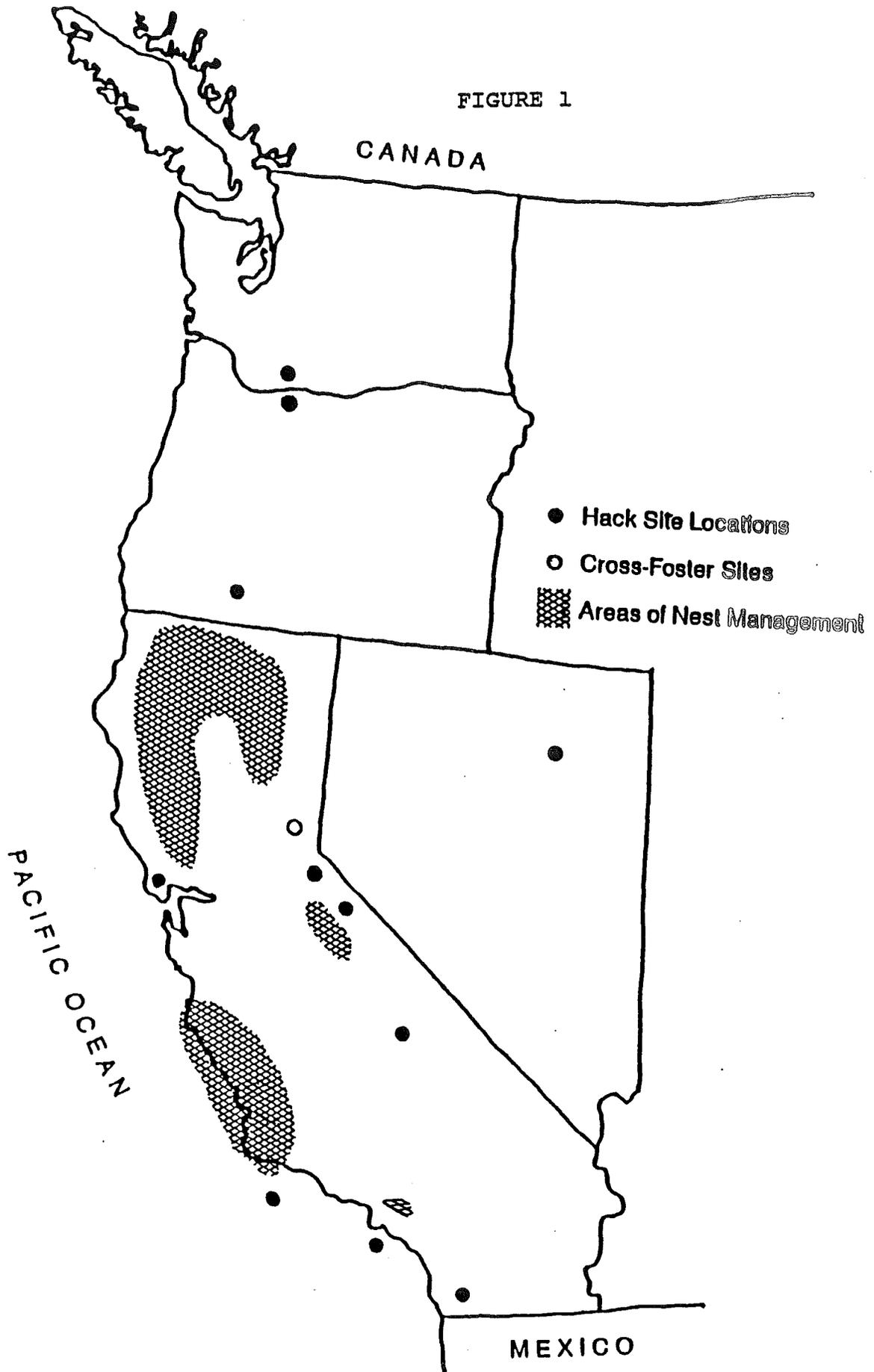
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\* unknown

\*\* 1 returned to Santa Cruz

FIGURE 1



## MANAGEMENT AT WILD PEREGRINE FALCON NEST SITES

The goal of the wild peregrine nest management program is to increase net productivity, (the number of fledged young) at as many nests as feasible. Due to DDE-induced eggshell thinning, a significant portion of the peregrine population each year fails to hatch their eggs or suffers reduced productivity. Most nests with a history of four to five continuous years of occupancy fall into this category. It appears that females accumulate DDE residues from several potential sources including residual DDE from applications prior to the DDT ban (1972), migratory prey species carrying residues from exposure to DDE in countries still using DDT, or other environmental sources not yet fully understood.

By the age of sexual maturity (three to four years), females have accumulated residues at levels that induce eggshell thinning (15-20 ppm wet weight). Eventually, they lay eggs that exceed the accepted 15+% threshold level of thinning at which the probability of an egg hatching becomes extremely low. Normal incubation by wild adults and the close proximity of eggs within the clutch contribute to the eggs breaking or denting, eventually becoming unhatchable.

The nest management program is designed to increase productivity through laboratory incubation of thin-shelled, wild peregrine eggs. Eggs are removed from wild nests and safely hatched at our University of California, Santa Cruz facility. Captively hatched young (either from these wild eggs or our captive breeders) are then placed in the wild nests.

Each year, addled peregrine eggs and eggshell fragments are collected by our climbers from wild nests. They are measured at the Western Foundation of Vertebrate Zoology and the contents are analyzed for DDE residue levels by the Bodega Bay Institute. Nests that fail or sites with eggs that have severe thinning are given high priority for management in the following year. An attempt is made to ensure fledging of two young by all nesting pairs of peregrines. This goal has not been completely attained each year. Some sites are visited too late to save the eggs from breakage, and sites able to hatch one egg are often not augmented with more young. Some sites may receive only one fostered young as we are not yet able to produce enough young in captivity to provide two to every failing nest.

The effect of our augmentation efforts has been a significant increase in net productivity. Table 1 shows the combined increase in productivity as a result of management activities including captive incubation and fostering, captive breeding, cross-fostering, and hacking.

In 1985, a large-scale cooperative management effort was undertaken by Lee Aulman and Victor Apanius (SCPBRG), Geoff Monk (U.S. Fish and Wildlife Service and SCPBRG) Monte Kirven (U.S. Bureau of Land Management), and numerous nest-site surveillance attendants. A total of 49 peregrine falcon eggs were collected from 15 wild nests; 42 were alive and feasible to hatch upon collection. Of these, 25 hatched, 21 survived and were released in the Pacific states.

Since 1977, when these management efforts began with peregrine falcons, we have collected 340 eggs; 253 of these were considered hatchable. Of these, 197 hatched with 181 surviving. We have released 309 young peregrines to date; 165 from wild eggs and 144 from captive breeding sources (Table 2).

