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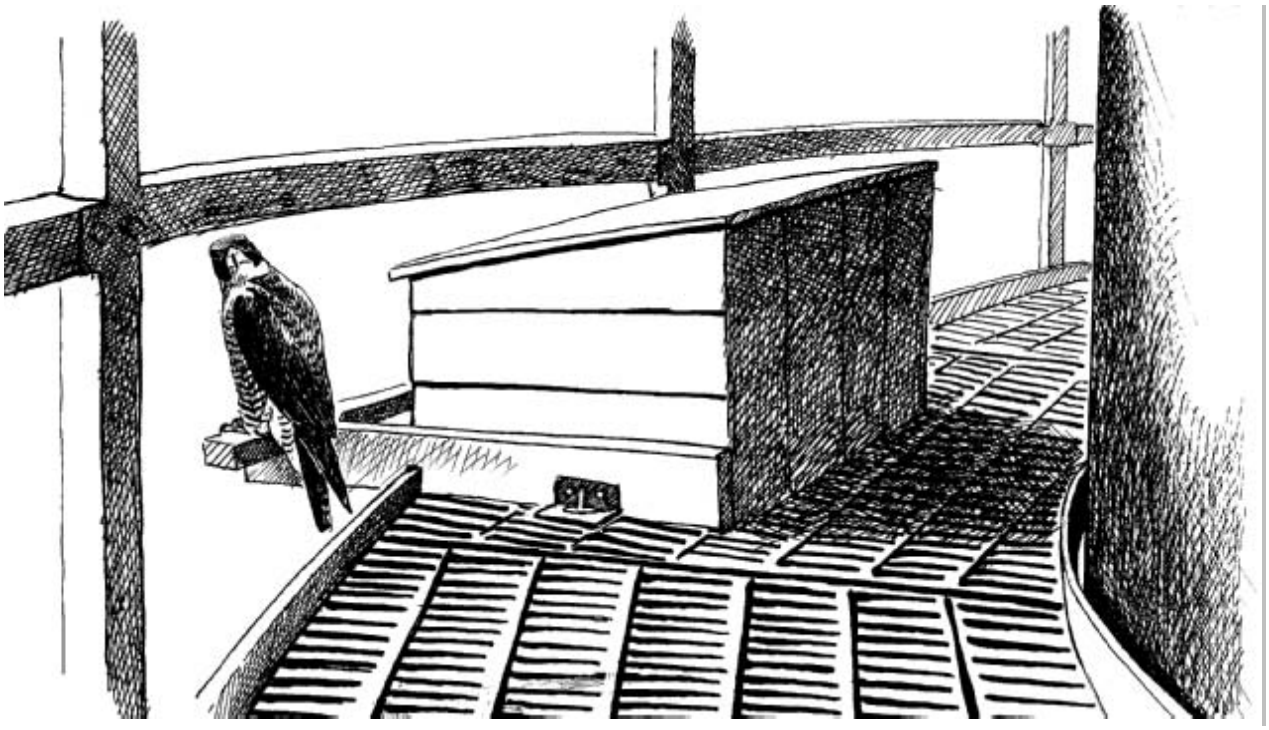
Attracting and Managing the Peregrine Falcon at Electricity Generating Facilities

Technical Report



Attracting and Managing the Peregrine Falcon at Electricity Generating Facilities

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Final Report, September 2004

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PRODUCT DESCRIPTION

The Peregrine Falcon Nest Box Program helps electric utilities attract and manage a nesting pair of Peregrine Falcons. Nesting peregrines are exciting to watch, easy to manage, and provide excellent organic Rock Pigeon control. This manual will help electric utilities choose nest sites, build nest boxes, and manage the Peregrine Falcons they attract.

Results & Findings

Peregrine Falcons are attracted to tall structures and readily nest on power plant stack catwalks and other elevated sites at utility power plants. Peregrine Falcons are low maintenance. Once falcons have been attracted to a utility facility, the falcon nest box must periodically be repaired, prey remains removed, and pea gravel changed. Falcons are either migratory and will return to the same spot year after year to raise young or reside near the facility year-round. In general, migratory falcons will return, choose a site, and copulate between February and late March; lay eggs sometime in March or April; and begin hatching eyasses after May 1st. Falcon eggs will begin hatching approximately 33 days after the third egg is laid. It is important to monitor nests and note when eyasses begin hatching. State wildlife agencies and independent, university, and museum scientists help utilities band and manage young falcons.

Challenges & Objectives

Peregrine Falcon populations declined rapidly between 1950 and 1965 throughout the United States and parts of Europe. In the early 1960s, researchers discovered that DDT, an extensively-used pesticide, was interfering in eggshell formation. By 1968 there were no Peregrine Falcons east of the Mississippi River and only 19 pairs in the entire country. Many people expected the peregrine to decline into extinction: Dr. Tom Cade, a founder of Cornell University's Peregrine Fund, believed that the Peregrine Falcon could be saved. Despite sometimes strident opposition, the Fund pioneered a captive breeding and release program based on a falconry technique called hacking. The Peregrine Fund began experimental releases in 1974. By the early 1980s, similar breeding-and-release efforts were underway across the United States. Utility participation in this campaign was crucial to the success of this program, beginning with a single falcon nesting at the Xcel Energy Plant in Oak Park Heights, Minnesota in late 1989. Other electric utility companies—Dairyland Power Cooperative, Alliant Power, Minnesota Power and Light, and We Energies (formerly Wisconsin Electric Power Company)—quickly joined the peregrine-utility program, which expanded rapidly. By 2002, peregrine-utility programs were underway across the United States and in several European and Asian countries as well.

Applications, Values & Use

The peregrine-utility program is high profile, ecologically beneficial work. People get very excited about peregrines. They want to know about falcons as a species, falcons as parents, what young falcons eat, and where their falcons go once they've fledged. Utility volunteers help to

manage Peregrine Falcons by observing when falcons return, reporting on territorial battles, watching nest boxes for signs of young, and assisting grounded falcons on their maiden flights. School classes visit plants for the naming and banding of young falcons. Millions of people worldwide visit, via the Internet, utility-based Peregrine Falcon cams; swap images; and eagerly wait for eyasses to hatch each spring. Utility companies and regional wildlife agencies benefit from working towards a mutual goal: establishing a home for a rare and highly prized species. The peregrine-utility program helps build positive working relationships between regional wildlife agencies and utility companies. Peregrines also benefit utilities by providing quality organic Rock Pigeon control.

EPRI Perspective

The U. S. Fish & Wildlife Service removed the Peregrine Falcon from the Endangered Species List in 1999, surely one of the greatest conservation achievements of the twentieth century. Utilities can be proud of the part they played in helping to restore this magnificent species to American skies.

Approach

This handbook outlines the steps needed to undertake a successful peregrine-utility program. It explains how to locate a suitable nest site, build a nest box, attract and manage falcons, and publicize a peregrine program, including the use of an Internet Birdcam to make it possible to observe the falcons as they raise their brood. The handbook also explains how to release young captive-bred falcons to create a territorial breeding pair at sites that don't attract wild birds.

Keywords

Peregrine Falcons
Conservation
Peregrine-utility program

ACKNOWLEDGMENTS

Credit goes to Jonathan Wilde for the outstanding art work in Figures 1-1, 1-2, 2-1, 2-2, 2-3, 2-4, 2-5, 3-1, 3-2, and 3-3.

ABSTRACT

By providing nesting sites for breeding Peregrine Falcons, electric utilities have played a key role in returning these splendid birds to the midwestern United States and saving them from extinction. The peregrine-utility program helps utilities attract and manage a nesting pair of Peregrine Falcons. Nesting falcons are exciting to watch, easy to manage, and provide excellent organic pigeon control. This manual explains how to choose nest sites, build nest boxes, and manage the Peregrine Falcons they attract.

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INTRODUCTION TO THE PEREGRINE FALCON NEST BOX PROGRAM

"Man has emerged from the shadows of antiquity with a peregrine on his wrist. Its dispassionate brown eyes, more than those of any other bird, have been witness to the struggle for civilization, from the squalid tents on the steppes of Asia thousands of years ago, to the marble halls of European kings in the seventeenth century."

– Roger Tory Peterson

Peregrine Falcons

Members of the twenty-two subspecies of Peregrine Falcon live on all continents except Antarctica. Three of the twenty-two subspecies nest in North America: *Falco perigrinus* pealei, from the coastal islands off Alaska; *F.p. tundrius*, which nests above the Arctic tree line; and *F.p. anatum,* which once ranged across the entire North American continent. The peregrine's long wings, incredible vision, and aerial maneuvers make it the undisputed master of the sky. Peregrines are the fastest member of the animal kingdom, diving at speeds of up to 278 miles per hour. They can cruise long distances at speeds of up to 90 miles per hour and feed primarily on other birds they capture in flight.

The speed and power of the Peregrine Falcon has fascinated and enthralled humanity throughout most of recorded history. The Egyptians worshipped the falcon in the form of Horus, the falcon-headed god; a passion for peregrines inspired Frederick II of Hohenstaufen to write the first book of ornithology, and William Shakespeare frequently refers to Peregrine Falcons in his work. Falconry has been practiced for centuries in the Middle East, the Orient, and Europe, where the peregrine was at one time reserved for the noble classes.

