Conservation Assessment

For

Loggerhead Shrike (Lanius ludovicianus)

USDA Forest Service, Eastern Region

2003

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This Conservation Assessment was prepared to compile the published and unpublished information and serves as a Conservation Assessment for the Eastern Region of the Forest Service.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: *Lanius ludovicianus*

Common Name: Loggerhead Shrike

Family: Laniidae

Synonyms:

USFS Region 9 Status: Sensitive

USFWS Status: None

Illinois Status: Threatened

Global And State Rank: The Illinois Natural Heritage Program ranks this species as G5/S3 (Illinois Natural Heritage Database 1999). This ranking means Loggerhead Shrikes are globally widespread and abundant and rare or uncommon in Illinois. The Nature Conservancy (The Nature Conservancy 1999) lists it as being extirpated from most of the Northeast, and nearly extirpated from Minnesota, Wisconsin, and Michigan. Reasons for this decline include loss of open habitat (represents a return to presettlement conditions when shrikes were probably absent from much of the heavily forested northern states); however, the decline has proceeded beyond what can be explained by habitat loss. Pesticides, loss of wintering habitat quality, and/or dependency on roadside habitat with high predation pressure have been suggested as possible causes (The Nature Conservancy 1999).

RANGE:

Breeding: southern Manitoba, southern Ontario, southwestern Quebec, central New York, and formerly Pennsylvania, New England, southwestern New Brunswick, and Nova Scotia, south to eastern Oklahoma, northeastern Texas, central Louisiana, Tennessee, northwestern Mississippi, western North Carolina, northern Virginia, and Maryland. In northeastern United States, there is a small breeding population in northern New York; extirpated elsewhere (The Nature Conservancy 1999). Figure 1 indicates the range in North America. Wintering: southern half of breeding range south to northeastern Mexico, Gulf Coast, and Florida.

In Illinois, this species can be found in 59 counties: Adams, Alexander, Bureau, Carroll, Cass, Champaign, Christian, Clay, Clinton, Coles, De Kalb, Du Page, Edwards, Franklin, Greene, Grundy, Hancock, Henry, Jackson, Jasper, Jefferson, Jo Daviess, Johnson, Kane, Kendall, LaSalle, Lawrence, Lee, Marion, Mason, Massac, McDonough, McLean, Menard, Mercer, Monroe, Morgan, Moultrie, Ogle, Piatt, Pike, Pope, Pulaski, Putnam, Randolph, Richland, Saline, Sangamon, Shelby, Stark, St. Clair, Tazewell, Union, Wabash, Wayne, Washington, Whiteside, Will, Winnebago (Illinois Natural Heritage Database 1999). Figure 2 shows the distribution in Illinois by county.

PHYSIOGRAPHIC DISTRIBUTION:

Loggerhead Shrikes 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 (Keys et. al. 1995). Illinois has been divided up into Natural Divisions based on physiography, flora and fauna (Schwegman et. al. 1973). Loggerhead Shrikes are found within the Grand Prairie Division, the Northeastern Morainal Division, the Rock River Hill Country Division, the Illinois River and Mississippi River Sand Areas Division, the Western Forest-Prairie Division, the Middle Mississippi Border Division, the Southern Till Plain Division, the Wabash Border Division, the Ozark Division, the Lower Mississippi river Bottomlands Division, the Shawnee Hills Division, and the Coastal Plain Division.

HABITAT:

Loggerhead Shrikes prefer open habitat characterized by short grasses and forbs of low stature interspersed with bare ground and shrubs or low trees. Loggerhead Shrikes use prairies, pastures, sagebrush (*Artemisia*) desert, and fence rows or shelter belts of agricultural fields, as well as old orchards, riparian areas, open woodlands, farmsteads, suburban areas, mowed road rights-or-way, abandoned railroad rights-of-way, cemeteries, golf courses, and reclaimed strip mines. Scattered shrubs or trees, particularly thick or thorny species, serve as nesting substrates and hunting perches. Thorny shrubs or trees also serve as impaling stations. In southwest Idaho, impaling stations for prey were 7-65 m (23-213 feet) from the nest, contained one or two sharp points, and were well protected within the shrub. Fences, utility wires, grasses, and forbs also may be used as perches. In the upper Midwest, abundance of open habitat, foraging areas, and elevated perch sites were considered the most important factors in habitat suitability (Dechant et. al. 1999).

