Falco peregrinus Tunstall — peregrine falcon

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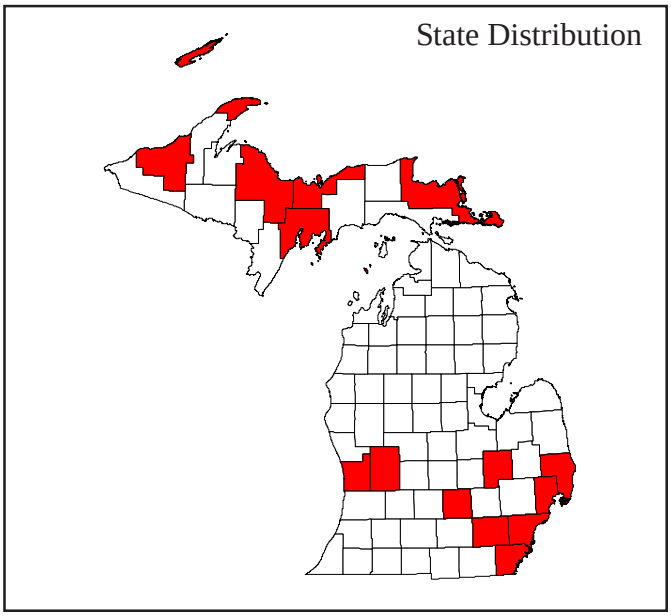
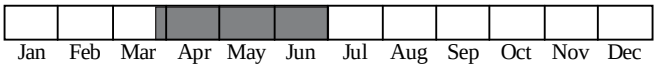


Best Survey Period



Status: State Endangered

Global and state rank: G4/S1

Family: Falconidae – Falcons

Total range: While having one of the most extensive global distributions, peregrine falcons were never abundant anywhere, due to its specific habitat requirements and position in the food web as a top predator (Hess 1991). The species was formerly extirpated throughout much of its original range due to exposure to organic chemicals such as DDT, and reoccupancy and restoration is still incomplete (White et al. 2002). Three subspecies occur in North America, with *F. p. anatum* being the subspecies that breeds in Michigan. Payne (1983) noted that *F. p. tundrius* is an occasional transient in the State. See White et al. (2002) and citations therein for a detailed description of the current peregrine falcon breeding range in North America. Breeding range encompasses Alaska, Yukon Territory, Northwest Territories, Nunavut, ice-free parts of western Greenland, British Columbia, northern and central Alberta, Saskatchewan, Manitoba, southern Ontario, southern Quebec, and Labrador. Distribution is local in the northern tier states of Midwestern and eastern U.S. The species is widely distributed in the western United States, but absent in most of North Dakota, Florida, Oklahoma, Arkansas, Alabama, Mississippi, Louisiana, Texas, and Nevada. In Mexico, peregrine falcon is present on the Baja Peninsula, islands of the Gulf of California, and northwestern states of the mainland. Breeding also confirmed for eastern Cuba and the Dominican Republic (White et al. 2002).

State distribution: Barrows (1912) noted that the peregrine falcon was “nowhere common” and Wood (1951) called the species a rare local summer resident in northern counties along the Great Lakes. Isaacs (1976) described ten historical nesting sites in Michigan: Goose Lake escarpments, Huron Islands, Huron Mountains, and Lake Michigamme in Marquette County; Grand Island and Pictured Rocks in Alger County; Garden Peninsula of Delta County; Isle Royale in Keweenaw County; Mackinac Island in Mackinac County; and South Fox Island in Leelanau County. After declines attributed to DDT contamination, the last known successful nesting in the State occurred in 1957 on cliffs of the Garden Peninsula of Delta County (Berger and Mueller 1969). Peregrine falcons were released throughout the United States in an effort to restore populations. One hundred thirty-nine (139) falcons were released in Michigan, which included 108 in the Upper Peninsula and 31 in urban areas of the Lower Peninsula (Michigan Department of Natural

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2005). Highlighted counties in the above map contained release sites during reintroduction efforts, element occurrences from the Michigan Natural Features Inventory database, or records of recent (since late 1980s) nesting activity. Recent peregrine falcon breeding at natural sites has centered on the Lake Superior shoreline (Pictured Rocks National Lakeshore, Grand Island, and Au Train Island) and the Porcupine Mountains region (Porcupine Mountains Wilderness State Park and Ottawa National Forest). Contemporary nesting on artificial structures has occurred in the cities of Detroit, Mt. Clemens, Monroe, Ann Arbor, Grand Haven, Grand Rapids, Lansing, Flint, Port Huron, and Sault Ste. Marie.