Adult Peregrine Falcons are 15-20 inches long and have a wingspan of 36-46 inches. Females are roughly one-third larger and are more heavily barred than males although the sexes are identical in coloration. Adults have long, pointed wings and a long, rounded tail with thin, black bands, ending with a wide, dark band tipped with white. The barred upper side is slate blue, while the under side is white barred with black or brown. The black crown and nape form a distinct black hood, which may vary in size and darkness. Immature peregrines are similar, but the back and under sides are brown and the throat and breast are streaked with brown.

Figure 1-1
An Adult Peregrine Falcon

Figure 1-2
The Peregrine's Distinct Hood

Peregrine Falcons are migratory birds. They reach sexual maturity at age two and generally return to the same area to nest each year. Females commonly lay three to four red-brown eggs, which they incubate for 33 days after the last egg is laid. The hatchlings, or *eyasses*, are covered with white fluffy down. They are voracious eaters that double their hatch weight in six days and are ten times their hatch weight in 21 days. The young begin flying at 40 days.

Peregrine Falcon populations declined rapidly between 1950 and 1965 throughout the United States and parts of Europe. In the early 1960s, researchers discovered that DDT, a widespread, extensively-used pesticide, was interfering in eggshell formation. Healthy birds were laying eggs so thin that the incubating adult crushed them to death.

How drastic were the effects of DDT? In the early 1940s Joseph Hickey, a Wisconsin biologist, determined that there were more than 200 pairs of Peregrines east of the Mississippi River. However, by 1963, no Peregrines fledged in the eastern or central United States. By 1968, there were no Peregrine Falcons east of the Mississippi River. By the mid-1970s, America's peregrine population had dwindled to 19 pairs, all nesting in the western United States. Many people believed that the peregrine would inevitably decline into extinction.

Dr. Tom Cade, a founder of Cornell University's Peregrine Fund, believed that the Peregrine Falcon could be saved. Despite some strident opposition, the Fund pioneered a captive breeding and release program based on a falconry technique called hacking. The Fund began experimental releases in 1974. By the early 1980s, similar breeding-and-release efforts were underway across the United States.

In 1987, a captive-produced peregrine named MF-1 fledged wild young from the top of the MultiFoods Tower in Minneapolis, Minnesota. This marked the first time that a falcon had nested mid-continent since the species' extirpation in the early-to mid-1960s. MF-1 died in a territorial battle in 1996: her daughters include Maude, who flew north to establish a territory in Winnipeg, Canada; and Mae, who began the peregrine-utility program by nesting on the Xcel Energy Plant in Oak Park Heights, Minnesota.

Power Plant Stack Habitat: The Peregrine-Utility Program

The peregrine-utility program helps electric utilities attract and manage a nesting pair of Peregrine Falcons. Nesting peregrines are exciting to watch, easy to manage, and provide excellent organic pigeon control. This manual will help utilities to choose nest sites, build nest boxes, and manage the Peregrine Falcons they attract.

The peregrine-utility program began in 1988 when an Xcel Energy employee spotted a Peregrine Falcon at the company's Alan S. King plant in Oak Park Heights, Minnesota. The Raptor Resource Project confirmed the sighting and asked to install a peregrine nest box on the 400' level of the 800' stack. A young falcon named Mae made history when she claimed it in 1989, thereby becoming the first peregrine to nest at a utility location. The peregrine-utility program was underway!

Following Mae's success, the Raptor Resource Project and Xcel Energy entered into a partnership to install and maintain Peregrine Falcon nest boxes on utility power plant stacks along the Mississippi, Saint Croix, and Minnesota rivers. Other utility companies – Dairyland Power Cooperative, Alliant Power, Minnesota Power and Light, and We Energies – quickly joined the peregrine-utility program, which expanded rapidly. By 2002, peregrine-utility programs were underway across the United States and in several European and Asian countries as well.

The peregrine-utility program played an important part in returning the Peregrine Falcon to the midwestern United States. Between 1990 and 2002, 242 Peregrine Falcons fledged from utilities along the Mississippi, Minnesota, and St. Croix Rivers. Although Peregrine Falcons have a high first-year mortality rate (estimates range as high as 75%), some of these young falcons returned to the river to establish new nests on power plant stacks, industrial buildings and finally, in 2001,

cliffs. By 2002, 42% of all peregrines fledged in the upper midwest hatched at utility sites, as compared with 38% from buildings, 10% from bridges, and 10% from cliffs. First, second, and third generation utility-fledged falcons nested at utilities in Minnesota, Iowa, Wisconsin, Illinois, Michigan, Indiana, Kentucky, Colorado, Pennsylvania, Missouri, and Kansas, while in Minnesota and Wisconsin, utility-fledged falcons continued their move to the cliffs.

As of June 2003, Peregrine Falcons were successfully nesting at the following Midwestern utilities.

Minnesota

- Xcel Energy Highbridge, St. Paul, MN. Ramsey Cty.
- Xcel Energy Alan S. King, Oak Park Heights, MN. Washington Cty.
- Xcel Energy Prairie Island, Prairie Island, MN. Goodhue Cty.
- Xcel Energy Riverside, Minneapolis, MN. Hennepin Cty.
- Xcel Energy Sherco, Becker, MN. Sherburne Cty.
- Xcel Energy Monticello, Monticello MN. Wright Cty.
- Xcel Energy Blackdog, Eagan, MN. Dakota Cty.
- MN Power Clay Boswell, Cohasset MN. Itasca Cty.

Wisconsin

- WEPCO Oak Creek, Milwaukee, WI. Milwaukee Cty.
- WEPCO Valley plant Milwaukee, WI Milwaukee Cty.
- WEPCO Port Washington, Port Wash, WI. Ozaukee Cty.
- WPL Edgewater, Sheboygan, WI. Sheboygan Cty.
- WPS Pulliam, Green Bay, WI. Brown Cty.
- WEPCO Pleasant Prairie, Pleasant Prairie, WI. Kenosha Cty.
- Kewaunee Nuclear, Kewaunee, WI. Kewaunee Cty.
- Dairyland Power Cooperative Alma, WI. Buffalo Cty.
- Dairyland Power Cooperative, Genoa, WI. Vernon Cty.
- Alliant Energy Nelson Dewey, Cassville, WI. Grant Cty.

Michigan

- Monroe Edison, Raisin River MI. Monroe Cty.
- St. Clair Detroit Edison, Marine City, MI. Macomb Cty.
- Consumers Energy BC Cobb, Muskegon MI. Muskegon Cty.
- Grand Haven Sims, Grand Haven, MI. Ottawa Cty.

Iowa

- MEC Louisa, Louisa, IA. Louisa Cty.
- Alliant Energy Lansing, Lansing, IA. Allamakee Cty.

Illinois

- Midwest Generation, Waukegon, IL. Cook Cty.

Indiana

- NIPSCO Schahfer, Wheatfield, IN. Jasper Cty.
- NIPSCO Michigan City, IN. La Porte Cty.
- Kokomo Gas and Power, Kokomo, IN. Howard Cty.
- IPL Stout, Indianapolis, IN. Marion Cty.
- NIPSCO Bailly, Porter, IN. Porter Cty.

Ohio

- Miami Fort Station, Cleves, OH. Hamilton Cty.
- JM Stuart, Aberdeen, OH. Brown Cty.

Kentucky

- Kentucky Utilities Ghent, Ghent, KY. Carroll Cty.
- Louisville Gas and Electric, Bedford, KY. Trimble Cty.

The U.S. Fish & Wildlife Service removed the Peregrine Falcon from the Endangered Species List in 1999, surely one of the greatest conservation achievements of the twentieth century. Electric utility partners can be proud of the part they played in helping to restore this magnificent species to our skies.

Figures 1-3 and 1-4 show the impact of power plant stack nest boxes on the Peregrine Falcon population in Minnesota, Iowa, and Wisconsin. Smokestack nest boxes have made an important contribution to the recovery of this species.

