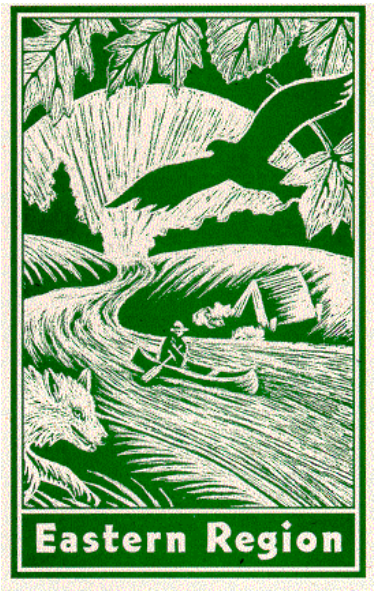
Conservation Assessment

For

Northern Harrier (Circus cyaneus)



USDA Forest Service, Eastern Region
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Prepared by:

This Conservation Assessment was prepared to compile the published and unpublished information and serves as a Conservation Assessment for the Eastern Region of the Forest Service. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject community, please contact the Eastern Region of the Forest Service - Threatened and Endangered Species Program at 310 Wisconsin Avenue, Suite 580 Milwaukee, Wisconsin 53203.

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NOMENCLATURE AND TAXONOMY

Scientific Name: *Circus cyaneus*

Common Name: Northern Harrier

Family: Accipitridae

Synonyms:

USFS Region 9 Status: Sensitive

USFWS Status: None

Illinois Status: Endangered

Global And State Rank: The Illinois Natural Heritage Program ranks this species as G5/S2 (Illinois Natural Heritage Database 1999). This ranking means that Northern Harriers are widespread, but imperiled in Illinois.

RANGE:

Breeding: throughout Canada except for the northern portion of the Yukon, the eastern two-thirds of the Northwest Territories, Newfoundland, and northern Quebec. In the U.S., the species breeds north of a line that extends southwest from northern Virginia through southern Texas and southern California. Figure 1 indicates the range of the Northern Harrier in North America.

Wintering: south of British Columbia, northern South Dakota, and northern New York. Northern harriers also winter in the Greater Antilles and throughout Central America.

In **Illinois**, there are current breeding records in 12 counties: Champaign, DuPage, Grundy, Jasper, Marion, McHenry, Pike, Randolph, Saline, Vermillion, Will, and Winnebago. Figure 2 shows the Illinois distribution of the Northern Harrier.

PHYSIOGRAPHIC DISTRIBUTION:

Northern Harriers in Illinois are found in the Central Till Plains Section and the Central Dissected Till Plains Section of the Prairie Parkland Province and the Central Till Plains, Oak-Hickory Section and the Southwestern Great Lakes Morainal Section of the Eastern Broadleaf Forest Province (Keyes et al. 1995). Illinois has been divided up into Natural Divisions based on physiography, flora and fauna (Schwegman et al. 1973). Northern Harriers are found within the Grand Prairie Division, the Northeastern Morainal Division, the Middle Mississippi Border Division, the Southern Till Plain Division, the Wabash Border Division, and the Shawnee Hills Division.

HABITAT:

Northern Harriers prefer relatively open habitats characterized by tall, dense vegetation, and abundant residual vegetation (Duebbert and Lokemoen 1977, Dechant et al. 1999). They use native or tame vegetation in wet or dry grasslands, fresh to alkali wetlands, lightly grazed pastures, croplands, fallow fields, old fields, and brushy areas (MacWhirter and Bildstein 1996, Dechant et al. 1999). Although cropland and fallow fields are used for nesting, most nests are found in undisturbed wetlands or grasslands dominated by thick vegetation (Duebbert and Lokemoen 1977, Dechant et al. 1999). Nest success may be lower in cropland and fallow fields than in undisturbed areas (Dechant et al. 1999).