Pesticide (DDE) contamination continues to be a very real problem plaguing the peregrine population. Relatively old females in coastal habitats and higher elevation regions lay extremely thin-shelled eggs. The same peregrine at the famous eyrie at Morro Rock, San Luis Obispo County, has produced eggs since 1977 with DDE residue levels ranging from 86 to 160 ppm (dry weight) and the shells are 25 to 36% thinner than normal pre-DDT eggshells. Several other females in central coastal, Sierran, and north coastal regions of California lay eggs of similarly poor condition. Without nest management we estimate that about one-third of the 60+ nesting pairs in California, Oregon, and Washington would fail to hatch eggs each year (relatively old breeding adults), one-third would have some eggs lost to breakage or desiccation, and the remaining one-third would fledge normal numbers of offspring (relatively young breeders in the population).

The following sections on cross-fostering and hacking detail these release techniques and their success.

TABLE 2.

Hatching and survival of wild eggs incubated at the  
Santa Cruz Predatory Bird Research Group facility since  
1977.

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	<u>YEAR</u>									
	1977	78	79	80	81	82	83	84	85	TOTAL
Sites with eggs collected	0	2	3	7	10	16	21	28	15	102
Eggs collected	0	6	14	27	38	59	66	81	49	340
Hatchable eggs	0	3	11	20	28	38	54	57	42	253
Eggs hatched	0	2	11	15	26	31	41	46	25	197
Young survived	0	2	5	15	25	30	40	43	21	181
Young released	0	2	5	9	21	30	40	37	21	165
Captive-bred young* released	2	0	0	0	6	20	30	44	42	144

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\*includes young donated by associates

## PEREGRINE HACK SITES

Hacking is a technique developed by falconers centuries ago whereby nestling falcons were fed on "hack carts" until their flight capabilities became developed. At that point they were trapped at the hack cart and their training was completed for sport use. We have adapted this method to develop a feasible technique to release fledgling falcons without the presence of adult peregrines. We do not trap the falcons when they reach the age of independence; instead, they are fed in our more sophisticated "hack boxes", which are placed high on cliffs or towers, until they are six-weeks-old. At that point they are released and fed for at least five weeks until they have instinctively learned to hunt and have reached a state of independence equal to young falcons fledged by wild adult peregrines. In every sense of the word they are now "wild" peregrines.

A disadvantage of using this technique is the absence of adult falcons to protect and defend the young falcons from predators, usually golden eagles and great horned owls. An advantage, however, is that we are able to begin reestablishing peregrines in areas where they no longer nest.

The technique involves two hack-site attendants monitoring the young falcons 24-hours a day. The falcons are provided with food through an externally accessible "food-chute". The attendants drop food to the falcons without being seen. As much as possible, the falcons are removed from any interactions with humans once they are placed in the hack box. Most young falcons are placed in the box at about 35-days-old and released at about 42-days-of-age. They are fitted with radio telemetry equipment just prior to release. These tiny radios are attached in a manner that allows them to fall off in less than 21 days. During the weeks following their release, the falcon's continue to come to the hack box as a source of food. During this time attendants monitor their activities and try to protect them from mishap. Soon they develop their own hunting skills and become less and less dependent on supplemental food. When this level of independence is reached, the hack-site is finished. The hack box is left on the cliff or tower as a possible nest site for returning falcons. Hack site locations are selected on the basis of numerous considerations. Primarily,

they are areas where we believe the young falcons have a high probability of survival. We cannot, however, predict what location they will ultimately select as their own nesting territory or nest cliff.

The following reports briefly summarize the results of the 1985 hack sites in California, Oregon, Washington, and Nevada. Table 3 summarizes the hack site program.

TABLE 3

Summary of 1985 hack-site program activities at eleven sites  
in California, Washington, Oregon and Nevada

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<u>Site</u>	<u>Number Released</u>	<u>Number Reaching Independence</u>	<u>Number Not Reaching Independence</u>	<u>Early Dispersal</u>
Bonneville Dam	2	2	0	0
Crater Lake	3	3	0	0
El Capitan	3	1	1	1
King's River	3	3	0	0
Lake Tahoe	3	3	0	0
Lee Vining	3	0	3*	0
Muir Beach	3	3	0	0
Ruby Lake	3	1	2**	0
San Miguel	3	3	0	0
Santa Catalina	4***	2	2	0
Table Mountain	3	2	1**	0
TOTAL	33	23 (69%)	9	1

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\* 3 returned to Santa Cruz

\*\* 1 returned to Santa Cruz

\*\*\* 2 from previous Lee Vining release

## BONNEVILLE DAM HACK SITE

Location: This site is on the Oregon side of the Columbia River Gorge. The hack tower is located on the eastern edge of a coniferous forest, approximately ten meters above the river. The box faces east across the river and up the Eagle Creek drainage. There is a railroad track and freeway bridge directly in front of the box.

Attendants: Bret Gaussoin, Peggy Cymerys, Russell Thorstrom and Craig Himmelwright.

History: The Columbia River Gorge is a historic peregrine falcon nesting area. The Bonneville Dam release site is part of the attempt to reestablish a nesting population in the gorge. This is the first year that Oregon has participated in the Columbia Gorge reintroduction program.

### Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./leg</u>	<u>Release Age</u>
No. 1	M	816-64351 - left	56 days
No. 2	M	816-64350 - right	66 days

Purchased by Oregon Department of Wildlife and the Army Corps of Engineers from Dan Thee who bought them from John Lejeune of British Columbia.

Placement in Hack Box: Both young were placed in the box by the Army Corps of Engineers.

Release from Hack Box: Walton released the birds at 1430 PDT on 25 July.

Results: Bird number 1 fledged at 2041 PDT on release day; 25 July. He appeared to miss a perch and flew across the river to roost. He was recovered from the ground the next morning and re-released the following day, 27 July. He never returned to the box after this, and began feeding at an alternate station four days after re-release.

Bird number 2 fledged on release day at 2150 PDT. On 28 July he returned to the box and fed there regularly for five days. On 2 August he began using the alternate feeding station and, along with bird number 1, continued to feed there. By day three of permanent release both birds were chasing and stooping at other avian species, primarily swallows. By

day six both were able to easily outfly other raptors and large birds. On 6 August bird number 2 began visiting a nearby peregrine hack-site at Table Mountain. He interacted with the birds there (occasionally eating quail) until the end of that release in mid August. Bird number 1 was last seen on 16 September at 109 days of age and bird number 2 on 26 August at 98 days of age.

Comments: These birds were unusually old for hacking and did not use the hack tower after release. Potential problems were myriad, but the attendants' persistence and good work resulted in hacking to independence.

Acknowledgements: This hack site was jointly funded by the U.S. Army Corps of Engineers and the Oregon Department of Fish and Wildlife. Both organizations provided superior logistical support as well. In particular, the success of this site was greatly helped by the support of the rangers working on the project. Thanks to Caroline Zarneckee and Joe Pesek.

CRATER LAKE HACK SITE

Location: This hack site is located at Crater Lake, Oregon, at an elevation of 7700 feet. The vegetation is dominated by upper montane coniferous forest types.

Attendants: Claire Seminara and Gail Ackerman

History: Crater Lake was the location of the only known active peregrine nest in Oregon in recent history. In 1983 both adult peregrines died during the breeding season and were replaced at the nest cliff by banded peregrines fostered during the previous two years. The new birds were too young for successful reproduction, and for this reason the area was selected as a hack-site. In 1983 three peregrines (two males and one female) were successfully released, and three more (all male) in 1984. No nesting activity was found in 1985, and three more peregrines were released.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release age</u>
No. 1	F	987-77264 - right	43 days
No. 2	M	816-64348 - left	42 days
No. 3	M	816-64349 - right	41 days

Placement in Box: Young were placed in the box by attendant Ross Laird at 1445 PDT on 12 July.