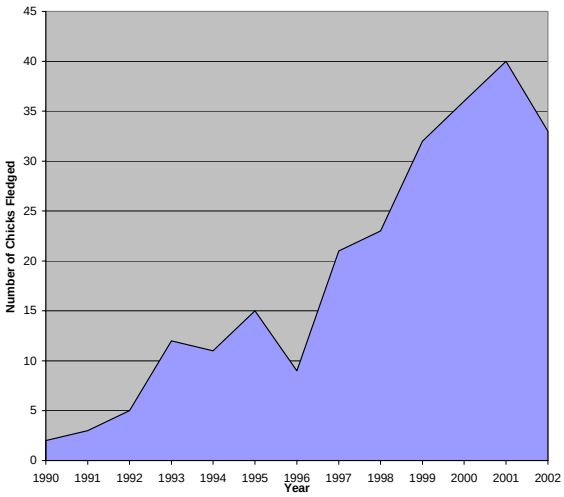

Figure 1-3
Peregrine Falcons Fledged from Upper Mississippi River Utilities, 1990 to 2002

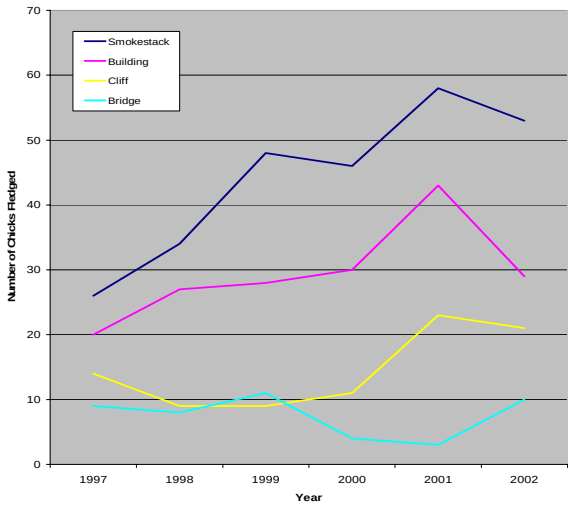

Figure 1-4
Peregrine Falcons Fledged from Upper Mississippi River Area, 1997 to 2002

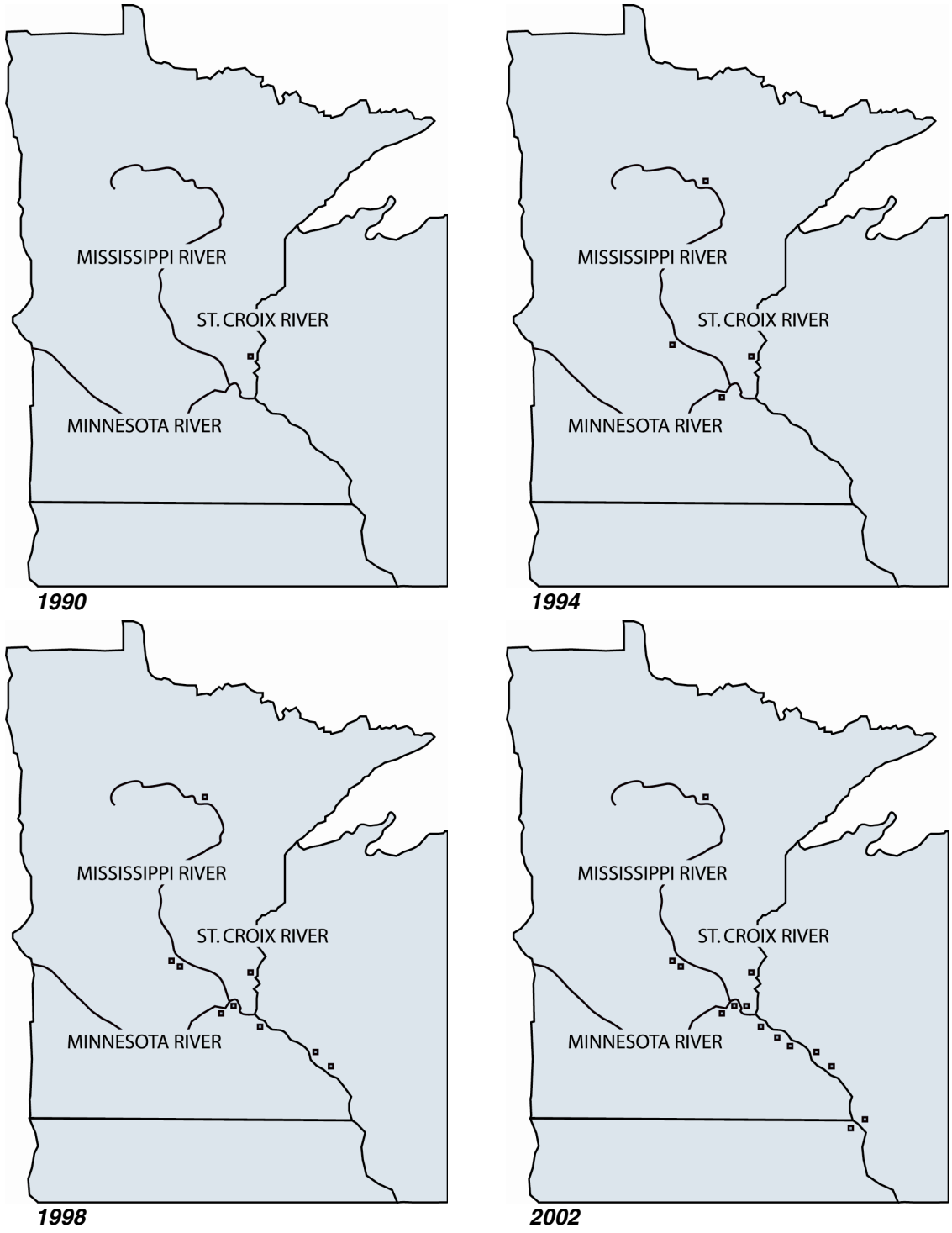

Figure 1-5
An Example of Peregrine Dispersal in the Upper Midwest Subsequent to 1990. Other Captive Breeding Projects have Shown Similar Success

A favorite part of the peregrine-utility program is the excitement and enthusiasm that peregrines generate! People get very excited about Peregrines – after thirteen years, one cannot enter a plant without hearing at least one person describe "our falcon's" stunning flight. People want to know all about falcons: how they parent, what they eat, how eyasses grow, and where young go once they have fledged. Power plant volunteers help to manage Peregrine Falcons by observing when falcons are present, reporting on territorial battles, watching nest boxes for signs of young, and assisting grounded falcons on their maiden flights. School classes visit plants for the naming and banding of young falcons. Millions of people worldwide visit utility-based Peregrine Falcon cams, swap images, and eagerly wait for eyasses to hatch each spring. The peregrine-utility program is high profile, ecologically beneficial work.

Electric power plants reap the benefits of quality organic rock pigeon control, since Peregrine Falcons prey extensively on pigeons. John Thiel, Environmental Biologist at Dairyland Power Cooperative in Wisconsin, has this to say about the peregrine utility program: "Besides the great feeling knowing that we have contributed to the return of the Peregrine Falcon, we also have seen significant benefit in the control of nuisance pigeon populations at our generating sites. Pigeons have been a major problem in some of our transformer switchyards and air pollution control equipment. The peregrines have significantly reduced the number of pigeons and the resulting maintenance and clean-up costs associated with this problem." Peregrines are organic, inexpensive, self-maintaining, and nearly always ready to hunt. They can provide an excellent, eco-friendly means of depleting a plant's resident pigeon population.

Utility companies and regional wildlife agencies benefit from working towards a mutual goal: establishing a home for a rare and highly prized species. The peregrine-utility program helps build positive working relationships between regional wildlife agencies and utility companies.

Summary

We hope that the success of the peregrine-utility program here in the Midwest encourages more utilities to establish a falcon nesting and management program. The Peregrine Falcon is a magnificent, awe-inspiring bird and it always is gratifying to see the pleasure it brings to the people who share its life: everyone from plant workers watching adults fly to preschoolers seeing a falcon eyass for the first time. This unique marriage of industry and conservation really has made a difference.

Robert Anderson directs the Raptor Resource Project in rural Bluffton, Iowa. Utilities currently involved in our peregrine-utility program include Xcel Energy, Dairyland Power Cooperative, Minnesota Power Company, Alliant Energy Corporation, We Energies, and Interstate Power Company. We also have worked with Rochester Gas and Electric and Cinergy.

If you have any questions after reading this manual, please contact Raptor Resource Project Director Bob Anderson.

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2
STARTING A PEREGRINE PROGRAM

Starting a Peregrine-utility program is very easy: build a nest box and the falcons – if they are there – will come! Tall structures attract Peregrine Falcons. They often perch on power plant stack catwalks, strobe light fixtures, tall buildings, and transmission towers: high perches make it easier for them to spot and launch a quick attack against their prey.

This section outlines the steps needed to undertake a successful peregrine-utility program. It details locating a suitable nest site and choosing, building, and mounting a nest box.

Legal Considerations

The Fish and Wildlife Service removed the Peregrine Falcon from the Federal Endangered Species List in August of 1999. However, other federal, state, and sometimes local regulation may still apply, including the International Migratory Bird Treaty Act and state endangered species regulations. This does not mean that red tape will strangle the program. Placing a nest box to attract a nesting pair of Peregrine Falcons is very similar, legally, to mounting a Bluebird nest box or Wood Duck house.

It is sometimes necessary to handle Peregrine Falcons and to disturb the nest box during nesting season. Regulation will not apply to regular occurrences – for example, releasing a young falcon that grounded on its maiden flight. However, regulations probably will cover activities such as banding eyasses and transporting injured adults. Discuss the program with your state's nongame wildlife division early in the process. They are familiar with local, state, and federal environmental laws and regulations, and can provide assistance, recommendations, and information.

If it were not for the unique peregrine-utility program, the Peregrine Falcon might still be on the Endangered Species List. Power plants continue to be appropriate sites for peregrines given their role in recovering the species and the suitability of the power plant stack nest box as a home for nesting falcons. Most wildlife agencies will welcome this partnership.

Attracting and Managing Peregrine Falcons

In general, falcons return from migration, choose a site, and copulate between February and late March, lay eggs sometime in March or April, and begin hatching chicks after May 1st. You must choose a site and mount a nest box prior to February 1st if your facility is going to attract falcons in the program's first year.

The list below outlines the steps your facility will need to take to attract and manage nesting Peregrine Falcons. More detail is included later in this section.