Undisturbed habitat is needed for nesting, but not for hunting. Open areas with minimal fence rows/woody corridors are needed for the harrier. Research at Prairie Ridge State Natural Area has shown that populations of northern harriers dramatically increased in open areas where hedgerows had been removed. Cruising range of this species is approximately ½ - 1 mile (Jim Herkert pers. comm.).

Northern Harriers nest on the ground or over water on platforms of vegetation in stands of cat-tail (*Typha*) or other emergent vegetation (MacWhirter and Bildstein 1996, Dechant et al. 1999). Ground nests are well concealed by tall, dense vegetation, including living and residual grasses and forbs, or low shrubs, and are located in undisturbed areas with much residual cover (Duebbert and Lokemoen 1977, Herkert et al. 1996, Dechant et al. 1999). In the northern Great Plains, few nests were found in croplands or in areas where litter cover was <12% of the total cover; areas with >40% residual cover were commonly used (Dechant et al. 1999). In planted grass/legume fields in North Dakota and South Dakota, most nests (52% of 27) were in cover >60 cm tall and were surrounded by smooth brome (*Bromus inermis*), intermediate wheatgrass (*Agropyron intermedium*), and forbs (Duebbert and Lokemoen 1977, Dechant et al. 1999). In the northern Great Plains, harrier ness were often associated with western snowberry (*Symphoricarpos occidentalis*; Dechant et al. 1999). In northwestern North Dakota, nests were placed in 0.05-0.5 ha stands of western snowberry or snowberry/other shrub with forbs and grass (Dechant et al. 1999). In Saskatchewan, success of nests in shrub patches was highly variable, with fledgling success from 0 to 100% (Dechant et al. 1999). Harrier nests in southwestern Missouri were found almost exclusively in blackberry (*Rubus*) patches with a mean size of 98 m^2 (Toland 1986, Dechant et al. 1999). Northern Harriers may have chosen these sites for their protective value (Toland 1986, Dechant et al. 1999). On an 11-km^2 island in North Dakota, harriers nested in tame grass/legume and western snowberry areas more commonly than predicted by availability of that habitat type (Sutherland 1987, Dechant et al. 1999).

Nests in wet sites may have an advantage in that fewer predators have access to them (Dechant et al. 1999). Northern Harriers are highly dependent on an abundant prey base of small mammals. However, this prey base does not need to be in the same field as the where the birds are nesting (Jim Herkert pers. comm.)**.** Placement of nests in wet versus dry sites may have been dictated by proximity to vole (*Microtus*) populations, such that a compromise

was made between nesting in wet areas where predation was lower and nesting closer to upland areas where vole populations were higher (Dechant et al. 1999). The relationship between ground moisture and vegetation on fledgling success was examined in New Brunswick (Dechant et al. 1999). Females preferred wet areas relative to availability, and nests in cat-tails and wetland grasses (bluejoint [*Calamagrostis canadensis*] and prairie cordgrass [*Spartina pectinata*]) were more successful than those in shrubs (speckled alder [*Alnus incana*] and meadow-sweet [*Spirea*]) or in upland areas. Contrary to results from upland ground nests, the most successful wet-site nests were less concealed (Dechant et al. 1999). Similar studies are lacking in the Great Plains. In Alberta, Manitoba, and Montana, nests have been found on platforms of vegetation over standing water in cat-tail/rush (*Juncus*) wetlands (Dechant et al. 1999). A mean of 83% of young survived to fledging from nine nests in an Alberta cat-tail wetland, whereas the young disappeared from two nests in wheat grasses (*Agropyron*; Dechant et al. 1999). Northern Harriers may nest semi-colonially, even when large tracts of apparently suitable habitat are available. They have also been found to nest in close association with ducks and Greater Prairie-Chickens (*Tympanuchus cupido*; Dechant et al. 1999).

Northern Harriers adapt to changes in nesting habitat. In a Wisconsin marsh subjected to chemical shrub control, willows (*Salix*), bulrushes (*Scirpus*) and sedges (*Carex*) were reduced as goldenrod (*Solidago*) and meadow-sweet (*Spirea alba*) increased; harriers subsequently switched from nesting in the former to nesting in the latter (Dechant et al. 1999).

