PRAIRIE FALCONS NEST ON AN ARTIFICIAL LEDGE

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Abstract

Four days during fall 1978 were needed to measure, construct, and install an artificial nesting ledge on a historical Peregrine Falcon nesting cliff in the Mendocino National Forest, California. The platform was constructed of steel with rock nesting material added onto it. Expansion bolts inserted into predrilled holes held the ledge in place. Prairie Falcons laid four eggs on the artificial ledge in April 1979. Two young hatched in May and fledged from the ledge in June 1979.

Introduction

There are two general categories of man-made raptor nesting structures. First, man-made *structures* intended for man's own use are sometimes adopted and subsequently used as nesting sites by raptors. Examples of such structures include bridges, high-rise buildings, and buoys. Second, *artificial platforms* can be designed and installed specifically to encourage raptors to nest.

Large falcons have frequently adopted man-made *structures* as nesting sites. White and Roseneau (1970) reviewed artificial nest site use by different species of falcons. Some noteworthy examples are the Gyrfalcon (*Falco rusticolus*) nesting on arctic gold-dredges, Lanner Falcon (*Falco biarmicus*) nesting on Egyptian pyramids (Meinertzhagen 1954), Orange-breasted Falcon (*Falco deiroleucus*) nesting on Mayan temple ruins in Guatemala (Smithe 1966), and Peregrine Falcon (*Falco peregrinus*) nesting on metropolitan sky-scrapers (Groskin 1952) and bridge piers (Craighead and Craighead 1939).

Artificial nesting platforms have been used by a wide variety of tree-nesting raptors, such as Osprey (*Pandion haliaetus*), Bald Eagle (*Haliaetus leucocephalus*), Great Horned

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Owl (*Bubo virginianus*), Great Grey Owl (*Strix nebuloso*), and Ferruginous Hawk (*Buteo regalis*) (Bohm 1977). Very few artificial platforms, however, have been constructed to encourage falcons to nest. In Alaska artificial wooden ledges placed along the sloping Sagavanirktok River banks have failed to attract nesting Gyrfalcons or Peregrines (White pers. comm.). So far, only the Raven (*Corvus corax*) has shown interest in these ledges. Both Peregrines and the Prairie Falcon (*Falco mexicanus*) (particularly the latter) were attracted to excavated cavities in sandstone cliffs in Canada (Fyfe and Armbruster 1977). These cavities however, contain no artificial structures.

The Mendocino National Forest Ledge

The historical Peregrine nesting cliff at which we constructed the artificial nesting ledge is situated on a 1,500-meter ridge. Facing east, the 110-meter-tall metagraywacke cliff overlooks the west side of the northern Sacramento Valley. The nesting ledge is in a rock chimney (a large vertical fissure, roughly the size and shape of a house chimney) 60 meters below the cliff top.

During a 1978 Mendocino National Forest Peregrine Falcon nesting survey, the historical nesting ledge was discovered to have fallen from the cliff. The remnant ledge was restricted to only 80 square centimeters. No alternative nesting ledge exists on the cliff. Therefore, an artificial platform project to encourage renesting by Peregrines was contracted to Wilderness Research Institute by the U.S. Forest Service.

Methods and Materials

Ledge Design. All materials, supplies, and personnel were airlifted by helicopter to within 300 meters of the cliff. Three climbers (Lehman, Hipp, and Boyce) rappelled down the cliff face, using standard rock climbing equipment, to reach the site. A large piece of stiff cardboard from a packing crate served as a template. The cardboard was cut using a grocer's razor to fit the rock chimney exactly. The template location was marked so that the artificial ledge could be placed in the proper position.

Ledge Construction. A U.S. Forest Service welder used the template to guide his assembly of the ledge. Arc and acetylene welding joined all metal pieces. All materials were selected to reduce ledge weight while providing necessary strength.

Galvanized slotted angle iron (1½-inch by 3-inch angle) formed the supporting perimeter of the ledge (fig. 1). Slotted angle iron with its multitude of holes was used for easy bolt placement (thus eliminating the need to drill through metal). Two-inch expanded metal (diamond pattern) was then welded on top of the slotted angle-iron perimeter (fig. 1) to give support to nesting substrate to be added later. One-inch expanded metal (diamond pattern) was laid on top of the two-inch expanded metal. The two expanded metal patterns were placed at right angles to each other. In this way large gaps resulting from spaces in the diamond pattern were reduced. A brass mesh screen (nonrusting) was inserted between the two expanded metal sheets to prevent finer nesting substrate particles from falling through the expanded metal sheets. A black pipe (1½-inch inside diameter) was positioned along the ledge's front edge for use as a perch.

Ledge Placement. The ledge was designed to be bolted to the cliff, and a gasoline driven generator was used to power heavy duty impact drills. Three types of drill bits—standard rock climbing hand drill bits, masonry drill bits, and masonry drill bits with carbide

tips—were used.