Recognition: White et al. (2002) describe peregrine falcon as a **medium to large falcon** with **bluish-gray upperparts**, a variable-width **blackish facial stripe** extending down from the eye across malar, pale auriculars (sometimes all dark), underparts whitish, grayish, or buffy with variable amount of blackish spotting and barring, and under wing and undertail surfaces barred pale gray and black. Immatures are similar to adults but upperparts are pale to slate or chocolate brown and underparts are buffy with blackish streaks (White et al. 2002). White (1968) describes *F. p. tundrius* as smaller and white to gray compared to the more brown and rufous-colored *anatum* subspecies that breeds in Michigan. Sexes best identified by size, with females being 15-20% larger and 40-50% heavier than males. Females are 45-58 cm (18-23 in) in length and males 36-49 cm (14-19 in). Peregrine falcons frequently use the ***cack* call**, a harsh *kak kak kak kak kak* often repeated incessantly, in alarm and in conjunction with nest defense (White et al. 2002). Peregrine falcon can be confused with the similarly colored and shaped Merlin (*Falco columbarius*), but peregrine adults are larger and have a heavier malar stripe (Evers 1994).

Best survey time: Surveys best conducted during the breeding season, spanning about late March through late June, when pairs are territorial and most vocal. Use of electronically broadcast conspecific calls during surveys may increase the likelihood of detecting breeding adults.

Habitat: White et al. (2002) note that peregrine falcons use many terrestrial biomes in the Americas, with none seemingly preferred, although densities may be greater in tundra and along coasts. Eyries (nest sites) usually found on cliffs overlooking expansive openings, such as large bodies of water; historic nesting areas in Michigan occurred on sandstone or granite cliffs located above the Great Lakes shoreline (Evers 1994). In North America, cliff heights ranged from 8 – 400 m with cliffs 50 – 200 m tall being preferred (White et al. 2002). Peregrine falcons commonly use artificial structures as nesting sites, such as buildings, bridges, and towers.

Biology: Peregrine falcons in Michigan are migratory with their phenology closely following abundance of small migratory bird prey (Hess 1991). Few data are available on migration timing in Michigan. Bent (1938) suggested seasonal movements were irregular with variable arrival and departure dates. Wood's (1951) analysis of a small number of spring records indicated a protracted migration occurring between about the second week of March and sometime in May. Most migrant peregrine falcons in Ohio observed from April 20 to May 15 and from September 25 to October 20, with some as late as mid November (Peterjohn 2000). Wood (1951) noted that the southward movement of peregrine falcons occurred primarily in September and October but extended from late August to November. Some peregrines have remained in Detroit during winter, which is likely due to abundant food in the form of rock doves (*Columba livia*) and European starlings (*Sturnus vulgaris*) (Hess 1991). Males usually arrive in spring prior to females and nesting occurs between late March and late May (Evers 1994). Peregrine falcons do not build nests, but instead usually make shallow scrapes on cliffs or rock outcrops. A variety of natural and artificial structures are used as nest platforms, such as abandoned nests of other bird species, tops of hollow tree stumps or snags, building ledges, nest boxes, bridges, and towers (White et al. 2002 and citations therein). Unless potential nest sites are limited, males will make several scrapes from which the female selects one for egg laying (White et al. 2002). Pairs tend to use the same nest sites annually. Peregrine falcon pairs are monogamous and stay together until young disperse; most mates remain paired year after year, which is likely due to strong attachment to the nesting territory rather than strength of the pair bond (White et al. 2002). In the increasing Midwestern population, the majority of individuals of both sexes bred at two years of age, but twice as many females bred at

1 year and 10 times as many males bred at three or more years (Tordoff and Redig 1997). Peregrines lay three to four eggs (rarely two to six) between late March and late May (Evers 1994). Eggs are short subelliptical to short elliptical, smooth and non-glossy, creamy or buff, and heavily marked and usually obscured by dense fine red or chestnut-red speckles (Baicich and Harrison 1997). Although both sexes participate in incubation, females typically spend more time incubating than males. Length of the incubation period recorded as 33-35 days in wild birds (Bent 1938); Burnham (1983) suggested an incubation period of approximately 33.5 based on captive falcons. Peregrine falcons single brood but will renest if the first nest is destroyed. Young are semialtricial and covered by off-white down (White et al. 2002). Fledging occurs about five to six weeks after hatching (Evers 1994), and young remain dependent upon parents for food until the onset of migration (about 5-6 weeks postfledging) or up to 9-10 weeks postfledging in nonmigratory populations (White et al. 2002). The diet of the peregrine falcon is dominated by bird species, which are hunted by pursuit and aerial attack. Stooping is one of the species most well known modes of hunting. In this behavior, peregrines dive at their prey from above and use gravity to produce a high enough velocity to overtake and capture the fleeing prey, which is usually flying but sometimes swimming or running (White et al. 2002). White et al. (2002) noted that velocities produced during stoops range from 25 to 100 m/s (56 to 225 mph). An array of bird species are eaten, ranging from passerines to small geese, as well as small mammals, especially bats, microtines, squirrels, and rats, and occasionally amphibians, fish, and insects (White et al. 2002 and citations therein). White et al. (2002) state that in temperate continental latitudes pigeons and doves may be most important to peregrine falcons by frequency and biomass.