SPECIES DESCRIPTION:

A strongly sexual dimorphic hawk of slim body, long wings and tail, and long, slender legs. Females about 50% heavier and 12.5% larger than males. Adult male gray above, lighter below, and with black wing-tips; adult female brown above and buffy with brown streaks below. Subadults similar to adult female but darker brown above and russet below. Both sexes have a distinctive white rump patch. Owlish appearance of the face due to a facial ruff similar in structure and function to that found in most owls. Northern Harrier's narrower wings and slimmer tail distinguish it from the light-morph Rough-legged Hawk (*Buteo lagopus*). Northern Harrier are usually seen in open habitats flying slowly low over the ground with a series of heavy flaps and distinctive buoyant, tilting glides, wings held in a shallow V (MacWhirter and Bildstein 1996).

LIFE HISTORY:

Males arrive on breeding grounds in March in central Wisconsin (F. Hamerstrom *in* Bildstein and Collopy 1990, MacWhirter and Bildstein 1996) and between late March and early April in Illinois. Adult males generally arrive 5-10 days before females. Nest building begins late April to early May in Minnesota and Missouri. Nests are completed within several days to 2 weeks (MacWhirter and Bildstein 1996).

Most eggs are laid in mid-May to early June in the northern Great Plains and Wisconsin. The timing of egg-laying is significantly earlier in years of high, rather than low, vole abundance, but not significantly correlated with total precipitation or ambient temperature in spring.

Older (>3 yr) females precede younger ones by 6 days, on average. Primary female lays earlier than secondary females by 8 days, but the range of settling dates is highly variable within harems (MacWhirter and Bildstein 1996).

Harriers produce only one brood per breeding season; however, renesting may occur if the nest is destroyed or deserted during egg laying (MacWhirter and Bildstein 1996).

Nestlings usually hatch mid-June to early July in the northern Great Plains and Wisconsin. Nestling period averages 6 weeks. Fledgling period occurs late July to early August in New Brunswick, as juveniles remain in the vicinity of the nest 2-4 weeks (MacWhirter and Bildstein 1996). The breeding season is about 120-135 days, beginning in March and ending in early August (MacWhirter and Bildstein 1996).Harriers leave for the wintering grounds between August and November (McWhirter and Bildstein 1996).

NATURAL AND HUMAN LAND USE THREATS:

Habitat loss may be the most important factor causing declines in northern harrier populations. In Illinois, Northern Harriers used small (>7ha) habitat blocks if blocks were part of extensive grassland complexes, although 89% of 37 nests were in tracts >40ha (Herkert et al. 1996, Hands et al. 1989).

Contaminants are also a threat to northern harrier populations. During the late 1940's to late 1960's, eggshell thinning of 4-24% was detected in harrier eggs collected in Wisconsin, Ontario, Alberta, and British Columbia (Anderson and Hickey 1972). Peak spraying of DDT occurred in central Wisconsin during this period. Behavior was noticeably different and fewer nests were initiated. Radiation may be another source of contamination. Nine radionuclides were detected in young from a nest located 330 feet from a nuclear test reactor in Idaho (Hands et al. 1989). The effect of radionuclides on the nestlings was not determined.

As ground-nesting birds, predation may be an important cause of nest loss. However, there have been only 3 cases of predation reported in the literature: by a red-tailed hawk, a great horned owl, and a snake (Hands et al. 1989).

Although northern harriers may compete for other resources, they have been observed defending only nesting and winter feeding territories against conspecifics (Hands et al. 1989). Competition among nestling may also be intense. If food is in short supply, the nestling(s) that hatched last may starve (Hands et al. 1989).

Cold, wet weather probably reduces the activity of and, therefore, the availability of harrier prey. During an extremely cold winter in Ohio, northern harriers were observed feeding on frozen carcasses more frequently and pirated more prey from red-tailed hawks, rough-legged hawks, and American kestrels than they did during winters with normal temperatures (Hands et al. 1989). In addition, long periods of rain during the brood-rearing period force females to decide whether to brood young or forage for young (Hands et al. 1989).

