



Riparian Raptors on USACE Projects: Red-shouldered Hawk (*Buteo lineatus*)

The red-shouldered hawk (Figure 1) is one of four raptors included in a series of Engineer Research and Development Center (ERDC) technical notes produced under the Ecosystem Management and Restoration Research Program (EMRRP). These technical notes (ERDC TN-EMRRP-SI-(12-15)) identify riparian species potentially impacted by U.S. Army Corps of Engineers (Corps) reservoir operations. For management purposes, these raptors are considered riparian generalists because they inhabit the riparian zones surrounding streams and lakes on Corps project lands but may seasonally use adjacent transitional and upland habitats. The other raptors in this grouping include the bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), and peregrine falcon (*Falco peregrinus*), each of which is discussed in a separate technical note describing the ecology, legal status, potential impacts, and management guidelines for the species. These technical notes are products of the EMRRP work unit entitled "Reservoir Operations - Impacts on Habitats of Target Species," and are linked to ERDC TN-EMRRP-SI-11, which describes the function of the work unit and general status, impacts, recovery, and management of these four riparian raptors on Corps projects.



Figure 1. Red-shouldered hawk
(Photo by Victor W. Fazio)

DISTRIBUTION: The red-shouldered hawk has both an eastern and western distribution (Figure 2). In eastern North America, the species ranges from southern Canada along the eastern edge of the Great Plains, south through Florida and the Gulf Coast states, and into northeastern Mexico. In the West, the species ranges from northern California west of the Sierra Nevada, and south through Baja, California. Only the most northern breeding populations exhibit migratory behavior. Migratory birds winter primarily from southern Wisconsin, Oklahoma, Ohio, and New England through the Gulf Coast states. Winter range extends south into the the Mexican states of Jalisco and Veracruz. Western populations are considered nonmigratory, yet will move to lower elevations during winter months (Crocoll 1994, DeGraaf and Rappole 1995).

STATUS: Eastern populations have shown the most dramatic declines. Declines have reached as high as 90 percent in Michigan, Wisconsin, Illinois, and Iowa, due to extensive loss of forested habitats (Peterson and Crocoll 1992, Crocoll 1994). Other eastern populations experiencing declines include those in Arkansas, New Hampshire, Ontario, Pennsylvania, Tennessee, and Texas (Bednarz and Dinsmore 1981, Crocoll 1994, USGS 2000). Declining populations have led this species to be listed as endangered in the states of New Jersey and Iowa; threatened in Illinois,