Grasslands and structurally similar crops, such as alfalfa (*Medicago sativa*) and oat fields, are preferred over row crops, such as corn or soybeans. In Minnesota, 45% of 48 nests were found in grassland, 37% adjacent to agricultural fields, and 18% in pastures. Compared to unoccupied sites, nest sites had greater grassland and pasture cover and longer hedgerows. In southwestern Iowa, nest sites were located in areas with greater tree cover and bare ground and less shrub cover than unoccupied sites, probably reflecting a preference for large nesting trees. Loggerhead Shrikes in Iowa nested in road rights-of-way comprised of smooth brome (*Bromus inermus*) and small, scattered trees and shrubs. Most territories in Missouri and Illinois were in pasture (Dechant et. al. 1999).

In Canada, Loggerhead Shrikes breed in pastures with isolated trees and shrubs, thickets, or hedgerows, and in thorny bushes along railroad rights-of-way. In Ontario and Quebec, Loggerhead Shrikes preferred to nest in isolated trees more so than in hedgerows; hawthorn (*Crataegus* sp.) and red cedar (*Juniperus virginiana*) were the two most common trees used for nesting. In southeastern Manitoba, willow (*Salix*) shrubs growing alone or in clumps and

deciduous trees growing in shelter belts were preferred as nesting sites; these sites contained significantly more pasture, fewer trees, and longer fence rows than randomly selected sites. Nest trees in pastures had wider canopies, larger diameters, and were surrounded by fewer trees >2 m in height. Nest trees in crop land were surrounded by fewer shrubs <2 m in height. In southeastern Alberta, breeding habitat had more buffaloberry (*Sherpherdia argentea*) shrubs, higher percentage of grass >20 cm, and taller mean height of grasses and forbs than heavily grazed unoccupied habitat (Dechant et. al. 1999).

Throughout the Great Basin shrub steppe and the Great Plains grasslands, abundance of Loggerhead Shrikes was positively correlated with percent shrub cover, percent bare ground, and average height of emergent forb/shrub; abundance was negatively correlated with percent grass cover. In Oregon and Nevada shrub steppe, abundance of Loggerhead Shrikes was positively correlated with increasing rockiness, dead vegetation, and shrub diversity, and to the percent coverage of spiny hopsage (*Grayia spinosa*), budsage (*Artemisia spinescens*), and cottonthorn (*Tetradymia spinosa*). In Washington, Loggerhead Shrike territories were located in areas characterized by relatively large, thick shrubs interspersed with native bunch grasses or sand dune openings with about 40% bare ground. Vegetation types supporting Loggerhead Shrike territories included big sagebrush (Artemisia tridentata) in lowland and upland areas, mixed shrub, and antelope bitterbrush (*Purshia tridentata*). In addition to having a mosaic of shrubs and openings, areas used by Loggerhead Shrikes had little slope and high horizontal and vertical structural diversity. Community types that were not dominated by shrubs, such as grasslands and riparian areas, were not used (Dechant et. al. 1999).

In Idaho shrub steppe, Loggerhead Shrikes nested in big sagebrush, antelope bitterbrush, and greasewood (*Sarcobatus vermiculatus*). Nests built later in the season had a tendency to be built higher above the ground and nearer to the edge of the nest shrub than earlier nests. In Washington, shrub species more common around nest sites than unoccupied sites were live big sagebrush, antelope bitterbrush, and spiny hopsage, whereas less common species were rabbitbrush (*Chrysothamnus nauseosus*) and dead antelope bitterbrush. Nest sites had greater shrub canopy, taller shrubs, and less annual grass cover than unoccupied sites. Loggerhead Shrikes preferred nesting in big sagebrush and antelope bitterbrush, and avoided spiny hopsage, rabbitbrush, and green rabbitbrush (*Chrysothamnus viscidiflorus*). Nest shrubs were taller, closer to an edge, and contained denser cover and fewer main stems than unoccupied shrubs. Roost shrubs were large, dense live shrubs, whereas tall, dead shrubs providing good visibility were used for perching (Dechant et. al. 1999).