In addition to habitat destruction, another threat to northern harriers has been shooting. Broun (1935 *in* Hands et al. 1989) estimated that 3000-5000 hawks were shot each year until the early 1930's along the Kittatinny Ridge, Pennsylvania. Hawks have been protected from shooting since a 1972 treaty with Mexico (Hands et al. 1989) and harrier mortality from shooting probably has declined. However, no data supporting this hypothesis are available. Interactions with people during incubation can cause the female to abandon the nest. Even nest surveys could be a problem. Light recreation does not seem to impact nesting areas but moderate to heavy recreation could (Jim Herkert pers. comm.).

VIABILITY:

A viable population is defined as "a population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within the planning area." This will be accomplished within each planning area by providing special management as necessary to allow the continued existence of this species. Hamerstrom (pers. com., cited in Sweet 1999) recommends management for Harriers focus on maintaining 3-5 nesting pair per planning area.

MANAGEMENT:

Management should focus on maintaining and increasing the existing population by expanding and improving the current habitat suitable for northern harriers.

Managers should expand the acreage of habitat suitable for northern harriers in each planning area to at least 2000 acres. A total of 2000 acres is needed to support a population of 3-5 pairs based on their large individual cruising ranges (0.8 by 1.6 km [0.5 by 1.0 miles]; Hamerstrom 1986, Sweet 1991). Some specific guidelines which, if followed, will help ensure the viability of this species are as follows:

A) Grasslands utilized for breeding should be managed with periodic fire, grazing, mowing in order to provide nesting cover that is >60 cm high in late May (Herkert 1997). Open areas with minimal fence rows/woody corridors are needed for the harrier. Mowing, periodic fire and mechanical brush cutting should not be performed during the nesting season, mid-March through mid-August. Northern Harriers need areas that have been idle for at least one (for litter development) year before nesting. There is no sign that 2 years rest of habitat is better than one (Jim Herkert pers. com.).

B) Grasslands managed for northern harriers should contain moderate amounts of residual vegetation with optimal habitat containing between 40-70% cover of dead herbaceous vegetation (Herkert 1997). Rotational fire management will be necessary. At least 2000 acres (½) of northern Harrier habitat should be left unburned each year.

C) Other habitat types (for example crop fields, pasture, etc.) can be interspersed with the breeding areas as long as at least 50% of the area is suitable for breeding as defined by the northern harrier Habitat Suitability Index (Herkert 1997).

D) Disturbance within breeding should minimal. Harriers are sensitive to even minor human disturbance during the breeding season (Fernandez and Azkona 1993). Interactions with people can cause the female to abandon the nest. Illinois egg dates are April 12th through July 3rd (Walk et al. 1999). Areas within 400 m (1300 feet) of a nest should be closed to human visitation/recreation, including nest surveys, during the nesting season.

E) Since this species is so dependent upon its prey base, any management that is good for small mammals (especially voles) is also good for Northern Harriers.

MONITORING

Yearly population censuses and rough nest locations are necessary. However, since this species is so sensitive to human disturbance, detailed nest surveys should not take place during nesting season. Nest surveys based upon long distance observation of behavior are appropriate.

RESEARCH NEEDS

1) Once Northern Harriers are nesting within planning areas, information on the types of areas they are using (i.e. cover, management impacts, etc.) is needed. Grazing, stocking rates and different mowing techniques need to be developed to maintain Northern Harrier habitat.

2) Research is needed to determine the impacts of management activities on the prey base (seasonally).

3) Research is needed on the impacts of human disturbance (i.e. recreational activities) on nesting, wintering behavior, populations, and population establishment... particularly the effects of disturbance during periods of incubation.

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FIGURES

1) Figure 1. North American Distribution of Northern Harriers
2) Figure 2. Illinois Breeding Distribution of Northern Harriers by County