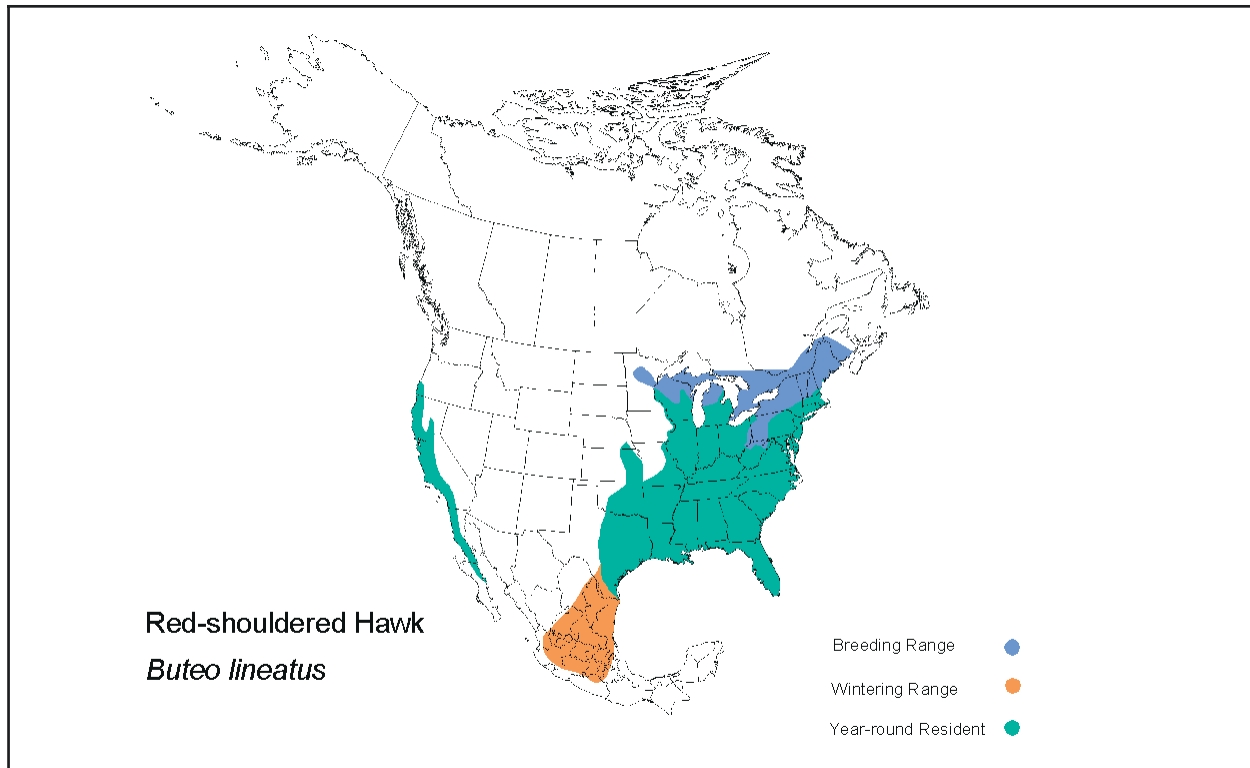


Figure 2. Range of the red-shouldered hawk in North America and Mexico

Michigan, and Wisconsin; and of special concern in 14 states (Table 1). This species has also been placed on a “watch list” in the states of Maine and Massachusetts (Crocoll 1994). Based on migratory counts, Bednarz et al. (1990) found significant declines of red-shouldered hawks between 1946 and 1986. Breeding Bird Surveys (BBS) between 1966 and 1998 show significant declines only in Pennsylvania and in the Great Lakes Plain, while the species appears to be increasing in several other states (USGS 2000). However, trend data for hawks with large territories are not considered accurate for BBS data (Crocoll 1994). Populations currently appear stable in the western portions of the range.

HABITAT: Red-shouldered hawks utilize bottomland hardwoods, mixed upland forests, and deciduous-coniferous forests of mature to old growth. Bottomland hardwoods and mature forests associated with rivers or open water are preferred habitats (Peterson and Crocoll 1992). Subcanopy characteristics are often open and park-like (Crocoll 1994). Pine plantations are used less frequently than bottomland hardwoods and other upland forest types (Howell and Chapman 1997). Mature floodplain forests are important as nesting habitat, providing the hawks with nest sites in large mature trees that usually result in higher nesting success (Dijak, Tannenbaum, and Parker 1990; Moorman and Chapman 1996). Availability of large branches may also be important in the foraging strategy where sit-and-wait hunting from stationary perches is often used (Howell and Chapman 1997). These hawks frequently forage along ecotones between riparian forests and other forest types. Western populations also prefer riparian forests but may utilize eucalyptus groves and wooded residential areas. During winter, individuals remain near riparian habitats but are not as restricted to forests (Crocoll 1994). Open pastures and fallow fields are used frequently during the winter by both migratory and nonmigratory individuals. In Florida, open areas with few scattered

trees were preferred during the winter over hardwood, pine, and wetland forest types (Bohall and Collopy 1984).

BEHAVIOR: Only extreme north-central and northeastern populations migrate. Western populations and most southeastern populations are year-round residents. Magnitude of year-to-year migration may depend on prey densities. Of 14 individuals banded in Wisconsin, only 3 migrated farther south than Tennessee. Of migratory individuals, immatures migrate from September through December, while adults migrate from October through December (Crocoll 1994). Fall migration peaks from late October through early November (Crocoll 1994), and individuals tend to collect along inland ridges and coastal areas (Kerlinger 1989). Birds usually migrate singly or in pairs, but rarely in flocks. Spring migration peaks from late February through early April.

REPRODUCTION: The red-shouldered hawk tends to be monogamous, but extra-pair copulation may occur (McCrary and Bloom 1984). Pair bonds are formed shortly after arrival on the breeding territory (mid-February through mid-March), and pairs engage in courtship displays for approximately 18 days before breeding (Portney and Dodge 1979, Crocoll 1994). Western populations may maintain territories throughout the year; birds begin to pair in February and may even begin nest building in November (Crocoll 1994). The nest site is close to open water and may be reused for many years. These hawks tend to select nest sites in deciduous trees greater than 16 in. (40 cm) in diameter (Bednarz and Dinsmore 1982). Nests are located below the canopy but often higher than 40 ft (12 m) (Crocoll 1994). Individuals typically begin breeding at 1 year of age, but juveniles have occasionally been observed breeding with adults (Henny et al. 1973). Females lay a single clutch of 3 or 4 eggs, and incubation lasts for about 33 days. A replacement clutch is possible if the first clutch is destroyed. Young fledge approximately 40 days after hatching and remain dependent on parents up to 19 weeks after leaving the nest, although juveniles may exhibit successful, independent hunting activities within 8 weeks after fledging. Mortality is about 59 percent among first-year birds but decreases to about 30 percent in later years (Crocoll 1994).

