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EFFECTS OF OIL DEVELOPMENT ON PROVIDING NESTING OPPORTUNITIES FOR GYRFALCONS AND ROUGH-LEGGED HAWKS IN NORTHERN ALASKA[1]

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Key words: Rough-legged Hawk (Buteo lagopus); *Gyrfalcon* (Falco rusticolus); *raptors; nesting sites; arctic Alaska; oil development.*

The construction of the Trans Alaska Oil Pipeline System (TAPS) and the development of a transportation corridor in arctic Alaska created numerous man-made structures that may be used for nesting by raptors and has modified the physical properties of otherwise flat tundra, thus providing some unusual nesting opportunities for cliff-nesting birds of prey. Examples of structures include elevated pipelines, buildings, and communication towers. Physical changes associated with these developments include numerous quarries and early snow melt caused by vehicle-generated dust. Here I summarize records of unusual nests of Rough-legged Hawks (*Buteo lagopus*) and Gyrfalcons (*Falco rusticolus*) on modified and artificial substrates associated with oil development in northern Alaska, including the first records of Rough-legged Hawk nests on the ground and buildings in Alaska, and a Gyrfalcon nest on an oil pipeline.

ROUGH-LEGGED HAWK

On 17 August 1985, I located the recently abandoned nest of a Rough-legged Hawk on the ground, approximately 60 km south of the Arctic Ocean and 150 m west of the Dalton Highway (69°45′N, 148°45′W; Fig. 1). Traditional cliff habitat used by nesting Rough-legged Hawks occurred approximately 3 km to the east along the Sagavanirktok River; the nearest vertical relief included the sloping shoulder of the highway, which was approximately 1.5 m above the surrounding tundra. Fledged Rough-legged Hawks were perched nearby on snow depth markers, and adults had been seen on these poles and at the nest throughout the summer (A. Richey, Alyeska Pipeline Service Company, pers. comm.). The nest was built directly on tussock tundra and was composed of willow (*Salix* spp.) twigs lined with grass.

In arctic North America, Rough-legged Hawks typically nest on cliffs or on river banks and occasionally nest in trees or on flat ground (Godfrey 1986, Palmer 1988). In northern Alaska, nests generally are on riparian cliffs or scree slopes (White and Cade 1971), whereas records of tree-nesting are limited (Palmer 1988), and ground nests have not been described. Many nests in Alaska are on gentle slopes or at the tops of escarpments, however, and for all practical purposes are similar to ground nests elsewhere in the species' range: Siberia (Cramp 1980, Flint et al. 1984) and Canada (Godfrey 1986).

The above nest was unusual because of its position on the tundra and proximity to traffic on the Dalton Highway. The Alaska Department of Transportation (ADOT) estimated a traffic rate of 150/day trucks (including heavy equipment) during summer of 1984;

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FIGURE 1. Ground nest of Rough-legged Hawks near the Dalton Highway, northern Alaska.

similar rates probably occurred in 1985 (B. Fantazzi, ADOT, pers. comm.). A dust cloud produced by vehicles normally lingered near the road and dust blanketed the nest. However, this apparent distraction may have been an important factor in selecting this area for a nest site because dust acts to increase absorption of radiant energy on snow-covered surfaces, causing more rapid snow melt in spring, and helps create a corridor ("dust shadow") of snow-free tundra and, hence, potential nesting habitat adjacent to the road (Walker and Everett 1987). This exposed tundra regularly attracts migrating birds in spring (Alexander and Van Cleve 1983, Walker and Everett 1987).

In their high-arctic range (Victoria Island, Canada), Rough-legged Hawks have nested on less-preferred sites such as snow-free patches of ground during lemming peaks in years when cliff sites are at a premium (Palmer 1988). The abundance of Rough-legged Hawk pairs nesting on bluffs near the Dalton Highway in 1985 may have been related to high prey levels and exposed tundra along the highway provided a similar alternate after preferred sites on river bluffs were occupied.

I found a stick nest and two nearly-fledged Rough-legged Hawks on a building's air vent on 30 July 1981 at TAPS Happy Valley construction camp (69°10'N, 148°50'W) (Fig. 2). Rough-legged Hawks had been observed there in June (Peggy Kuropat, Fluor Northwest, Inc., pers. comm.). Although truck traffic on the Dalton Highway regularly passed within 400 m of this building, the building and camp were unoccupied. Birds were not observed at this location in 1982, and the building was removed in 1983 (Ken Durley, Alyeska Pipeline Service Co., pers. comm.).