Nest success may be related to nest substrate. In central Missouri, nest success was highest in deciduous trees and lowest in multiflora rose (*Rosa multiflora*), possibly because rose bushes are not as structurally sound nor as thorny as deciduous trees used for nesting. In southcentral Washington, nests with better concealment fledged more young. In Minnesota, nesting success was positively correlated with percent cover of grassland, and fledging success was positively correlated with percent cover of herbaceous vegetation and percent cover of grassland. In Manitoba, nest sites with lower amounts of understory (ground cover and vegetation height) were more successful, and nests in pasture were more productive than nests in crop land or mixed habitat types (Dechant et. al. 1999).

SPECIES DESCRIPTION:

Adults have a stout, hooked, all-dark bill; bluish-gray head and back; grayish-white underparts, very faintly barred in adults; broad black mask extending above eye and thinly across top of bill; gray to whitish rump; black tail with white tip; large white patches in the black wings. Juveniles are paler and barred overall, with brownish-gray upper parts (The Nature Conservancy 1999). The Northern Shrike is similar to the Loggerhead Shrike. However, the adult Loggerhead Shrike has a solid black bill, whereas the Northern Shrike has a pale lower mandible. Additionally, the Northern Shrike has a longer, more strongly hooked bill than the Loggerhead Shrike. The Northern Shrike has faint barring on its chest, whereas the chest of the Loggerhead Shrike is a relatively solid gray.

LIFE HISTORY:

Loggerhead Shrikes return from their wintering grounds from mid-February to early May. Males display higher site fidelity than females on the breeding grounds. Females display low mate fidelity and have been reported to desert their first mate for a second mate. However, in southeastern Alberta, there was no difference in numbers of males and females that returned within 4 km of the previous years' territory. In Idaho, two of seven males and one of four females banded the previous year returned to their respective breeding territories. Of 171 nestlings, four first-year shrikes returned; three of these bred within 5 km of their natal area. Nest sites in Ontario and Quebec were re-used in subsequent years (Dechant et. al. 1999).

Loggerhead Shrikes have been known to raise two clutches in one season and to re-nest after failure of the first clutch (Dechant et. al. 1999).

NATURAL AND HUMAN LAND USE THREATS:

Because Shrikes are high on the food chain, pesticides have been implicated as a potential cause of the decline. DDE, a metabolite of DDT, has been detected in shrike eggs from Illinois and Virginia, but crushed eggs associated with eggshell thinning has not been reported. While there is evidence of some eggshell thinning in Illinois, there is no apparent eggshell thinning in California and Florida. Researchers agree that the relatively high nesting and fledging success rate for shrikes in the areas of marked decline indicate that pesticides have not reduced reproduction. Indeed, in Virginia, Luukkonen (1987) reported a 91% hatching rate for eggs. Young shrikes exposed to dieldrin have been shown to attack and kill prey more slowly than unexposed birds. Wide-scale use of organochlorides was curtailed in the U.S. in the 1970s, yet the decline in the loggerhead shrike population continues. Blumton et. al. (1989 in The Nature Conservancy 1999) reported that necropsies on six Virginia shrikes showed traces of pesticide contamination, but drew no conclusions on the relationship between contamination and mortality (The Nature Conservancy 1999).

Although the decline of loggerhead shrikes has been less severe in the southern United States, climate is not an apparent cause. Loggerhead shrikes continue to breed in northern New

York, Alberta, Ontario, and Saskatchewan. In West Virginia, immature shrikes have been observed several times in areas above 900 m in elevation (The Nature Conservancy 1999).