Release from Hack Box: Aulman, Patracuola and Laird released the falcons at 1235 on 19 July.

Results: Bird number 2 fledged on release day at 2055 PDT to a perch below the box. Birds numbers 1 and 3 were flushed into flight by on the second day of release by an immature golden eagle. Both escaped injury and had returned to the hack box by the next morning. That day an adult male peregrine (no band seen) was first observed in the area. The falcons chased invertebrates and birds after 27 July, and all dispersed normally.

Comments: Pine Martins repeatedly took quail from the box and four were trapped and relocated. The adult male peregrine frequented the hack area and became aggressive (especially toward the males). His presence was therefore discouraged. Other raptors, including golden eagles, were

also common and presented potential problems.

Acknowledgements: This hack site was funded by the National Park Service and the Oregon Department of Fish and Wildlife. Roger Andrascik, Jerry McCrea, John Jarvis, the National Park Service back country crew, and Ralph Opp deserve thanks for their help. The Park Service loaned equipment. Thanks also to Ross Laird for his field assistance.

EL CAPITAN HACK SITE

Location: The site is located on El Cajon Mountain, San Diego County, California, approximately five miles northeast of Lakeside. The 400 foot cliff overlooks the San Diego River Valley and El Capitan Reservoir. The dominant vegetation is southern coastal mixed chaparral, with some oak riparian areas in the river bottom. The lands are administered by the Cleveland National Forest.

Attendants: Linda Miller, Don Lipoma, John Roach, and Dan Loughman.

History: El Capitan is a historical nesting location for peregrine falcons. Three peregrines were hacked out successfully in 1983 (two males and one female). In 1984 three males were released, but one was killed by a grey fox.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	M	816-64347 - left	46 days
No. 2	F	987-77263 - left	45 days
No. 3	F	987-77262 - right	42 days

Placement in Hack box: The young were placed in the box by Walton on 10 July.

Release from Hack Box: Brimm and Walton released the birds on 17 July.

Results: Bird number 1 fledged on day one at 1215 PDT, and flew out of sight. He was frequently seen flying until day four, when his signal was last picked up coming from near the box. He was never observed again and was assumed to have flown out of the area. Number 2 fledged on day five but was killed on day 10 apparently by a predator. Remains were found below and southeast of the hack box amid fox sign. Evidence suggested that she had been killed while roosting by a grey fox. Number 3 was last seen on 27 August, 42 days after release.

Comments: Number 3 developed normally after the other birds were gone. She was seen chasing other raptors and large birds by day eight and chasing prey by day 21.

Acknowledgements: This site was funded by the Cleveland National Forest and the U.S. Forest Service. Russ Lajoie, Judy Sheppard, Marabeth and Dan of the Cleveland National Forest; Joanne Massirio, Art Scolari, Dan Brimm, Ed Franz, Craig Culver, Channel 10 and 8 news teams and the local sheriffs deserve thanks.

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## KING'S CANYON HACK SITE

Location: The site is located along the south fork of the King's River in the Sequoia National Forest. The hack box is on a cliff approximately 2000 feet above the river. The cliff is surrounded by a mixed forest of pine, fir and oaks.

Attendants: Joseph DiDonato and Bruce Handel

History: In 1983, three falcons were placed in a hack box on Windy Cliffs, 7 miles downstream from the present site. Predation by golden eagles that year caused us to move the site to its present location in 1984, where one female and two males were successfully released.

### Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	F	987-77259 - left	42 days
No. 2	M	816-64346 - left	44 days
No. 3	M	816-64345 - right	45 days

Placement in Hack Box: Young were placed in the box on 1 July by Lee Aulman.

Release from Hack Box: Aulman released the falcons at 1000 PDT on 9 July.

Results: Number 2 fledged on release day, number 3 on day two and number 1 on day four. All three birds developed well, and were seen harassing raptors, and chasing prey such as white-throated swifts and violet green swallows. By the end of the hack all three birds had developed competent flight skills. Both males were last seen on 19 August and the female on 21 August.

Comments: The falcons behaved typically throughout the period, beginning with perch to perch flights, and progressing to sibling pursuit and mock combat. Territorial reactions were observed towards other raptors and towards humans.

The female was younger than the males by several days and was behind in ability for about half of the hacking period. This resulted in her being harassed by the males when she first began flying. She was generally aggressive with her

food and mantled over it. Toward the end of the hacking period all three falcons exhibited excellent aerial ability.

Acknowledgements: This hack site was funded by the U.S. Forest Service and the Sequoia National Forest. Thanks to to the following people and organizations for their cooperation and assistance. In particular Mary Allison for her cooperation, coordination and supplies. Gordon Heebner for enabling us to be flown into a National Wilderness Area. Bruce Waldron, District Ranger, for his cooperation. The California Highway Patrol for the use of their helicopter and their pilots Mike Brown and Jerry Ennis. The National Park Service for their cooperation and for providing us with freezer space, a campsite, and shower. Thanks go to District Ranger Marvin Miller, Rangers Debbie Jo Bird and Scott Williams, the naturalists and Ron Cook in maintenance. Janet Zwanziger helped observe for a weekend. SCPBRG personnel who also helped out were Lee Aulman, Chuck Kilpatrick, Vicki Jones, and John Roach.

LAKE TAHOE HACK SITE

Location: The site is south of Lake Tahoe, above the Christmas Valley. It is surrounded by red fir and Jeffrey pine, with several riparian corridors nearby. The immediate area is a scrub community dominated by huckleberry oak, mountain mahogany and sagebrush. The box is on a cliff, and faces north toward the lake.

Attendants: Elizabeth Adams and Elizabeth Donahue

History: This is the first time peregrines have been released at this site.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	M	816-64343 - right	43 days
No. 2	F	987-77256 - left	44 days
No. 3	F	987-77257 - right	44 days

Placement in Hack Box: The falcons were placed in the box on 28 June by Aulman

Release from Hack Box: Aulman and Patracuola released the birds on 3 July at 0630.

Results: Several raptors including golden eagles were seen on release day, but no serious problems resulted. The male fledged on day two and both females on day four. Due to the topography of the site no hunting behavior was seen, but unofficial sightings of peregrines were reported at Lake Tahoe. Number 1 (male) was last seen on 8 August, number 2 on 14 August, and number 3 on 17 August.

Comments: All three birds were healthy and alert. They were wary of humans and aggressive toward other raptors. The smaller of the two females (number 3) quickly came to outmaneuver the other. The birds developed well and the site was a success.

Acknowledgements: This hack site was funded by the U.S. Forest Service and the Lake Tahoe Basin Management Unit. Thanks to Steve Widowski and Holland and Keith Kennedy. Lee Aulman, Diane Patracuola, Ross Laird and Peggy Cymerys of the SCPBRG also provided support.