Conservation/Management: Although no longer a federally listed species, peregrine falcons remain protected under the federal Migratory Bird Treaty Act. Peregrine falcon remains protected under the Michigan Endangered Species Act (Part 365, Natural Resources and Environmental Protection Act, P.A. 451 of 1994) as an endangered species. Widespread use of organochlorine pesticides (primarily DDT, dieldrin, and aldrin) from the late 1940s to early 1970s contaminated peregrine falcons (and other bird species) due to bioaccumulation in prey species, which caused lethal and sublethal effects and serious population declines (White et al. 2002 and citations therein). Researchers observed metabolites of DDT in peregrine falcons and their eggs and prey and identified eggshell thinning as a sublethal effect of contamination leading to reduced reproductive success (Cade et al. 1968, Hickey and Anderson 1968, Peakall 1970, 1974). Peregrine falcon was listed as a federal endangered species in 1969. The large-scale banning of most harmful chemicals in North America by about 1972, along with reintroduction and protection efforts, led to recovery of the species and federal delisting in 1999. Using data from other researchers, White et al. (2002) estimated the North American peregrine falcon population at 2,500-3,000 pairs. Mesta (1999) estimated at the time of delisting there were more than 225 peregrine falcons in the Midwestern and eastern states where the species was once extirpated. In 2006 at least 13 pairs nested in Michigan, 10 of which successfully produced young (Redig et al. 2007). The goal of the Michigan Department of Natural Resources was to reestablish 10 nesting pairs by the year 2000 (Michigan Department of Natural Resources 2005).

Other contaminants, such as PCBs, mercury, and lead (DeMent et al. 1986), have been cited in peregrine falcon deaths; however, population impacts to North American populations have not been observed (White et al. 2002). Peregrine falcons use a wide range of habitats, including human-modified landscapes, and are most susceptible to the loss or modification of specific nesting sites that are limited in number (White et al. 2002). Poorly designed field studies can result in the death of adults and young or nest abandonment; however, long-term population impacts of such disturbance are not known (White et al. 2002). Breeding pairs at remote locations are most susceptible to human disturbance, while those in urban locations or frequently visited sites often become habituated to humans (White et al. 2002). White et al. (2002) describe losses of urban-dwelling peregrine falcons due to collisions with buildings/windows, vehicles, wires, or other objects, and when nestlings fall from nesting areas or are killed by machinery. Losses to shooting, trapping, and egg and nestling collecting have been documented, but these impacts occurred primarily before federal and state legal protection (White et al. 2002 and citations therein).

Conservation efforts focus on habitat protection, habitat improvements/manipulations, population monitoring, and sustained yield use for falconry (White et al. 2002). Traditional nesting sites require protection from physical alteration and excessive human disturbance. Protection of sites supporting large numbers of prey, such as wetlands, should also be considered (White et al. 2002). Other conservation efforts that increase prey numbers are also beneficial. Habitat improvements typically focus on modifying nest sites (e.g. cliffs, buildings, other structures) to improve protection from predators or weather, or constructing improved alternate nesting sites (White et al. 2002). White et al. (2002) believe little active management will be necessary once nesting populations stabilize at carrying capacity.

Research needs: Consistent systematic surveys of current and historic nesting areas and sites with suitable habitat are needed to monitor the status of peregrine falcon in Michigan. Monitoring should also evaluate potential changes to habitat and level of human disturbance in order to protect important nesting sites. White et al. (2002) identified five priorities for future research: 1) assess changes in morphological variation that may occur from nonassortative mating of progeny from populations containing several subspecies released in eastern North America during reintroduction; 2) monitor peregrine falcon distribution and abundance as reintroduced populations increase to help determine current carrying capacity; 3) investigate the frequency of breeder dispersal in different regional populations and its influence on adult survival and population dynamics; 4) conduct removal experiments to determine whether male and female replacements differ between poor- and high-quality territories; and 5) evaluate changes in reproduction, age at first breeding, and survival of prebreeders and breeders in relation to increased population density and saturation of nesting habitat.

Related abstracts: Merlin, wooded dune and swale complex, dry northern forest, dry-mesic northern forest.

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Abstract citation:

Monfils, M.J. 2007. Special animal abstract for *Falco peregrinus* (peregrine falcon). Michigan Natural Features Inventory, Lansing, MI. 5 pp.

Funding provided by the Michigan Department of Transportation.