Shrikes are not particularly alarmed by proximity to human activity. Brooks (1988, in The Nature Conservancy 1999) noted that nests near buildings had a success rate similar to those farther away from buildings. In Virginia, a shrike continued to incubate a nest in a tree after the top was trimmed off, although a Maryland nest in a tree was abandoned after a multiflora rose concealing it was killed with herbicide. Some shrikes have nested less than 3 m from a road, but were not flushed by passing vehicles (The Nature Conservancy 1999).

Food shortages may occasionally limit nesting success. In Virginia, Luukkonen (1987) reported several nests with malnourished nestlings and developmental variability within a brood, both evidence of limited food availability at some sites. However, on a broader scale, early breeding, brood reduction, and multiple broods should off-set any local problems from food shortages, at least for the nesting season. In the Midwest, excessive winter mortality may be an important cause of the decline; reduced food supplies may weaken shrikes and cause them to move into woodlots occupied by raptors (The Nature Conservancy 1999).

Limited evidence from most of the Northeast suggests that lack of suitable breeding habitat limits the abundance of loggerhead shrikes in this region. Habitat loss has been caused by farmland abandonment, development, and widespread changes in farming practices. Although the acreage in pasture has decreased dramatically since World War II in New York and Virginia, there apparently is a substantial amount of unoccupied habitat remaining in both states. There also seems to be considerable unoccupied breeding habitat in Maryland and West Virginia. At least on a local level in Virginia, habitat loss may be the primary problem. Luukkonen (1987) expressed concerns about the fragmenting of potential shrike habitat into islands in the Ridge and Valley of Virginia. Occasional use of marginal habitat by shrikes may be partially to blame for the decline in Virginia. However, it seems unlikely that habitat loss on the whole can fully explain the downward population trend in shrikes (The Nature Conservancy 1999).

In the north-central states, habitat loss may explain some of the decline, but not all of it. In Missouri, declining shrike populations coincided with regions with the highest proportion of lands being converted from pasture to row crops. Several reports have concluded that much suitable habitat remains unoccupied in Michigan, Minnesota, and Wisconsin, although shrikes are now nearly absent from these states. However, Luukkonen (pers. com., in The Nature Conservancy 1999) questioned the availability of adequately sized pastures for habitat in Michigan. Threats in western Canada include habitat loss. In eastern Canada, declines probably have been due to loss of breeding habitat to changing agricultural practices, industrial development, residential development, and vegetation succession. Yosef and Grubb (1992, in The Nature Conservancy 1999) suggested that a human-caused reduction in hunting perches is at least partially responsible for the decline (The Nature Conservancy 1999).

Because of relatively high reproductive success for shrikes in southern Minnesota, Brooks (1988, in The Nature Conservancy 1999) concluded that the 20% mean annual rate of decline

in the shrike population in the region was "probably due to factors on their nonbreeding range" to the south. Brooks (1988, in The Nature Conservancy 1999) further summarized concerns that the decline in Minnesota is possibly caused by decreases in winter habitat in the breeding birds' wintering range. She stated that "if resident (southern) shrike populations are being limited by habitat availability, migrant shrikes wintering in the same area are almost certainly being forced to occupy marginal habitats that are not being held by territorial residents." However, a banding study in Missouri indicated that the winter and summer populations in that same state are completely separate (The Nature Conservancy 1999).

A recent study documented cowbird parasitism of shrikes in Iowa, however the frequency was very low, only 3 out of 261 nests. The same study found a high incidence of nest predation among shrikes nesting along roadsides (86% of all losses), and only 35% nesting success overall. Predation is apparently more intense in roadside and other linear habitats. If shrikes are utilizing roadside habitat extensively throughout their range, high nest predation may be one explanation for their decline (The Nature Conservancy 1999).