Attracting Falcons

- **Contact your state's non-game wildlife division and let them know the facility is starting a Peregrine Falcon nest box program**. They will provide permit advice and assistance, give references to local falconers and wildlife rehabilitators, and assist in banding falcon eyasses.
- **Locate a suitable nest site**. Choose a location that is high off the ground, remote from daily plant and maintenance activities and accessible via elevators, ladders, ropes, or some combination of the three. The nest box will need regular cleaning, so accessibility is very important. We have mounted nest boxes on catwalks, the sills of strobe light port openings, the roofs of turbine buildings, and on nuclear power plant containment domes.
- **Choose, build, and mount a nest box**. For optimal results, mount the nest box prior to February 1. Do not mount a camera in the nest box until Peregrine falcons have successfully raised young for at least one year.
- **Formally announce the program to your facility**. Make an announcement via facility newsletter, internal email, or at a facility-wide meeting. Ask everyone to watch for Peregrine Falcons and recruit one or two volunteers to monitor the nest box, report falcon sightings, and assist in banding falcon eyasses.
- **Wait for Peregrine Falcons**. Peregrine Falcons may be spotted near the box, chasing pigeons, or streaking over the facility. Their speed makes them easy to spot! Panicking pigeons are another telltale.

Managing Falcons

Watch for two falcons, signs of peregrine copulation, and multiple visits to the nest box: these are all signs that falcons have moved in. Notify your state's non-game wildlife division if you believe that peregrines have adopted the nest box.

If your facility is interested in a BirdCam program, contact the information technology department and begin planning for next year. Do not try to install a camera the first year, since frightening or disturbing the falcons prior to egg laying might drive them away.

- **Watch for copulation**. Look for mutual bowing (courtship) and multiple visits to the nest box. If peregrines are copulating, it is likely they will lay fertile eggs.
- **Watch for eggs**. Falcons usually begin laying eggs about 20 to 30 days after their arrival in early spring. If the female suddenly disappears a few weeks after copulation, she is probably laying or sitting on eggs. Watch for the male to bring food to the nest box.

  Peregrine falcons usually lay a four-egg clutch, although they may lay as few as three or (very rarely) as many as five. The female lays eggs over a 60-hour interval. She will cover the first and second egg, but not begin incubation in earnest until she has laid the third egg.
- **Watch for eyasses**. The first egg will hatch approximately 33 to 34 days after the female lays the third egg. In a typical four-egg clutch, three young will usually hatch within a 24-hour period and the last egg a day later.

Falcon eyasses eat a lot of food. For the first ten days, mother spends most of her time with the new eyasses while father provides food for the entire family. If father suddenly begins bringing more food to the nest box, it may mean that the eyasses have hatched.

- **Band eyasses**. Eyasses are banded 15 to 28 days after hatch. If you think eyasses have hatched, set a banding date with the state's non-game wildlife division. It is a good idea to have facility volunteers involved in banding if possible.

  This is a great time for a press release to announce the new arrivals. Once the banding date is set, call local newspapers, television stations, and radio stations to invite them to the show. We like to invite a local school class or scout troop to see and name the eyasses.

- **Watch for fledging**. The eyasses, now young falcons, begin flying approximately 40 days after hatching. If young falcons end up on the ground or an adult is injured, follow the guidelines in this manual. Groundings are very common and no cause for alarm.

  Your facility may want to issue a press release when young falcons fledge.

- **Make sure the nest box is in good working order**. After October, it will be safe to remove prey remains, replace gravel, make sure the nest box is sound, and conduct camera maintenance or install a camera. It is very likely that nest box area will need to be cleaned: falcons do leave prey remains. Test web-based cameras within the company firewall to assure they are working properly.

Appendix B includes a log of falcon activities at the Riverside plant in Minneapolis, Minnesota. Read it for a closer look at the work required to maintain nesting falcons at a utility site.

Locating a Suitable Nest Site

Choose a nest site that is high off the ground, remote from daily plant and maintenance activities and accessible via elevators, ladders, ropes, or some combination of the three. We have mounted nest boxes on catwalks at and above the 400' level of power plant stacks, on the sills of strobe light port openings, on the roofs of turbine buildings, and on nuclear power plant containment domes. If possible, mount nest boxes on catwalks: catwalk-mounted boxes are high off the ground and in a remote yet accessible location for maintenance and banding. Tall structures attract falcons – the higher, the better – and falcons may reject nest boxes mounted in the shadow of a taller building.

Peregrine Falcons may be aggressive. During nesting season, they are highly protective of their nest boxes and may dive on intruders. You can avoid problems by choosing a site that is accessible, yet remote from daily activity – place nest boxes well above continuous emission monitors and other regularly maintained equipment. Accessibility is important: nest boxes that require special equipment to access are difficult (and costly) to maintain.

It is possible to work near Peregrine Falcons during nesting season, although not advisable – too much disturbance puts eggs and eyasses at risk. It is very important not to disturb falcons prior to egg laying, since this may cause them to abandon the nest box. The entire nesting season, from mating through fledging of young, lasts three to four months. Once nesting is finished, the adults will stop defending the nest box.

Power Plant Nest Boxes: Standard Mount

Alan S. King Plant, Oak Park Heights, Minnesota

The Alan S. King plant is a conventional coal-fired power plant located along the lower St. Croix River in Minnesota. This site uses a standard nest box bolted to a platform on a catwalk at the 400' level of the power plant stack. The BirdCam camera doubles as a perch and is located on the outside of the nest box, pointing in through the front.

The location of this nest box is perfect. Peregrine falcons like to nest on tall structures near water – the higher the nest, the better the site. The catwalk is accessible via an elevator bolted to the inside of the stack, which makes maintenance very easy; however, the nest box is also remote enough that the falcons are not disturbed by daily plant activities.

Figures 2-1 and 2-2 show two common nest box configurations. Figure 2-1 shows a nest box mounted directly on a catwalk. Many utilities have used this design – catwalk nest boxes are easy to install and maintain.

If a catwalk is not available, containment domes (Figure 2-2) and light sills also provide wonderful homes for falcons.

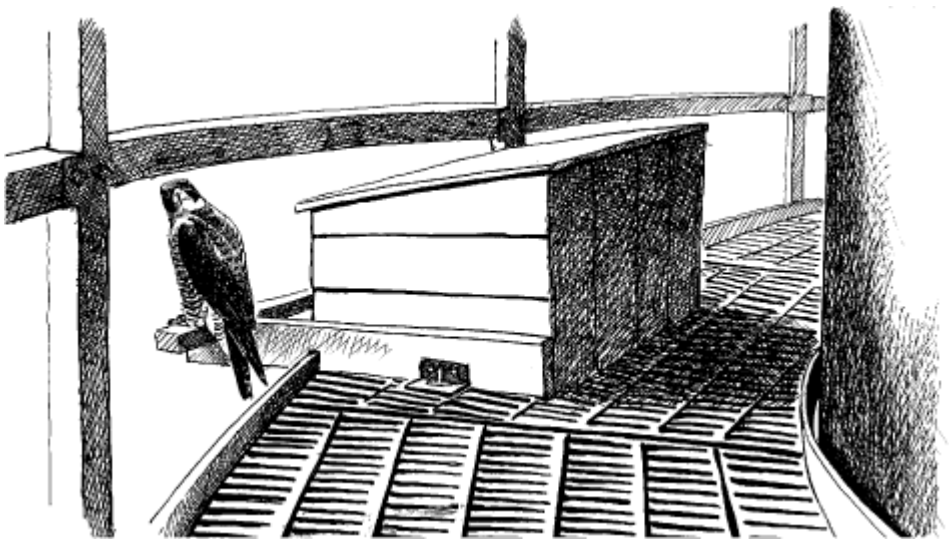

Figure 2-1
Standard Mount Nest Box on Catwalk

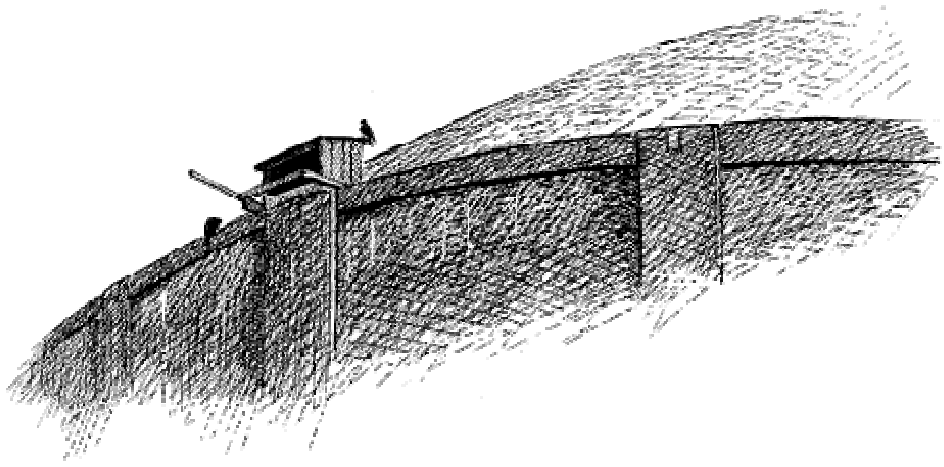

Figure 2-2
Standard Mount Nest Box on Containment Dome

Choosing a Nest Box

Choose a nest box that fits the site: this will make the box easier to mount and reduce maintenance requirements. There are two basic nest box designs: strobe light sill-mount, for nest boxes mounted from the sill of a strobe light port opening, and standard-mount, for nest boxes mounted everywhere else. Appendix A contains blueprints for a standard nest box.