Records of Rough-legged Hawks nesting on man-made structures are limited. Cairns or "beacons" in northern Canada and mining dredges in southwestern Alaska have been recorded as nest substrates (Palmer 1988). Rough-legged Hawks have nested on "stone pyramids" (Uspenskii 1969:283) and in artificial nests (Berggren 1975) in tundra areas in the Palearctic. Buildings previously have not been recorded as nest substrates, however. Bent (1937) incorrectly referenced an account of Rough-legged Hawks sometimes nesting in buildings (see Henniger and Jones 1909); the latter article only included records of the American Kestrel (*Falco sparverius*) nesting in buildings.

GYRFALCON

On 15 July 1988, three nearly-fledged Gyrfalcons were seen in a Common Raven's (*Corvus corax*) nest on an above-ground portion of the TAPS pipeline approximately 150 km south of Prudhoe Bay (68°50'N, 148°50'W; Fig. 3). The nest was directly beneath the pipeline, on the horizontal steel beam between two vertical support members. The nest was approximately 2.5 m above ground, and approximately 0.5 m from the base of the pipeline. The support members and the pipeline provided an unusual degree of protection.

Although not an obligate nester in other species' nests (White and Cade 1971), Gyrfalcons commonly use nests of Common Ravens (Burnham and Mattox 1984, Poole

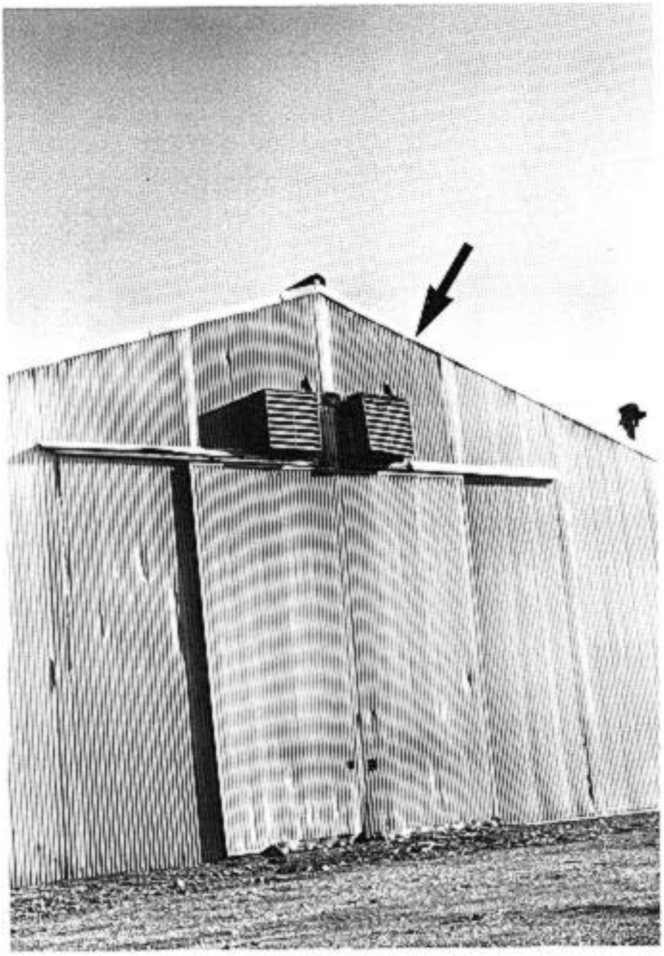

FIGURE 2. Nest of Rough-legged Hawks on metal building, Happy Valley Construction Camp, northern Alaska.

and Bromley 1988). Gyrfalcons nested in Common Raven nests on gold dredges, on abandoned pilings, and on a gold miner's sluice box in Alaska (White and Roseneau 1970) and a water tower in the Aleutian Islands (C. White, Brigham Young University, pers. comm.). In addition, Gyrfalcons may have nested on an abandoned wooden drill rig near the Chandler River in 1989 (69°25'N, 151°20'W). Although nesting was not verified, the behavior of an adult female suggested breeding (she attacked the aircraft) and at least four Common Raven nests provided suitable nest sites. Uspenskii (1969:283) stated that the nests of birds of prey were "noticed in various vacant buildings in the arctic region: Gyrfalcons sometimes nested on triangular peaks."