LEE VINING HACK SITE

Location: This site is located on the east slope of the Sierra Nevada in Mono County, CA. The hack box is on a rocky hill surrounded by sage covered hillsides, overlooking Lee Vining Canyon and Mono Lake. A small creek with aspen groves is in the immediate area.

Attendants: Peggy Cymerys, Arnold Gerstell and Janet Linthicum.

History: Three peregrines (two males and one female) were successfully released at this site in 1983. Six peregrines were released here in 1984. One broke its wing and was recovered. In addition to the remaining five hack birds, two or possibly three subadults were seen at the 1984 hack site. One of the subadults (male) frequented and fed at the hack area.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	M	816-64342 - right	45 days
No. 2	F	987-77254 - left	44 days
No. 3	F	987-77255 - right	43 days

Placement in Hack Box: Aulman and Patracuola placed the birds in the hack box on 19 June.

Release from Hack Box: Aulman released the falcons at 0645 on 24 June.

Results: The male fledged on release day. The winds became strong and he was blown down Lee Vining Canyon, but he roosted safely and returned to the hack area the next morning. Neither female fledged until the third morning in the dim light of predawn. Just prior to this, movement had been seen at the feeding station which was very near the hack box. After this, none of the falcons would eat the food, although all three saw it and showed extreme interest in it. They often hovered over it or approached on the ground. We surmised that the movement seen near the quail on day three was a large predator. Two bobcats had been at the hack box the previous year. Such a predator may have frightened the females into first flight and made the birds unwilling to land at the food station. Up to 14 quail were being eaten at night. The attendants didn't place food at the hack box proper because the falcons were roosting there. The three

birds were recovered on 29 July, 30 June and 1 July (days five through seven) and returned to the SCPBRG.

Comments: Bobcats were seen at the hack box in 1984. We cannot explain the falcons reluctance to eat the plainly visible quail in any other way than that stated above.

Acknowledgements: Clinton McCarthy of the U.S. Forest Service, as well as Terri Russi and Linda Estrada of the U.S. Bureau of Land Management deserve thanks for their support.

MUIR BEACH HACK SITE

Location: The site is located in the Marin Headlands, just east of Muir Beach. The hack box is located on a rocky face 400 feet above the ocean, facing east. This area is within the boundaries of the Golden Gate National Recreation Area and is under the administration of the National Park Service. The dominant form of vegetation in the surrounding area is coastal shrub.

Attendants: Joseph DiDonato and Craig Himmelwright.

History: The area of release is a historic peregrine falcon nest site. This is the third consecutive year of hacking in a proposed five year study. Three birds were released in 1983 and in 1984.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	F	987-77276 - Left	41 days
No. 2	F	987-77275 - Right	43 days
No. 3	F	987-77274 - Left	45 days

Placement in Hack Box: The birds were placed in the hack box on 9 August.

Release from Hack Box: The birds were released from the hack box on 16 August at 0845 PDT.

Results: On the day of release two of the falcons came from behind the hide within 35 minutes and were followed by the third bird one hour later. Each bird ate and wing-flapped.

Birds numbers 2 and 3 fledged the next day and number 1 fledged a day later. Bird number 2 chased a turkey vulture four days after she was released. Eight days after release bird number 3 was observed making her first tail-chase on a California gull, and bird number 1 was seen tail-chasing an adult red-tailed hawk.

Within two weeks the falcons were capable of aerial pursuit and capture of large insects and butterflies. All three birds had developed the ability to perform vertical stoops, usually at other avian targets, by twelve days on the wing.

Comments: Due to this site being located in an area of high public use and accessibility, the falcons became quite accustomed to human presence. Fortunately, they remained cautious of close interactions and cacked and flushed when people approach. Their curiosity led them to follow both runners and bike riders as they moved along the trails near the site. All three peregrines pursued nearly every species of bird in the area, some with more intensity than others. Two weeks after the hacksite closed, a young peregrine released in Idaho was seen at the site.

Acknowledgements: This hack site was funded by the National Park Service. William Oswald, David Gregoire, Edward Tindell, The Independent Journal and the San Francisco Chronicle deserve thanks for their time and effort.

RUBY LAKES HACK SITE

Location: The hack site is located on the Ruby Lakes National Wildlife Refuge near Elko, Nevada. The tower is approximately 200 feet from the east shoreline of the Ruby Marsh, in a flat plain of sagebrush and rye grass.

Attendants: Arnold Gerstell and Janet Linthicum.

History: Peregrines were historically seen in the Ruby Valley area (Herron, personal communication). Three falcons (one male and two female) were hacked out in 1984. The male never returned to the box after fledging, but the two females dispersed normally.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	M	816-64322 - right	43 days
No. 2	F	987-77261 - right	41 days
No. 3	F	987-77260 - left	39 days

Placement in Hack Box: Herron placed the birds in the box on 9 July.

Release from Hack Box: Aulman released the birds on 15 July at 0900.

Results: The male fell from the tower on release day and returned the next morning. Thereafter he flew and behaved normally until the night of day 6 when he left the box after dark. He was later found drowned in the marsh. Neither female flew until day four, when number 3 fell from the tower. The other female (number 2) flushed as we retrieved the younger bird, who was not yet able to fly. Number 2 returned to the tower the next day. Number 3 was again placed on the tower, but fell off a second time and was returned to Santa Cruz.

Comments: Number 2 developed normally after her cohorts were gone. The level terrain of the valley allowed observation of minute detail in flying development - e.g. the peregrine was out-flown by common nighthawks or northern harriers one day and attendants watched her learn to outmaneuver them two days later.

This tower site has many real and potential problems including predators such as coyotes, great horned owls and large biting flies which could distract or even threaten the falcons. Due to these conditions we are considering re-locating the hack box in the future.

Acknowledgements: This hack site was funded by the Nevada Department of Wildlife. Special thanks to Gary Herron for making this release possible and to Carol Evans and the staff at Ruby Lakes National Wildlife Refuge for their help.

SAN MIGUEL ISLAND HACK SITE

Location: The hack box is located on San Miguel Island, in the Channel Islands National Park, California. It is on a six foot tower on a north-facing bluff that is exposed to prevailing northeast winds. The bluff is 400 feet high and is covered with low-growing shrubs and grasses with an occasional rock outcropping.

Attendants: Vicki Jones and Chuck Kilpatrick.

History: This was the first year we have had a hack site on this island.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	M	816-64353 - right	43 days
No. 2	F	987-77273 - right	44 days
No. 3	M	816-64352 - left	40 days

Placement in Hack Box: The birds were placed in the box on 6 August.

Release from Hack Box: The birds were released from the hack box on 13 August at 1600.

Results: By day 3, all falcons had fledged and returned to the box. Because they spent most of their time away from the box during the hacking process, and dispersed early, no hunting behavior was observed from any of the birds. There was little pursuit of each other during play. They generally would tail-chase for a short time after becoming air-born, then separate and soar out of sight. On two occasions, a male was observed tagging the tops of bushes and once carried a piece for a short distance before dropping it.

All three birds used a communal roost when they were present at the site; a short cliff just below the rim of the bluff on which the hack box was located. They used it sporadically for two and a half weeks, and subsequently roosted away from the site. All the falcons dispersed by day 27.