The standard nest box (Figure 2-1) is 32 inches wide by 22 inches deep. The back of the nest box is 22 inches high and the front of the nest box is 20 inches high, creating a downward slanting roof. The roof overhangs the front of the nest box by two inches.

We designed the strobe light sill-mount nest box (Figures 2-3 and 2-4) to hang from the sill of a strobe light port opening on stacks that lack catwalks. The size of the strobe light opening will determine the width of the strobe light sill-mount nest box. For example, a nest box 28 inches wide by 22 inches deep has a downward slanting roof that is 24 inches in the back and 22 inches in the front. Both designs have a six-inch lip across the bottom to hold in pea gravel, an outdoor platform for adults and older young, and a perch.

Note that the sill-mount nest box requires a piece of wood or other material to extend the roof, hinged on the front to open from the back (Figure 2-4). Opening the roof of this box closes the front, which prevents eyasses from jumping from the nest box during banding. To assure the safety of falcon eyasses, opening the top of the sill-mount nest MUST block its front.

Power Plant Nest Boxes

Alma Power Plant, Alma Wisconsin

The Alma plant is a conventional coal-fired power plant located along the Mississippi in Wisconsin. This site uses a sill-mount nest box that hangs out the light port of a power plant stack. The BirdCam camera doubles as a perch and is located on the outside of the nest box, pointing in through the front.

This was one of our first strobe light sill-mount nest boxes. This box opens from the roof and requires a special extension to prevent eyasses from jumping out the front when the roof is opened. This design is effective and safe for locations that lack catwalks.

20 eyasses fledged here between 1998 and 2002.

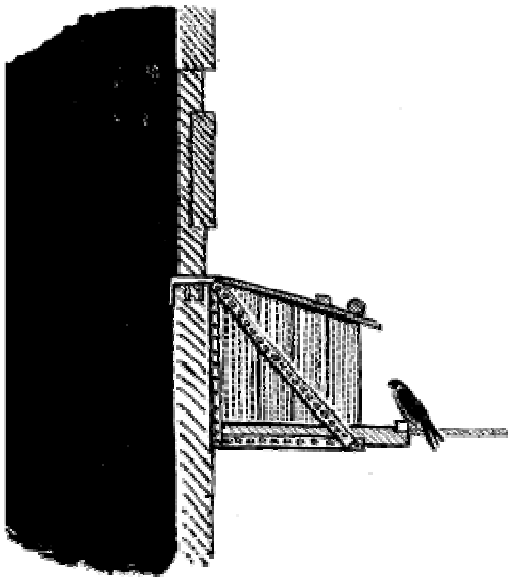

Figure 2-3
Cut Away Showing Strobe Light Sill Mount Nest Box

Figure 2-4 illustrates the roof extension requirement. Falcon eyasses must be removed from the nest box during banding. When the roof of the box is tipped open, the front of the box is closed. This prevents the eyasses from jumping from the box when you reach in for them. Do not build a top-opening strobe light sill-mount box for anything other than strobe light sill ports.

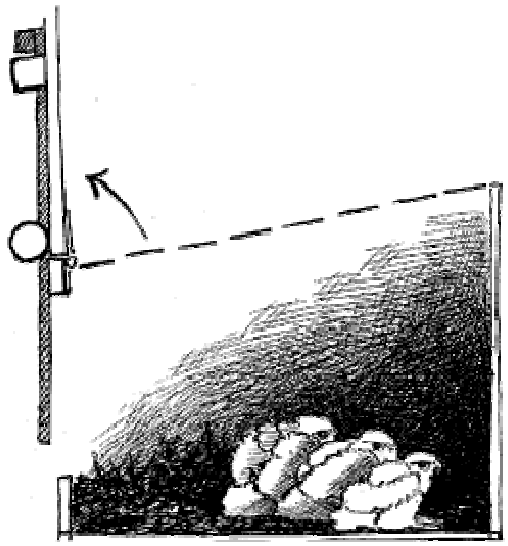

Figure 2-4
Strobe Light Sill-Mount Roof Detail

Building the Nest Box

Use the nest box plans in Appendix A to build a light, sturdy, safe nest box. We build nest boxes with T-111 cedar siding. It is light, weather resistant, and available at most lumberyards.

Changes to the design of the nest box can result in a box that is unsafe or unsuitable for Peregrine Falcons. In particular:

- Do not add doors to the back or sides of the nest box to facilitate banding. If people reach into the back or sides of the nest box, they may drive the eyasses toward the front of the nest box, where they may jump or fall from the platform prematurely. Reaching in from the front will force eyasses towards the back, where they are safe.
- Do not make the nest box too deep. People often worry that the nest box design is not deep enough to protect adults and young; however, Peregrine Falcons are ledge-nesting birds, not cave-nesting birds. A deep nest box is less attractive to Peregrine Falcons.

Since Peregrines do not build stick nests, they must have a substrate in which to make a scrape or depression to cushion their eggs and prevent breakage. Therefore, we put four to five inches of washed pea gravel in the bottom of each nest box. The depth of the pea gravel is very important - if it is not deep enough, small pebbles may puncture the eggs. Both the standard and sill-mount designs require a 6-inch lip across the front bottom to retain the nesting substrate.

Drill fifteen 3/16-inch evenly spaced holes in the bottom of the nest box. This will allow drainage and help prevent the wood from rotting. Do not drill more than fifteen holes and space them evenly to assure the integrity of the nest box bottom.

Power Plant Nest Boxes

Prairie Island Plant, Prairie Island, Minnesota

The Prairie Island power plant is a nuclear power plant located along the Mississippi river south of the Twin Cities area. This site uses a standard nest box bolted directly to the containment dome. The box is built of T-111 cedar siding. There is no BirdCam at this location.

This plant was the second nuclear power plant to host nesting falcons and the first to have the box mounted directly on the dome. While containment domes provide a good home for nesting falcons, the boxes are more difficult to reach. We have to rappel down the side of the dome to band young.

18 falcons fledged here between 1997 and 2002.

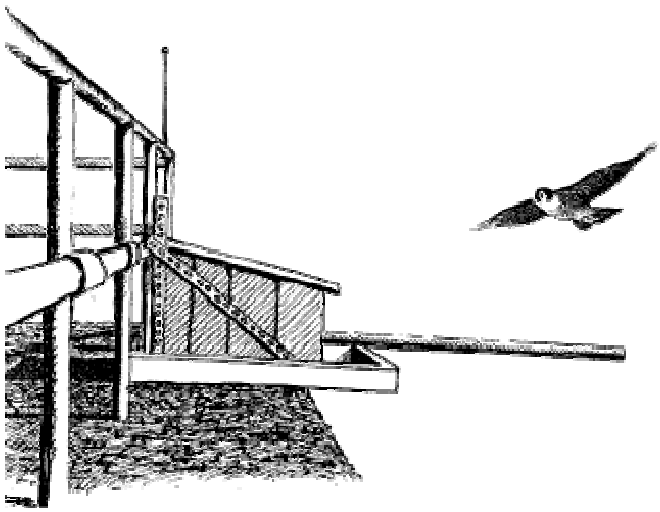

Figure 2-5
Standard Nest Box Mounted on Roof of Turbine Building

Mounting the Nest Box

Each box mounts a little differently; however, every nest box should be mounted to make it as sturdy and secure as possible. If possible, bolt nest boxes directly to power plant stack catwalks, sills, and nuclear containment domes. Do not bolt the nest box in the path of daily operations and remember that a nest box with gravel added will weigh over 125 pounds.

Mount the nest box prior to February, when falcons begin returning from their migration. Boxes mounted prior to this time will be more likely to attract falcons the first year.

Figure 2-5 illustrates a nest box mounted from the lip of a roof.

What Comes Next?

Once the nest box is mounted, keep an eye out for Peregrine Falcons. They may be seen perched near the nest box, chasing pigeons, or streaking over the facility. The Peregrine's wings are pointed and its tail is narrow. Whether in level flight or diving on prey, the Peregrine's speed and agility make it easy to spot.

Falcons adopt some nest boxes immediately, while others sit empty for a several seasons. However, once falcons have used the nest box they usually will keep coming back. Make sure to contact your state's non-game wildlife division once falcons adopt the box. They will provide information and resources, and help band eyasses. We have included a chronology of annual nest box events in Appendix B and can provide advice, recommendations, and training: our contact information is in Appendix E.

Cleaning and Maintaining the Nest Box

The nest box and surrounding area need periodic cleaning and checking. If the nest box looks messy, remove prey remains and change the gravel. Some falcons are messy while others keep their boxes very clean; additionally, wind and rain do blow and wash away debris, especially during the winter months. We recommend maintenance between October and late January, when falcons will have migrated from the area or, if present, will not be as likely to defend the nest box.