The traditional Gyrfalcon aerie nearest to the pipeline nest is approximately 15 km south along the Sagavanirktok River. Closer cliffs lack old stick nests or stable ledges with overhangs. In 1988, Gyrfalcons may have used all the best sites, as indicated by the occupancy of all traditional cliff sites (R. J. Ritchie, pers. obs.) as well as additional sites such as this artificial platform. In 1989, Gyrfalcons again nested and successfully raised three young in another Common Raven's nest along this section of the pipeline (Ken Durley, Alyeska Pipeline Service Co., pers. comm.). Interestingly, low (<150 m) helicopter surveys immediately over the pipeline occurred at least biweekly in both nest seasons.

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FIGURE 3. Young Gyrfalcons in and adjacent to nest on above-ground portion of the Trans Alaska Oil Pipeline, northern Alaska.

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WHY HOUSE WRENS DESTROY CLUTCHES OF OTHER BIRDS: A SUPPORT FOR THE NEST SITE COMPETITION HYPOTHESIS[1]

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Key words: House Wren; Troglodytes aedon; *egg destruction; cannibalism; competition.*

House Wrens, *Troglodytes aedon,* are notorious for destroying clutches of other birds, including those of conspecifics. The destruction usually involves pecking holes in eggs and removing the soft lining from the nest cup; if small nestlings are present, they may also be killed (Kendeigh 1941). It has been proposed that wrens attack clutches 1) to acquire suitable cavities for their own use, 2) to consume the contents of broken eggs, 3) to force other birds to breed farther away, hence reducing competition for food, and 4) to free potential mates (in case of conspecific nests), thereby increasing chances of becoming polygamous (Belles-Isles and Picman 1986). Because little evidence for the hypotheses is available (see Quinn and Holroyd 1989), we report several cases of clutch destruction followed by a cavity takeover, and provide evidence against the egg consumption hypothesis.

Observations reported here are part of a long-term study of the House Wren breeding ecology being conducted in the Mer Bleue Bog conservation area near Ottawa, Ontario, Canada. In May–July 1989, we conducted two tests in which we offered breeding House Wrens nesting boxes with experimental clutches (unpublished data). The nesting boxes were made of plywood and each was attached to a stake 1.5 m above ground. Wren responses to those boxes provide data on the plausibility of two of the above hypotheses for the function of egg-destruction by House Wrens.

In the first test, we introduced five nesting boxes near each of 25 active House Wren nests (125 boxes in total). The boxes were placed 20 m apart along a transect receding from the House Wren nest; the first box was 20 m from the wren nest. Each nesting box contained a dry-grass nest with one quail (*Coturnix chinensis*) egg. The wren nests contained either eggs or small nestlings of the first brood. The nesting boxes were checked after 6 hr, 1 day and 3 days. During the three-day period, males in six of 25 (24%) territories started building a nest in one of the boxes (males build a rough twig nest which females complete with soft lining; Kendeigh 1941). The males first punctured and removed the quail egg, then removed the grass nest, and finally started bringing in twigs. Five males brought in several centimeters of twigs, one male completed three-quarters of the nest. The males chose boxes which were 20 m (one bird), 80 m (one bird) and 100 m (four birds) from their nests. We assume that the majority of the males were resident males because a) in a separate experiment, we equipped a nesting box with a trap and placed it 20 m from several active House Wren nests (seven out of ten (70%) trapped wrens were resident males); and b) the transects of nesting boxes used in this test were always directed away from neighboring House Wren nests.

In the second experiment, a nesting box was successively introduced into territories of 11 males. Each nesting box contained a House Wren nest and one House Wren egg. The nests and eggs were obtained from failed nesting attempts of other pairs. The males were either unmated males defending a territory, or mated males whose females were incubating. We directly observed all 11 males enter the box and remove the egg, usually by carrying it in their beaks through the entrance and then dropping it below the box, or flying a short distance and dropping it into vegetation. Each male, except two, spent less than 8 sec inside the box; one male spent 11 and one 23 sec. The fact that all eggs were removed from the nests and dropped into vegetation, and that the males remained inside the nest for a short time suggests that conspecific eggs are not

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