Comments: Bird number 1 was a proficient flyer. He often initiated mock-combat and tail chases with the other falcons. He appeared to range farther at an earlier time on the wing than the other falcons. Bird number 2 spent most of the time during the first week and a half on the box eating or perched close by. Her flight was sluggish and her aerial maneuverability developed later than the males. She exhibited the most aggression by mantling over her food and by footing the prey of the males. Bird number 3 was the smallest and most maneuverable, although he was not as proficient at soaring. He was very vocal, cacking at other raptors and at humans. Bird number 3 also was often in the company of the female during flights, perching and roosting.

Acknowledgements: This site was funded by the Channel Islands National Park. Special thanks go to Frank Ugolini, project coordinator, who assisted with flights, supplies, observations and support; Nick Whelan who assisted with flights, supplies and support; Tom Cox, Island Ranger, and Marilyn Martin, relief Ranger.

SANTA CATALINA ISLAND HACK SITE

Location: The hack box is located on an 18 foot hack tower near Mount Orizaba on Santa Catalina Island. It is surrounded by sparse chaparral and cactus.

Attendant: Craig Harris

History: On 8 April 1904, peregrine falcon eggs were collected at Long Point by George Willett. A second set was collected on 5 May 1905 at another location on the island by O.W. Howard. There are no recent records of peregrines nesting on Catalina Island. The latest report is by R. Arnold, who saw peregrines chasing bald eagles and being chased by ravens on 15 April 1938. Three peregrines were successfully released from a tower near the southern slope of Mount Orizaba in 1983. In 1984 three were released at a different hack site near Two Harbors. This will be the third year of our hacking program on this island. In 1985 we used the Mt. Orizaba site.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	M	816-64316 - left	43 days
No. 2	M	816-64313 - right	44 days
No. 3	F	987-77255 - right	60 days
No. 4	F	987-77254 - left	61 days

Placement in Hack Box: The two males were placed in the hack box on 5 July, seven days before release. The two females came from a previous release site in Lee Vining Canyon which had been unsuccessful. They had spent several days in Santa Cruz before being sent to Catalina.

The males were in the box for five days before the female's arrived. During these initial days on the island the temperatures reached the lower 100's. Bird number 1 was more active than bird number 2 during this time. After the females arrived, the males became timid and remained in the corners of the box for the majority of the pre-release period. There was a thunder and lightning storm on 9 July during which the falcons cacked throughout the night.

Release from Hack Box: The birds were released on 11 July. Personnel present were Craig Harris, Merlyn Felton and Mora Solomon. After the release all four falcons remained on the tower and by 1100 had eaten and exercised their wings.

Results: Both females had fledged during their release at another hack site and therefore were capable of sustained flight when they were released on Catalina. They each took several flights on the first day of release and had no problem orienting back to the box. Neither male fledged until 2030, when bird number 2 stretched his wings and was blown off the box. The other male also took off at this time. Neither male returned to the box that night and only one female roosted there.

On 13 July one male (number 2) was killed by a feral pig while roosting on the ground. The other male did not return to the box after fledging, nor did he eat food left for him at the various sites where he roosted. He was killed by a male red-tailed hawk on 19 July. Dave Garcelon reported seeing one of the females collide with a power line at Middle Ranch on 27 July. No apparent injury resulted. He also reported seeing both females harass bald eagles at the Salta Verde platform. The females dispersed normally.

Comments: One male was strong and very alert. Although his behavior and flight patterns indicated that he was a healthy male, the older females apparently intimidated him enough to keep him from returning to the box.

The other male was small and timid compared to the females. When the females were placed in the box he appeared to be intimidated by them.

Both females were strong and active with excellent hunting and flying skills. They did, however, have a difficult time flushing unwanted ravens from the hack box.

The decision by Walton to re-release the two females salvaged from the Lee Vining hack site by placing them in the hack box at Catalina with two young males was a mistake. Although the release of the females was a success, the males were intimidated and their failure to reach independence is attributed to this incorrect technique.

Acknowledgements: Thanks go to Dave Garcelon, David Leal and Gary Roemer from the Institute for Wildlife Studies for their support and guidance. Also many thanks to Gary Boberg who supplied food for the peregrines and transported the female peregrines to the island.

TABLE MOUNTAIN HACK SITE

Location: The hack site is located in the southwestern Cas-  
cades overlooking the Columbia River in Washington. The  
mountain is composed of Columbia River basalt and lies on  
the north side of the river at an elevation of 3500 feet.  
The hack box is situated on a southeastern bench at an  
elevation of 2500 feet. The surrounding area is character-  
ized by Douglas fir forests, talus slopes and a large  
meadow.

Attendants: Peggy Cymerys and Russell Thorstrom.

History: There is a long history of peregrine falcons nest-  
ing in the Columbia River Gorge. However, there have been  
no nest sites since the 1960s. 1983 was the first year Table  
Mountain had been used as a hack site. In 1982 a hack site  
was established on Beacon Rock in this area but moved  
upriver in 1983 to avoid local predators. There was no hack  
site in 1984.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	F	987-77265 - right	43 days
No. 2	F	987-77266 - left	44 days
No. 3	F	987-77267 - left	45 days

Placement in Hack Box: The birds were placed in the hack box  
on 12 July.

Release from Hack Box: The birds were released on 20 July.

Results: Numbers 1 and 3 fledged at dusk on the day of  
release. Both roosted away from the box for two nights.  
They made short perch to perch flights and returned to the  
box on day three. Number 2 dropped her transmitter before  
fledging on day four.

Number 3 was not observed near the box from 29 July to 1  
August. On 1 August she cacked at a common raven and was  
thereby located near a cliff face below the box. She  
flushed, flapped briefly, then glided out of sight with her  
left wing-tip dangling (she had lost her transmitter previ-  
ously). She could not be located during subsequent search-  
ing, but returned to the box on 6 August. She remained in

the box area after this but could only reach the box on gusty days. Her flapping capability was poor and she mostly glided. She was captured and returned to SCPBRG with a broken radius. Numbers 1 and 2 dispersed by day 27.

Comments: On 6 August a male peregrine falcon being released from a hack site at Bonneville Dam began frequenting the Table Mountain site. He mainly interacted with numbers 1 and 2 and frequently came and "played" with those two females for the rest of the hack. During the second week of September, number 1 was found dead in Snohomish, Washington, approximately 160 miles northwest of Table Mountain. She had apparently been hit by a car.

Acknowledgements: The Washington Department of Game funded this site. Thanks go to Tara Zimmerman and Fred Dobler for their assistance and support.

## CROSS-FOSTERING

Cross-fostering of peregrine falcon nestlings into nests of adult prairie falcons is another method used in 1985 to increase the number of peregrine falcon fledglings.

Cross-fostering was tested by The Peregrine Fund in the Rocky Mountain region. In California, we tested the technique in 1980 and 1981 by cross-fostering nine prairie falcons--three young into each of three red-tailed hawk nests in trees. All nine falcons fledged successfully. It has been difficult to follow each of these birds, but at least two females have successfully bred with wild male prairie falcons near the Pinnacles National Monument in California. Skeptics of the technique fear that cross-fostered birds might select mates of the wrong species or nest sites not typically used. The successful breeding observed by cross-fostered prairie falcons is encouragement that the technique is feasible for large-scale use without detrimental effects.