Quickly inspect the box during banding. If it has rot or other damage, replace it. Boxes degrade at varying speeds depending on materials and location, so be sure to check the box thoroughly during maintenance. The sill-mount strobe light port nest box does not have different maintenance requirements than the standard mount nest box – we simply designed it for a specific location in which front access is not possible. Both styles of box require regular at least some maintenance and cleaning.

Hacking (Releasing) Young Falcons

Most facilities attract falcons quickly, although we have seen nest boxes sit empty for up to five years. If falcons do not adopt the nest box within a couple of years, young captive-bred falcons can be released, or hacked, at the power plant to create a territorial breeding pair. The hack can be costly and must be carefully planned.

State and federal wildlife permits must be applied for well in advance of the hack. Captive-produced young falcons cost roughly $1,000 each: we recommend releasing as many as possible to increase the likelihood of success. Some ecosystems do not have falcons because they lack the necessary resources – especially a large body of water, such as a lake or river, and an abundant food source. Do not release Peregrine Falcons unless the area can support them.

During hacking, the young falcons (almost fledglings) are placed in a closed hack box at 35 days of age. They are released at 42 days of age, when they are able to take wing. The proper breeding stock, age, and gender of the release group are very important. The young falcons must be very

close in age for the release to be a success and the release group should include both male and female falcons. Since the young falcons are not proficient hunters, food must be set out daily for up to 20 more days.

Do not attempt to hack young falcons without help. The Raptor Resource Project has a lot of hacking experience: please contact us if your facility is considering a hack. Their contact information found is in Appendix E.

3
SAFE MANAGEMENT AND HANDLING OF PEREGRINE FALCONS

Although Peregrine Falcons are low-maintenance it is sometimes necessary to handle falcons or disturb the nest box during nesting season. This section provides falcon-handling guidelines to make these situations easier and safer for humans and falcons alike.

Check with state and federal wildlife officials regarding the handling and transport of Peregrine Falcons. Regulation will not apply to regular occurrences – for example, releasing a young falcon that grounded on its maiden flight. However, regulations will probably cover activities such as banding eyasses and transporting injured adults. Discuss these issues with your state's nongame wildlife division before an incidence occurs: this will help the facility to prepare for any emergencies.

Approaching the Nest Box

Sometimes work needs to take place near the nest box during nesting season. We have seen facilities install new communications equipment, re-roof turbine buildings, and undergo stack inspections near falcon nest boxes. With just a few precautions and a general understanding of falcon behavior, it is possible to work safely near the nest.

First and foremost - hard hats and safety glasses are mandatory when approaching a nest box! Furthermore, it is best if two people work together when approaching and handling peregrines.

Not all nesting falcons are aggressive: some will defend the nest box and others will fly away. A striking falcon will most likely hit the top of a hard hat with its talons, especially if people working near or approaching the box have their backs turned toward the falcon.

There are two ways to help ward off an incoming falcon: one, keep your back to the stack; and two, carry a broom. Do not bat at or swat the falcon with the broom: simply hold it above your head and the falcon will direct its aggression to the broom rather than the person or people near the nest box. If a large number of people need to work near the nest box, select one or two to act as 'decoys' to draw the falcons' attention. The falcons will eventually tire of striking and settle down near the nest box or fly away until the intruders have left for the day.

Strafing is very intimidating! Adult falcons are expert flyers and will move and call very aggressively even when they do not plan to attack. However, only a few power plant nesting falcons are aggressive enough to attack. Usually they just fly nearby, loudly vocalizing their protest. Remember, a hard hat and glasses will prevent serious injury even in the event of an attack. If you are concerned about striking, bring a broom to hold over your head.

A few precautions:

- It is important not to bother the nesting falcons when they first claim their nest box, which usually happens between mid-February and early March. Once the adults have eggs or young, they can tolerate a great deal of intrusion.
- Monitor the nest closely. Be sure that the falcons continue to care for their eggs and/or eyasses throughout the disturbance.

Remember, never approach the nest box area without a hard hat and safety glasses!

Banding Falcons

Your state's non-game wildlife division will help band falcon eyasses. The eyasses must be banded between 15 and 28 days of age. If they are banded at a younger age, it is difficult to sex them. If they are banded at an older age, they may be bumped into premature flight. When the downy eyasses are standing up, they are ready to band.

During banding, one or two people carefully take the chicks from the nest and fit a US Fish and Wildlife band – a snug metal hoop – around the right leg. In the central and eastern United States, a second bi-colored research band is fitted around the left leg. The bands help researchers determine the health and vitality of the falcon population and make it possible to track individual falcons. A licensed bander must band the falcons, although non-licensed people may assist.

It is crucial to assure that falcon eyasses are not prematurely bumped from the nest box during banding. If they are bumped from the nest – that is, if they try to fly away to escape the banders – they will die. To prevent bumping, always reach in around the front of a standard mount nest box. This drives the eyasses to the back, away from the opening.

The eyasses may be banded at the nest site or on the ground. If you decide the eyasses should be banded on the ground, they must be placed in a secure plastic (non-wire mesh) kennel for removal from the nest site. The licensed bander will have the bands and supplies necessary to band the eyasses.

Although the eyasses complain, banding does not hurt them. Several utilities have turned banding day into a community event.

Handling Falcons

Whether banding eyasses, freeing trapped, grounded young falcons, or rescuing injured adults, it may be necessary at some point to hold or handle the falcons. We have included illustrations and some simple instructions to make handling safe for people and falcons alike.

In general:

- Be aware of the falcon's talons and beak. Even eyasses may attempt to bite or 'foot' the people handling them. Falcons are wild birds: respect them and pay close attention while handling them.
- We do not recommend gloves. Bare hands are less likely to damage the blood feathers of young falcons and make it easier to monitor the falcon's reaction to handling.
- Make sure the falcon can breathe: do not hold it so tightly that its chest cannot expand.
- Handling is stressful. Do not handle the eyasses, young, or adult falcons unless it is necessary.

These warnings sound frightening, but none of the people involved in our program have damaged a young falcon by handling it. If you follow our instructions and pay attention to the falcon, it is unlikely that anyone will be hurt.

Handling Eyasses

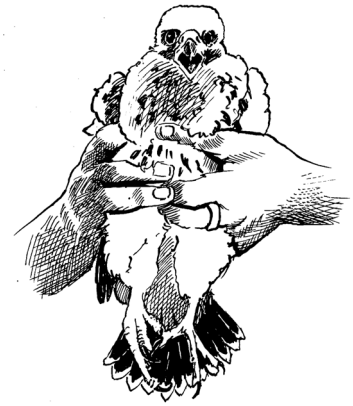

Figure 3-1
Holding an Eyass 1

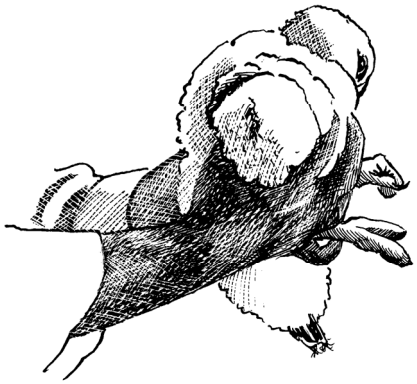

Figure 3-2
Holding an Eyass 2

Hold the eyass as shown in Figures 3-1 and 3-2. Pick it up quickly, firmly, and smoothly. Hold it securely to prevent struggling, but not too tightly, or the eyass will not be able to breathe. Be careful not to damage the eyasses developing adult feathers. These feathers, called blood feathers, are very susceptible to damage, which will delay their growth and the young falcon's flight.

Even an eyass may try to 'foot' or bite – watch the talons and beak.

Handling Young Falcons

Figure 3-3
Holding a Falcon

Hold the young falcon as shown in Figure 3-3. Pick it up quickly, firmly, and smoothly. Hold it securely to prevent struggling, but not too tightly, or the falcon will not be able to breathe. Be careful not to damage the young falcon's feathers. The blood feathers of a young falcon are very susceptible to damage, which will delay their growth and the young falcon's flight.

Again, watch the talons and beak.

Handling Injured Falcons

Peregrine Falcons are very occasionally injured. Signs of injury may include obvious wounds, lacerations, or tears, an inability to fly, or an inability to stand. In the event of an injured falcon, contact your local conservation officer, falconer, or raptor rehabilitator immediately.

Hold the injured falcon gently but firmly when picking it up, as shown in Figure 3-3. Take care not to injure it further and be aware of its talons and beak. The falcon, although injured, may still try to defend itself. Place the falcon in a very dark box, in a cool area, until a local conservation officer, falconer, or raptor rehabilitator arrives. This will reduce visual stimulation, which helps calm the falcon, and prevent overheating. Handle the falcon as little as possible and do not disturb it once you have placed it in the box, since stress can reduce the falcon's chance of recovering.

Grounded Young Falcons

Once young falcons reach approximately 40 days of age, they will begin fledging, or making their maiden flights. As with an infant's first attempts at walking, these first flights are usually quite clumsy. Young falcons frequently end up on the ground!

Young falcons typically ground within the first three days of fledging, when they are gaining their flying wings. If a young falcon grounds in an area with little traffic, it is best to leave the falcon alone. Grounding is a natural part of learning to fly.

If the young falcon grounds in a high-traffic area or in an area from which it cannot escape (such as the fenced area of a substation), it will need rescue. Hold the young falcon as shown in Figure 3-3.