Locally, mortality from vehicle collisions may be significant. A high incidence of automobile-caused mortality among shrikes was noted by Miller (1931, in The Nature Conservancy 1999). Shrikes typically fly low to the ground, sometimes across roadways, and often feed on roads. Inexperienced juveniles have been observed following adults across highways and learning from adults to feed on highways. In many areas, hedgerows, barbed-wire fences, and other habitat features utilized by shrikes are concentrated along roadways. Fledglings and other juveniles are frequently killed by automobiles. Automobile collisions killed all three fledglings produced at an Ontario nest and four of seven young fledged over three years at a New York site. Juveniles killed by vehicle collisions in the summer have also been observed in both Virginias and Maryland. Blumton et al. (1989, in The Nature Conservancy 1999) reported that automobiles accounted for 29% of the observed fall and winter mortality among Virginia shrikes.

Based on the unpublished nesting data (Jim Herkert pers. com.) nest predation is the greatest cause of nest failure in Illinois grasslands. Nesting success is roughly 53% (Mayfield estimates of nest success), with a range of 32-100% among years (based on 41 nests monitored 1994-1998).

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." The minimum viable population is the smallest size that can persist over a period of years (usually 100 years is used) with a low extinction probability (less than 5 %) (Soule, 1980). Due to the rapidly changing environment and short duration of baseline data a 50 year window was used instead of a 100 year time period.

Based on population models described by Dennis et. al. (1991) and Morris et. al. (1999) and

using nesting data from Joliet Army Ammunition Plant (JAAP), a population of 48 pairs is needed to sustain a viable population (less than 5% probability of local extinction within 50 years) of loggerhead shrikes. For 100 years, 341 pairs would be necessary.

MANAGEMENT:

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Management goals to ensure a viable population of this species include:

Maintain, increase and improve current acreage of grasslands suitable to Loggerhead Shrikes to a size capable of supporting a population of at least 48 pairs on an annual basis. Based on average territory size of 10 ha (25 acres) of Loggerhead shrikes (Dechant et. al. 1999**)**, at least 480 ha (1186 acres) of suitable habitat will be required to achieve this goal.

Besides the acreage requirements, the following management prescriptions are necessary to maintain the required acres of habitat suitable for Loggerhead Shrikes.

A) Each potential shrike territory (10 ha), should consist of at least 90% herbaceous ground cover (Brooks and Temple 1990). This herbaceous ground cover can be maintained by fire, grazing and mowing. Prescribed fire should not be used during the nesting season, March through mid-August.

B) Potential foraging habitat (i.e., pasture, upland prairie, grassland and hay land) should cover 80% or more of the each potential shrike territory (Brooks and Temple 1990). This foraging habitat can be maintained by fire, grazing and mowing.

C) Each potential shrike territory (10 ha), should consist of 18% or greater cover of a usable foraging habitat (i.e., potential foraging habitat that is within 18 m (59ft) of an elevated hunting perch) (Brooks and Temple 1990).

D) Each potential shrike territory (10 ha), should contain at least 10 nesting trees. Potential nesting trees should be 1.5 to 10m tall with their lowest branches less than 3m from the ground (Brooks and Temple 1990).

E) Potential shrike territory should contain scattered, thorny shrubs.

MONITORING

Yearly monitoring of the Loggerhead Shrike nests, populations and habitat preference is necessary. Nests should be located in early spring prior to the trees leafing out. Each nest should be followed to determine the fate. Continued monitoring is necessary to update census numbers used in the PVA and to monitor the impacts of management practices on Loggerhead Shrikes.

RESEARCH NEEDS:

1) Research on nest predation is needed. It is not known what animal is responsible. This may require miniature video cameras to record predation.

2) Research is needed on toxicological issues. Research is necessary to determine if loggerhead shrike reproduction is being effected by toxicants in the environment.

3) Research is needed specifically on Illinois populations in order to localize the general, Midwestern model .

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FIGURES

1) Figure 1. North American Distribution of Loggerhead Shrike
2) Figure 2. Illinois Distribution of Loggerhead Shrike By County