We began our cross-fostering of peregrines in 1982 by placing two 15-to 25-day-old peregrines into prairie falcon nests and moving the young prairie falcons to the nests of conspecifics with young of approximately the same age. Nine cross-fostering attempts have already been completed--two in 1982, three in 1983, three in 1984, and 1 in 1985. All 18 young peregrine falcons have successfully fledged from the prairie falcon nests. Prairie falcon nest sites in historic peregrine nesting territories are selected. Also, an effort is made to select pairs of prairie falcons primarily preying on birds rather than mammals.

One female peregrine cross-fostered in 1982 in San Luis Obispo County, California, took up residence on the Oakland Bay Bridge in San Francisco Bay and was seen frequently with an adult male peregrine on the Kaiser Building in downtown Oakland. The male is banded and from a nest site in Napa County where egg and young manipulations are conducted. This cross-fostered female peregrine selected an urban, industrialized environment instead of near-wilderness, mountainous terrain similar to her fledging location. Her diet in the nest was primarily band-tailed pigeons, swallows, and other small- to medium-sized birds. In Oakland, she fed on gulls, terns, and to a large degree, feral domestic pigeons. She was a prime example of the opportunistic nature of this highly adaptable but endangered species. She was found shot before the 1984 breeding season on the Oakland Bay Bridge.

In the fall of 1984, an adult male peregrine was captured alive on a fishing boat within sight of the active nesting site offshore from the Diablo Canyon Nuclear Power Plant south of Morro Bay, California. Before releasing the bird, the fisherman recorded the peregrine's band number. This peregrine had fledged from our Los Padres cross-foster site with prairie falcons as foster parents.

A major problem with hacking is avoided using the cross-fostering technique. Predation of young falcons at hack sites by golden eagles and great horned owls is lessened due to the presence of adult falcons who defend the nesting territory from intrusion. Also, cross-fostering is less labor-intensive; no radio telemetry is required, a hack box is not put in place, and a supplemental food source is not needed. Only one attendant is required to monitor the cross-fostering effort, while the adult prairie falcons do the majority of the work usually assigned to our hack-site attendants.

We plan to continue cross-fostering efforts to economically increase our peregrine management efforts; increasing net productivity and expanding the geographic distribution of peregrines into previously occupied habitats.

DIXIE MOUNTAIN CROSS-FOSTER SITE

Location: Dixie Mountain is located approximately 20 miles northwest of the town of Chilcoot in the Plumas National Forest, Plumas County, California, at an elevation of 8323 feet. The primary vegetation in the area consists of Jeffrey pine, western white pine and western juniper with frequent stands of manzanita, snowbush and Great Basin sage scrub. Large outcroppings of volcanic rock, most of which have a south to southwest exposure, dominate the mountain top. The open valleys near the eyrie and the grassy meadows near Frenchman Lake, eight miles to the north, provide adequate hunting grounds.

Attendant: Gail Ackerman

History: In 1984 a hack site was attempted here, but due to prairie falcon activity in the area it was terminated and the peregrine young removed. This is the first year a cross-foster site was done.

Description of Released Peregrines:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Fledging Age</u>
No. 1	F	987-77253 - Right	48 days
No. 2	M	816-64341 - Right	45 days

Placement at Nest: On 10 June the young peregrines were placed in the eyrie at 30 and 31 days of age.

Fledged from Nest: On 24 June the male peregrine took his first flight. The female fledged on 26 June.

Results: Once the young fledged, they flew after the adults and begged for food. They also soon began to chase each other, engaging in mock combat. The male was the faster and more agile flier, and would often turn complex somersaults around the female. He would fly upside down and grasp her by the feet. Only one potential predator was sighted between 12 June and 4 July (an adult golden eagle).

Comments: This cross-fostering project was a success in that the adult prairie falcons readily accepted the young peregrine falcons as their own and raised them successfully. The adult female prairie falcon disappeared on 27 July, but the male continued to successfully feed the young. After

the attendant left the site the peregrines were seen moving farther away from the previously used perches and were probably nearing independence. Since only one fledgling was seen on the last three observations it is difficult to determine if both peregrine young were still dependent on the male adult or if one had already dispersed.

Acknowledgements: This effort was funded by the U.S. Forest Service and Plumas National Forest. Our thanks to Bob Montroni and Tom Radcliffe of the U.S. Forest Service for their assistance and encouragement.

APLOMADO FALCONS

KING RANCH HACK SITE

Location: The release site is located in Kleberg County, Texas, approximately five miles northwest of Riviera, off Highway 77. It is within the Santa Cruz pasture of the King Ranch. The habitat is a brush/grassland savanna mosaic, dominated by mesquite and sweet acacia. The topography is flat overall, and the climate is hot and humid. Thunder showers are frequent and often last all day.

Attendants: Craig Himmelwright and Russell Thorstrom

History: This was the first year that we attempted to release aplomado falcons.

Description of Released Aplomados:

	<u>Sex</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	F	745-71012 Left	43 days
No. 2	M	745-71011 Right	41 days
No. 3	F	745-71014 Left	41 days
No. 4	M	614-11779 Right	43 days

Placement in Hack Box: The first two birds were placed in the box on 5 June at 1800 CDT. The second pair was placed in the box at 1830 on 28 June.

Release from Hack Box: The first two birds were released from the hack box on 10 June by Walton. The second pair was released on 7 July.

Results: After the first release the female flew immediately and the male within one hour. Both birds were mobbed by scissor-tailed flycatchers. Over the next few days the flycatchers drove them away from the area. The falcons never returned to the box to feed, nor did they come to food boards placed near their roost spots. Because of the incessant mobbing, the falcons burrowed into thick bushes before roost time, and so were fairly safe from owls and other predators. The female finally became so weak while showing no sign of returning to the food that she was caught in her roost after dark on 12 June, three days after release.

By 11 June the male had left the area, and entered dense brush country four miles WNW of the hack box. When he was

located at dark, great-horned owls were calling on either side of him, approximately 40-50 meters away. He was caught in his roost and returned to the box that evening.

The birds were kept in the hack box until 2 July at 1637 when they were re-released. Prior to this second release, scissor-tailed flycatchers were collected from the territories around the release site. In addition, food boards were placed in view of the birds, and food was placed on them every morning before dawn, so that the birds could see these feeding stations the entire time they were in the box.

The female took off 20 minutes after release and flew NW, downwind, and disappeared two miles away. The male flew ten hours later, and flew downwind about one mile. At 1822 he again flew downwind, and was lost from sight.

The attendants followed both birds by car, but signals were not picked up. The search continued until 0300 on 3 July over the entire area of the ranch to the west. Over the next few days 40 hours of search by car and six hours of aerial tracking turned up no results.

The second two falcons were released on 7 July at 0630. There was no harassment by flycatchers. The female flew downhill at 2015 hours and roosted on the ground. She was recovered and placed in a cardboard box mounted to a food board, and placed in a tree.

The male made four flights, returning to the box or perching nearby. He roosted in the open at the box. Despite the attendants vigil until 0100 hours, he was killed by a great horned-owl that night.