Quickly take the young falcon to a plant rooftop door, turn it loose, and retreat, closing the door behind you. We have never had to rescue a young falcon twice.

Trapped Falcons

Adult falcons may trap themselves in buildings, stacks, and other places. It is important to set the falcon free as soon as possible, since a trapped falcon might injure itself and cannot feed its mate or its young until it is set free. Try closing all inner doors (if possible), shutting off the lights, and opening outer doors and windows. If, after several hours, the falcon has not escaped, call your local conservation officer, falconer, or raptor rehabilitator for assistance.

4
PUBLICIZING THE PEREGRINE PROGRAM

Peregrines fascinate people! They enjoy the Peregrine's speed, power, and fantastic aerial acrobatics. They like to watch the adults gently caring for their young. They are amazed at how quickly young go from fluffy lumps of white down to skilled and experienced flyers.

This section outlines how your facility can publicize its peregrine program and begin an internet birdcam to bring the nest box to a worldwide audience.

Celebrating Your Falcons

Milestone events provide a wonderful opportunity to boost employee ownership and reach out to the wider community. Recruit volunteers to help build nest boxes. Science classes, Scout troops, and/or or 4-H clubs will welcome the chance to build a nest box. Employee volunteers can help install and monitor the nest box for signs of returning falcons, egg laying and egg hatching.

Inform the entire facility of any peregrine events well in advance. Peregrine events can include banding, an Earth Day program, or a class field trip. Employees may want to bring their children, help coordinate school fieldtrips to the plant, or volunteer to help.

Let everyone know once peregrines adopt the nest box. Radio, newspapers, television, company newsletters, email, and the Internet all provide a wonderful venue for the falcons. Invite local reporters to cover the program, issue press releases when babies hatch, and consider inviting school or community groups to eyass banding. Xcel Energy and other electric companies have hosted school classes for children ranging in age from preschool through eighth grade. The 'name-that-falcon' contest is a favorite, and eyass banding has attracted national media attention.

BirdCam

BirdCam, an Internet camera trained on the King Plant falcon and her brood, has been a huge success since 1997, when Xcel Energy mounted a surplus security camera on an arm extending out from the opening of the nest box at the King plant. The camera was cabled to a monitor where employees could watch the falcon 'Mae' incubate her eggs and care for her eyasses.

In 1998, Xcel Energy made the live image from Mae's nest available on the Internet. As word spread Internet-wide, over one million people worldwide logged on to BirdCam to follow Mae, her mate, and brood, making Xcel Energy the busiest corporate web site in the world.

BirdCam and other cam sites like it are now an annual tradition for well over one million internet users. As of spring 2004, Internet visitors could watch peregrine falcons, eagles, and owls raise babies at Xcel Energy facilities in Minnesota and Colorado.

Beginning a Birdcam Program

Wait to begin a Birdcam program until peregrines have nested at the facility for at least one year. This will help assure that your facility is using the most current camera technology. Install the camera between October and early January, when the falcons will have migrated south. This will give the facility plenty of time to test and improve the camera and Birdcam site and avoid disturbing the falcons during copulation, egg laying, and nesting.

In general, a camera must be selected, mounted, and connected to a network or server. The camera will require power and network cabling or wireless access. Once the camera has been connected, the facility's Birdcam website must be tested internally to assure that images are clear, updating correctly, and accessible. User testing can help determine website function: how often images from the camera should update, how long images should be accessible online, and how users access images. The cameras are prone to lightning strikes, so keep a plug-and-play backup on site.

The Information Technology (IT) department needs to be involved in your facility's Birdcam program from the very beginning. IT will help resolve crucial issues, such as:

- What kind of camera will work best?
- What server setup should be used?
- What type of connection should be used?
- How will images captured on camera be exposed via the Internet?
- Does your facility need to buy any additional software?
- Does your facility's web page need to have content added?
- Can the existing server or servers handle more web traffic?

These are just a few of the issues that need to be resolved prior to Birdcam rollout. If the facility's IT department helps, it is less likely that hardware or software issues will be a problem and more likely that the Birdcam rollout will happen on time.

Choosing and Mounting the Camera

The camera will be exposed to wind, rain, sun, and falcons. It must be:

- Weatherproof
- Rugged
- Adaptable

We recommend cameras that allow operators within the facility to control tilt, zoom, and pan. Tilt-zoom-pan cameras capture wonderful close-up images that help identify the band numbers of adult falcons.

The camera may be mounted high on a side wall inside the nest box, or on the outside, pointing in. To mount the camera inside the nest box, position it on an inside wall near the top of the nest box roof. This will help prevent the lens from getting dirty and provide a wide-angle view of the entire nest box. To mount the camera outside the nest box, drill a small hole in the side and mount the camera from the outside pointing in, or mount the camera on an arm extended from the nest box, pointing back into the nest box.

We often use the Silent Witness camera, which is small enough to mount directly in the nest box. We use a 2.9mm lens for cameras mounted inside the box. A larger lens will provide a better picture, but will also require an outside mount.

Falcon eyasses shoot "hawk chalk" (guano) from the front of the nest box when they are old enough to stand and walk. To prevent whitewash from coating the lens of a camera mounted outside the nest box, make sure the camera extends out at least four feet from the nest box opening. Cameras mounted high on a sidewall inside the nest box will not have this problem, although down feathers may stick to the lens and obscure the image. If the image is too obscure, the lens should be cleaned.

To look at current Birdcam programs and websites, follow the URLs below. These URLs were current in June 2004.

- Xcel Energy's birdcam: http://birdcam.xcelenergy.com/falconcams.asp
- Dairyland Power Cooperative's birdcam: http://www.dairynet.com
- Horizon Milling's birdcam: http://www.horizonmilling.com
- Kodak's birdcam: http://birdcam.kodak.com/

Remember the users. It is our experience that Birdcam users want to swap stories and pictures with other users, look up information about the birds, and ask questions. A Birdcam alone is nice, but a Birdcam with added features will attract and keep users.

Xcel Energy's Birdcam sites feature round-the-clock image storage, so users may browse through a library of images retained over a 24-hour period. Kodak's popular site features an internet forum where viewers can swap photos and stories of the nesting falcons: Kodak has also arranged well-attended chats with falcon and raptor researchers. Know who your target market is and what that market wants before launching your Birdcam site.

BirdCam

Horizon Milling, a Subsidiary of Cargill Foods, Lake City, MN

Eric Kirsling was responsible for implementing the BirdCam at Horizon Milling in Lake City. His team decided that their camera implementation required a camera that could send digital images directly to a website.

Their camera has a built in web server and is able to publish photos or streaming video directly to the web. Kirsling found the camera easy to install and liked its many configuration options. The camera allows the user to determine how many pictures will be published in a given time period, whether or not motion detection should be used, and what level of motion will trigger the motion detector.

Although the Axis by itself is more expensive than a similar analog camera, it doesn't require an A to D converter or other web-enabling hard or software. Kirsling found that the Axis was less expensive than a comparative analog camera and hardware. The camera did require an enclosure and mount. Kirsling chose a Pelco and was very satisfied with it, although he recommends a small camera enclosure.

Overall, the camera, mount, enclosure, and cable cost approximately $1,500. An electrician was required to run the network and electrical cables. According to Kirsling, the camera was very easy to install on site. It took him just four hours.

From a user perspective, the images are sharp, clear, easy to access, and download quickly. Take a look: http://www.horizonmilling.com.

A
NEST BOX PLANS

Figure A-1
Standard Nest Box

This is a standard mount nest box. It is 22 inches deep, 22 inches high in the back, 20 inches high in the front, and 32 inches wide. The box uses T-111 cedar siding for the outside. T-111 siding is lightweight, easy to get, and very durable. The long arm provides a perch for the falcons.