Climbers drilled the holes while suspended from climbing ropes. Drilling while suspended on ropes posed the problem of pressing drills into the cliff while hanging free. This problem was solved by having an additional climber exert pressure on the drill operator's back.

Once holes were drilled, the ledge was positioned. Masonry expansion bolts were inserted through the slotted angle iron and into the holes. Each bolt was capable of supporting several thousand pounds. A piton was inserted in one corner.

Three types of substrate (115 kg) were applied to the ledge in layers. First, one-inch river gravel was poured over the metal ledge surface to cover small holes in the expanded metal. Next, half-inch river gravel was placed on top to close any remaining spaces. Finally, river sand and comparable cliff substrate material were laid down. The fine sand material was placed 5–8 centimeters thick to allow a falcon to build a scrape for eggs. The final available nesting area was increased to 1 square meter. Figure 2 shows the ledge in place on the cliff.

Results and Discussion

Four days were required to design, construct, and install the ledge. A limiting factor was finding and using the proper drill bit. Hand drill bits, used in power drills, virtually melted in 30 second's use. Masonry bits required an hour to drill one-half inch. Carbide-tipped bits proved to be most effective; all drilling was accomplished in just 4 hours.

On 7 April 1979 C. M. White and Boyce flew by the site in a helicopter and found two adult Prairie Falcons and four eggs on the ledge. Boyce climbed into the eyrie on 14 May 1979 and found two young falcons, approximately one week old, and two addled eggs (fig. 3). In June two fully feathered young were seen on the artificial ledge.

The drier habitat surrounding the cliff is conducive to nesting by Prairie Falcons. In fact, Boyce and White (1979) found Prairie Falcons commonly nesting all along the western edge of the northern Sacramento Valley. Just a few kilometers west, in more humid forested areas, Prairie Falcons are replaced by Peregrines. The authors expect nest site competition to occur between Prairie Falcons and Peregrine Falcons in these drier habitats. Ogden (1972) and Granger Hunt (pers. comm.) have observed Peregrines outcompeting Prairie Falcons when such interactions occur. By numbers alone it might be expected that Prairie Falcons would use the ledge first.

Artificial ledge construction and placement at suitable nesting sites might increase the number of nesting Peregrines in California. Four northwestern California National Forests recently conducted a Peregrine Falcon nesting habitat survey to determine where suitable nesting habitat occurred and to select, among identified habitats, those that might be enhanced to encourage nesting by Peregrines. Six Rivers National Forest has taken Mendocino National Forests' lead and begun a small-scale ledge enhancement project on lands they administer.

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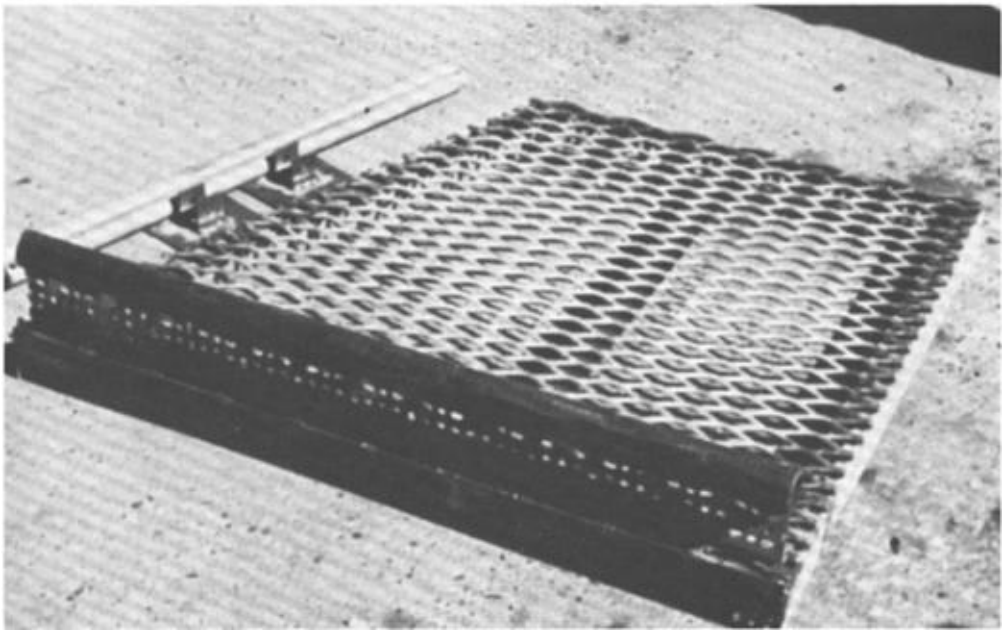

Figure 1. Partially completed artificial ledge showing slotted angle iron, expanded metal (diamond pattern), and 1½-inch inside diameter black pipe perch.

Figure 2. The ledge as installed on the cliff. Note the black pipe perch at the front of the ledge.

Figure 3. Two downy young Prairie Falcons and two addled eggs on the ledge in May 1979. These young fledged from the ledge in June.