The female was re-released the next morning by pulling down a cardboard flap on the box she was in. That evening she moved to the top of the tree, and was taken by a great-horned owl.

Comments: This was our first attempt to release aplomado falcons. While this year's release was unsuccessful, we hope to have better results in the future, based partly on what we learned this year. We plan to relocate the box to a much more open grassland, next to a tree clump. This will reduce the fly-catcher and owl problem. We also plan to add branches to the hackbox to facilitate easier perching.

Acknowledgements: Thanks go to the following: Tio Kleberg, Bill and Jim Kiel of the King Ranch; Mark Kopeny, biologist; John and Linda Howe of Kingsville; and Chris Pease at the Texas A and I Field Station.

ELF OWLS

PIUTE CREEK HACK SITE

Location: Piute Creek is located in the Piute Mountain Range, which runs parallel to the Colorado River in the eastern portion of the Mojave Desert.

The enclosure was placed on a raised, flat, sandy area approximately 10 feet from the current stream bed. The site was about two feet above the stream.

Attendants: Vicki Jones and Charles Kilpatrick

History: This is the first elf owl hack site.

Description of Released Elf Owls:

	<u>Weight</u>	<u>Federal Band No./Leg</u>	<u>Release Age</u>
No. 1	38.2 g	912-23405 - left	1 year +
No. 2	36.6 g	912-23403 - right	1 year +
No. 3	(died before weighed, banded and released)		

Placement in Hack Box: Three owls were released into the enclosure on 19 June at approximately 0800. All three birds flew around inside the enclosure and did not show any signs of stress. They showed no difficulty in capturing sufficient amounts of prey. On 25 June one owl was found dead inside the enclosure.

Release from Hack Box: On the morning of 13 July the birds were banded and weighed. The gold identification bands were replaced by federal bands and a hole was cut in the enclosure.

Results: At 2027 both birds were seen leaving the enclosure. On the morning of 14 July bird number 1 was seen in the enclosure where it spent the day. On 15 July there were no owls in the enclosure. No sound or sight of the elf owls was noted after the evening of 14 July.

Comments: Piute creek is periodically scoured by flash floods and therefore a location for the enclosure was chosen that would minimize the risk of endangering the owls, but would provide adequate shade during the long hot days of summer. An area that would provide an indigenous food source capable of passing through the netting was also an

important consideration.

We are adapting techniques successfully developed for other species by the Peregrine Fund for these extremely small and nocturnal predators. In the next several years we hope to further develop techniques and to increase the number of owls released.

Acknowledgements: This site was funded by the U.S. Bureau of Land Management. Thanks to Jim Bickett for his help.

HARRIS' HAWKS

IMPERIAL NATIONAL WILDLIFE REFUGE HACK SITE

Location: The Imperial National Wildlife Refuge includes parts of the main course of the Colorado River, its backwater lakes, marshes and adjoining watersheds, and the Lower Sonoran Desert in both California and Arizona. The hack box is located on the Arizona side in the refuge's "farm unit" where crop lands and marshes are managed to provide more desirable habitat. The marsh communities are dominated by introduced cane, cattail, and bullrush. The hack area consists of an isolated group of willow trees and two osprey platform towers that are surrounded by dense stands of cane.

Attendants: Charles Kilpatrick, Vicki Jones, Steve Spangle and Lee Aulman.

History: This is the first time we have used this site for hacking.

Description of Released Harris' hawks:

	<u>Sex</u>	<u>Federal Band No.</u>	<u>Age</u>	<u>Telemetry</u>
No. 1	F	877-78494	Adult	None
No. 2	F	877-78468	Adult	None
No. 3	F	877-78426	Adult	None
No. 4	F	877-78403	Immature	None
No. 5	F	877-78472	Immature	None
No. 6	F	877-78474	Immature	None
No. 7	F	877-78404	Immature	None
No. 8	M	987-77270	Immature	Red
No. 9	M	987-77280	Immature	Black
No.10	M	987-77272	Immature	None
No.11	M	987-77269	Immature	Yellow
No.12	M	987-77281	Adult	None
No.13	M	987-77278	Immature	None
No.14	M	987-77268	Immature	None
No.15	M	987-77277	Immature	None
No.16	F	877-78473	Immature	None
No.17	F	877-78469	Adult	None

Placement in Hack Box: Three adult females were placed in the hack box on 30 October.

Four immature females and one adult female were placed in the box on 9 November.

Four immature males (three with transmitters), one adult male, one adult female, and the female from the first release, were placed in the box on 17 November. The later had been released earlier but was found on the ground by the attendants.

Three immature males were placed in the hack box on 3 December.

Release from Hack Box: The first release was on 7 November (three adult females). Two of these individuals ranged from the vicinity of the hack area shortly after release and were only intermittently observed thereafter.

The second release was on 16 November at 0645. All but one of the immature females ranged from the immediate area after the release. The remaining immature bird stayed in the general hack area throughout the entire project. The adult female that had been returned did not leave the box during the second release.

The third release was on 25 November. The day after release, the following birds were observed in the area: all three transmitted birds, three adult females, the adult male, and one immature female. All of these individuals except the black transmitted male remained in the general area.

The fourth release was on 8 December at 0700. Two of these individuals ranged from the area immediately upon release and were not observed thereafter. The remaining male stayed in the area for several days mingling with other released hawks.

Results: On 16 November a pair of adult Harris' hawks (from prior years releases on the Colorado River), were observed in brief, low-intensity territorial displays toward some of the immatures. Continued territorial behaviors were not observed from these adults, who had apparently established a defined critical distance regarding the presence of the young birds. The resident adults displayed rather "tame" behaviors and were observed consistently near Imperial National Wildlife Refuge headquarters, perched on telephone poles. The prognosis appears to be favorable for a breeding pair. From the date of the last release (8 December) to the closure of the hack site (7 January) five individuals, in addition to the pair-bonded residents, were observed at the Imperial National Wildlife Refuge hack area displaying gregarious perching, roosting, and foraging behaviors. Several prey remains were discovered in close proximity to the hack box.

During the last three weeks of the project, the remaining Harris' hawks were "weaned away" from the consistent quail

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diet. The birds were fed jack-rabbits at five day intervals, which appeared to accelerate independence and the dispersal process.

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Comments: The Imperial National Wildlife Refuge offers desirable habitat and management characteristics that appear conducive to a Harris' hawk breeding population. Although limited in the immediate hack area, trees that meet nesting requirements are present in the peripheries of the area. The diversity of habitats within the refuge harbor an abundant prey base of mammals, reptiles, and birds.

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Acknowledgements: This site was funded by the U.S. Bureau of Land Management. Thanks go to the following people and agencies for their help with this release: Dr. Richard Olen-dorff of the U.S. Bureau of Land Management in California, Dean Bibles of the U.S. Bureau of Land Management in Arizona; Susanna Goad, Gary Ferrier, Allen Belt, and Gene Miller of the U.S. Bureau of Land Management in Yuma, Arizona; Will Niedecker, Claire Caldes, Bill Valikai and Sam Milazzo at the Imperial National Wildlife Refuge; Don Wing-field and Harry Reilly of Arizona Game and Fish Department; and Mike Johnson and Courtney Conway of the Yuma Clapper Rail Project.