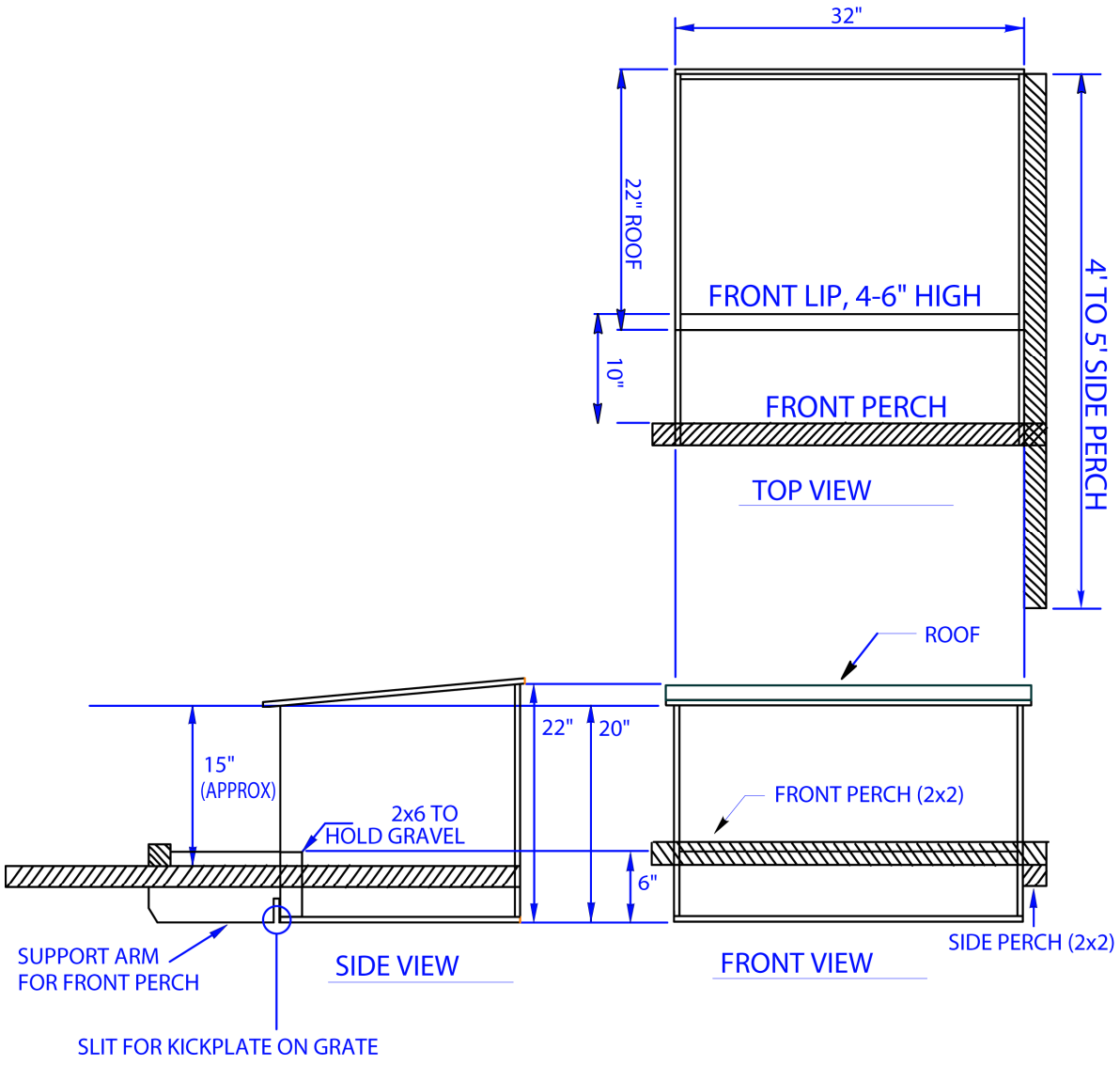

Figure A-2
Schematic of the Nest Box

Materials List

- T-111 Cedar Siding
- Wood (2x6s and 2x4s)
- Galvanized screws (screws must be rust-proof!)
- Drill with 3/16-inch bit (for drilling holes in the bottom of box)

The standard nest box (Figure A-3). The box measures 32 inches wide. The roof overhangs the box by two inches, as shown in the illustration. The back of the box is 23 inches high and the front of the box is 20 inches high, creating a downward slanting roof. The six-inch lip keeps pea gravel in. Space your screws at 4 inches max.

Be sure to use enough pea gravel and to drill fifteen 3/16-inch holes in the bottom of the nest box for drainage. Do not drill more than fifteen holes and space them evenly to assure the integrity of the nest box bottom.

This design can also be used to build a strobe light strobe light sill-mount nest box. Be sure to make the roof modifications described in Section 2.

B
A FALCON CHRONOLOGY

Most Peregrine Falcons migrate to southern climates each autumn. However, some falcons do stay year round. Falcons nesting in southern and coastal climates will begin nesting earlier than will those in interior and northern regions: this chronology will work best for utilities located in the Upper Midwest and Northern Plains areas.

February: Adult falcons begin returning to their power plant nest boxes.

March: The adult male will engage in spring courtship. Watch for him as he puts on stunning flights to impress his mate and boldly drives away any other raptor that ventures too close to the nest. The adult male will provide almost all food to the adult female during this spring courtship.

April: Egg laying will begin. Falcons lay eggs at approximately 50-hour intervals and the female will begin incubation in earnest after laying the third egg. Falcons usually lay four eggs, although they may lay as few as three or as many as five.

The adult female will do most of the incubation. Her mate will relieve her twice a day when he brings her food. She will fly off to preen and feed while the male incubates the eggs. When she is done preening and feeding, she will return to the nest to relieve the male.

May: The eggs will begin to hatch. Often three eggs will hatch during a single twenty-four hour period, and the fourth egg will hatch a day later. Falcon eyasses are banded approximately 15-28 days after hatch.

June: By mid-month, the young falcons will have grown considerably. When they reach approximately 40 days of age, they will begin to make their maiden flights. It is during these first few days that young falcons often will perch low in the plant area - sometimes, sitting on employee cars! Within three or four days, the young falcons will usually have gained enough flying prowess to keep to the higher structures of the plant. Young falcons often perch on the turbine building, transmission towers or any other tall structure around the plant. They can be quite vocal at this time, begging for food when they see the adult falcons with prey.

The young falcons usually will remain at or in the direct area of the plant until they develop enough skills to survive on their own. Young falcons have been seen at power plants as late as October.

C
PEREGRINE FALCONS AND FOSSIL FUELS

The peregrine-utility program in the midwestern United States has been very successful. When compared against nests on buildings, cliffs, and bridges, utility nests have the highest rate of eyass-to-fledgling survival and nest productivity. They also have very high year-to-year adult survivability and post-fledgling survival rates.

People asked almost from the very beginning whether Peregrine Falcons nesting at coal-fired plants were at risk from contaminants in the power plant stack plume. Could the physical or reproductive health of utility-nesting peregrines be jeopardized by mercury and other byproducts of coal combustion?

The Raptor Resource Project, Xcel Energy, Dairyland Power Cooperative, We Energies, and EPRI decided to find out. Between 1998 and 2000:

- 83 blood samples were collected from falcons nesting at 13 fossil fuel generating plants in Minnesota, Iowa, and Wisconsin.
- 18 blood samples were collected from falcons nesting at the Prairie Island and Monticello nuclear power generating plants in Minnesota.
- 4 blood samples were collected from falcons nesting in unpainted wooden nest boxes on non-industrial buildings in urban Des Moines and Cedar Rapids.
- 7 blood samples were collected from wild unbanded immature and adult *Falco Peregrinus tundrius* migrating through Decorah, Iowa; Cedar Grove, Wisconsin; and Virginia.
- 10 blood samples were collected from control falcons at the Raptor Resource Project.

The samples were tested to determine falcon blood levels of methylmercury, selenium, chromium, arsenic, and nickel. Where possible, adults and eyasses were tested: adults also were tested from year to year at some locations. Blood data from all five groups were compared all three years and within each group to develop a profile of metals exposure among each group and at each site. These data were used to establish whether Peregrine Falcons nesting at fossil fuel plants had higher levels of contaminants than did falcons nesting elsewhere. Baseline exposure data were developed for 15 electric utility plants spanning over 300 miles of the Mississippi river and its tributaries, from the river's headwaters at Minnesota Power and Light's Cohasset plant through Alliant Energy's Lansing plant in northeastern Iowa.

Results

Peregrine Falcons at fossil fuel burning utility sites do not appear to be at risk for significantly increased exposure to heavy metals, nor are they accumulating levels of heavy metals hazardous to their physical or reproductive health. When this question is asked (as it will be), you can confidently answer that the falcons are safe.

A copy of the study, titled *Heavy Metals in Utility Nesting Peregrine Falcons*, can be obtained from the Electric Power Research Institute. You may contact EPRI via telephone at (800) 313-3774 or visit EPRI's website at www.epri.com.

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The following reference materials may be useful for anyone considering a Peregrine nest box.

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F
GLOSSARY

Banding: Marking a bird with a leg band that contains a unique identifier.
Website: http://www.pwrc.usgs.gov/bbl/default.htm.

Bird cam: A camera that serves images of nesting birds to an Internet website.

Blood Feathers: An actively growing feather that still has a blood supply running to it. These feathers are more easily damaged than feathers that have stopped growing.

Bumping: Forcing eyasses into early flight from the nest. Since eyasses are not ready to fly, this is fatal.

Eyass: A young peregrine falcon still in the nest. Once a falcon begins to fly, it is no longer an eyass.

Falconer: A person who trains and flies raptors for hunting in partnership with humans.

Fledging: Leaving the nest. Young peregrines fledge when they learn to fly and hunt on their own.

Footing: When a raptor, in this case a peregrine, clutches something with its foot. Peregrines have long toes that clutch very tightly and very quickly.

Hacking: In this case, the process of preparing a peregrine falcon for release to the wild.

Hawk Chalk: Falcon droppings.

Nest Box: Commonly thought of as a 'bird house', the nest box provides a place for peregrine falcons to lay eggs and raise young.

Nesting Substrate: A thick layer – in this case, pea gravel – that helps to cushion the eggs and prevent breakage.

Raptor: A bird of prey. Raptors are hunting birds with sharp talons, curved beaks and keen eyesight.

Raptor Rehabilitator: A person who prepares injured raptors for re-release into the wild.

Sill Mount Strobe Light Port Nest Box: A nest box mounted from the sill of a strobe light port. These boxes have a special attachment that closes the front of the box when the top of the box is opened.

Stoop: A hunting technique in which the raptor folds its wings and dives at its prey.

Talon: The claw of a bird of prey.

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