HARRIS' HAWKS

PICACHO HACK SITE

Location: This site is located in the Picacho State Recreation Area on the California side of the Colorado River approximately 22 miles north of Yuma, Arizona. It consists of marsh, backwater lake and desert wash habitats. The hack box is located on an island-like peninsula that is covered with a dense stand of moderate to old growth willow trees and an understory of cane. The box is placed below and amidst a group of lateral-branched, very old-growth willow trees.

Attendants: Steve Spangle (Lee and Sheree Aulman assisted).

History: This is the first time we have used this site for hacking.

Description of Released Harris' Hawks:

	<u>Sex</u>	<u>Federal Band No.</u>	<u>Age</u>	<u>Telemetry</u>
No. 1	F	877-78425	Immature	Black
No. 2	F	877-78405	Immature	None
No. 3	F	877-78418	Immature	Red
No. 4	F	877-78419	Immature	Yellow
No. 5	F	877-78406	Immature	Black
No. 6	F	877-78424	Immature	Yellow
No. 7	M	987-77271	Immature	Red

Placement in Hack Box: Four immature females were placed in the hack box on 26 November. On 1 December, two immature females and one immature male were placed in the box.

Release from Hack Box: All of the birds were released in a "mega-hack" large-scale release on 9 December in the early morning hours.

Results: For the first week, all of the birds remained in the immediate hack area spending much of the time perched. At the end of the first week they began explorative flights. Approximately two weeks after release the hawks became increasingly active. Soaring flights became longer and wider ranging. A few instances of ambulatory, terrestrial hunting were seen. Three weeks into the release the feeding intervals were extended to five days, with an eventual change in diet from quail to white-tailed jack rabbit. By

the closing of the site at least five individuals had dispersed from the hack area. Two were sighted regularly at "Paddlewheeler Wash" (six miles up-river), and three frequented areas downstream from the park.

Comments: Although the hack site area is frequented by many humans during the winter, the release site is inaccessible by land and the presence of a large sand bar deters approach by most boats. Another favorable aspect of the site is that it lies approximately one-quarter mile downstream of, and is easily observed from, the park rangers' quarters. Picacho State Recreation Area personnel provided field observation assistance and logistic support throughout the release project.

Six of the seven released birds were equipped with radio transmitters. All stayed in the hack area until at least 21 December. These telemetry applications enabled attendants to rapidly identify the presence of individual birds.

Acknowledgements: This site was funded by the U.S. Bureau of Land Management. Thanks go to the following people and agencies for their help: Dr. Richard Olendorff of the U.S. Bureau of Land Management in California; Dean Bibles of the U.S. Bureau of Land Management in Arizona; Rick Campbell, Ray Ford, Rodney Ford, and Ken Hall of the Picacho State Recreation Area.

BALD EAGLES AT THE SANTA CRUZ PREDATORY BIRD RESEARCH GROUP

Three bald eagles were housed at the Santa Cruz Predatory Bird Research Group this year; two adults and one immature. All had sustained injuries in Alaska. They were held under Dr. James Roush's permit for veterinary treatment and rehabilitation, pending permanent placement by the U.S. Fish and Wildlife Service.

The first adult, probably a female, arrived on 28 August 1985. It had been found injured and unable to fly on Douglas Island in southeastern Alaska. The right elbow joint had been broken or dislocated, and subsequently healed. The bird arrived with arthritis that prevented full movement of the wing. On 25 November it was sent via Frontier Airlines to Dickerson Park Zoo in Springfield, Mo. for possible breeding. Placement was arranged by Rich Barns of the Sitka Raptor Rehabilitation Center in Alaska, and coordinated with the U.S. Fish and Wildlife Service. Glenn Stewart of the Ventana Wildlife Sanctuary coordinated activities with Captain Boettcher of the California Department of Fish and Game in Monterey.

The second eagle, a first-year bird and probably a female, arrived on 10 October, from the Sitka Raptor Rehabilitation Center after sustaining a broken wingtip in a collision with an automobile.

A third eagle was sent to Dr. Roush on 20 November by the Sitka Raptor Rehabilitation Center to be operated on for "bumblefoot". The bird was housed at the Santa Cruz Predatory Bird Research Group until 23 November, when it was sent to a rehabilitation center near Big Bear Lake for recovery care.

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Our Quail Production Facility was designed by Jamey P. Eddy, a poultry science major at Cal Poly State University in San Luis Obispo, Ca. Eddy also supervised construction and start-up of the facility. Funds for construction were furnished by a grant from the Ahmanson Foundation. Quail facility personnel include George and Diane Patracuola, John Moran, and John Sutton.

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The brooder building contains six rooms of progressively larger size, with connecting doors. Upon hatching, the quail are placed in the first room where they remain for six days. They are moved every seventh day until they are processed at 36 days of age. We have recently built a seventh room to mature them to 42 days in order to improve their nutritional value. We are also building a chicken room to provide variety in the diet we produce for our falcons, hawks, and owls.

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Quail production began on 31 May 1984 with the setting of 850 eggs that were purchased from Mr. Larry Ray, a commercial breeder in Fresno, Ca. Part of those hatched were used as breeders, and on 11 September 1984 the first eggs laid at our facility were set. They hatched on 28 September 1984, and by the same date in 1985, 60,040 eggs had been laid and set in our incubator. 37,066 hatched (61.74%). These quail were then reared to 36 days of age, with a survivorship of 89.68% (33,241 quail). The quail were then humanely killed and fed fresh or frozen (and thawed) to our birds during 1984 and 1985. 57,200 pounds of feed were used in the course of the year, or 1.72 pounds per individual reared to maturity.

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We expect fertility, hatchability, and survivability to increase in coming years, since we have increased production and made necessary adjustments in lighting, feeding, watering, heating, building design, and other factors that affect quail productivity. Our goals are to produce quail with very good nutritional value and at the same time reduce man-hours and increase the economy of this effort.

SUMMARY OF CAPTIVE BREEDING AT SCPBRG IN 1985

A total of 171 eggs were laid at SCPBRG in 1985.

Aplomados laid 31 eggs. Incompatibility and nutritional problems resulted in low hatchability. Four young hatched and were released.

Bat falcons laid eight eggs. Five young hatched, only one young survived. None were released, the one young was kept for breeding.

Elf owls laid 24 eggs. Nutritional problems resulted in low hatchability. Only one young hatched, it was kept for future release.

Harris' hawks laid 16 eggs. 10 young were hatched and released. 16 additional birds were donated by associates, releases totaled 26 birds.

Tawny eagle eggs were donated by Steve Martin. Seven eggs were provided, three young hatched and were later returned to Mr. Martin.

Captive peregrines laid 61 eggs. Associates donated 23 eggs of anatum subspecies and 12 of pealei subspecies. 33 young hatched from SCPBRG eggs, two from associates' anatum eggs, and eight from pealei eggs. The pealei young were returned to the donor, we released 22 SCPBRG young as well as 20 young from associates, so total releases were 42 captive bred peregrines.

We also collected thin-shelled wild eggs, and 21 young were released from that source.

In 1985, 68 young hatched at SCPBRG. 63 young from those hatches and donations from associates were released.