FOOD HABITS: Red-shouldered hawks hunt diurnally for small mammals, birds, reptiles, and amphibians. They generally hunt under the forest canopy from stationary perches that are 7 to 13 ft (2.1 to 4.0 m) above the ground and strike at prey within 300 ft (90 m) of a perch (Crocoll 1994). In open habitats, individuals fly low and use surprise attacks. The species also shows opportunistic foraging behavior and will grab prey over water surfaces, snatch birds from feeders, and even forage on the ground by stationing themselves in front of small mammal burrows. Red-shouldered hawks consume grasshoppers during outbreaks and may eat carrion on occasion; crayfish form a large portion of the diet in the midwestern part of the range. These hawks have been reported to cache prey items near the nest for later retrieval (Crocoll 1994).

IMPACTS: Forestry practices and forest fragmentation from encroaching agriculture and urbanization have been reported to lower nest success of red-shouldered hawks (Wiley 1975). However, some individuals have been reported to acclimate to human presence and achieve nesting success in urban landscapes (Crocoll 1994). Hunting seriously affected populations of this species before enactment of the Migratory Bird Treaty Act and the outlawing of indiscriminate shooting of raptors. Traces of industrial chemicals, including DDE, DDD, DDT, dieldrin, heptachlor epoxide, Furadan, organochlorine, and polychlorinated biphenyls have been found in the eggs and tissues of red-shouldered hawks (Crocoll 1994); however, eggshell thinning has had little effect on reproductive success

of the species (Henny et al. 1973, Wiley 1975). Death from exposure to toxins (e.g., chlordane, heptachlor epoxide, dieldrin) has been reported (Crocoll 1994). Fragmentation of large contiguous forests has probably resulted in the most recent population declines (Woodrey 1986, Peterson and Crocoll 1992, Crocoll 1994). Small blocks of forest may create better habitat for more aggressive raptors such as great horned owls and red-tailed hawks (*Buteo jamaicensis*) that out-compete red-shouldered hawks in fragmented landscapes. Various forestry practices, including selective thinning, may also create better habitats for great horned owls to the disadvantage of red-shouldered hawk populations (Crocoll 1994).

MANAGEMENT: The most important strategy for conservation of red-shouldered hawk populations is the maintenance of large, contiguous forest tracts, especially bottomland hardwoods and other riparian forest types (Peterson and Crocoll 1992, Crocoll 1994). Disagreement exists as to whether small openings (<10 acres (4 ha)) should be included in management protocols for this species. Bednarz and Dinsmore (1981) suggested that such openings, as long as they form less than 15 percent of the total area, are beneficial. However, others suggest that red-shouldered hawks do not need openings (Crocoll 1994). While the species can tolerate openings, care should be taken not to create too many openings, as that will put breeding individuals in competition with the more aggressive red-tailed hawk. Red-shouldered hawk populations should be monitored regularly to determine population status and identify potential negative impacts (e.g., competitors, human activity). Using conspecific playback recordings during early morning (0530-1030 EST) and prior to hatching of young yields better probability of detection for monitoring purposes than using playback of recorded great horned owl vocalizations (McLeod and Andersen 1998). During other times of the year, great horned owl vocalizations may be as good as or better than conspecific recordings (Mosher and Fuller 1996).

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Table 1 Red-shouldered Hawk (<i>Buteo lineatus</i>) State Protection Status			
State	Status	State	Status
Alabama	SP	Montana	
Alaska	SSC	Nebraska	
Arizona		Nevada	WL
Arkansas	SSC	New Hampshire	ST
California	SSC	New Jersey	SE/ST ¹
Colorado	SSC	New Mexico	SSC
Connecticut		New York	SSC
Delaware	SSC	North Carolina	
Florida	SSC	North Dakota	SSC
Georgia	SSC	Ohio	SE
Hawaii		Oklahoma	
Idaho		Oregon	
Illinois	SE	Pennsylvania	SE
Indiana	SE	Rhode Island	SSC
Iowa		South Carolina	
Kansas		South Dakota	ST
Kentucky	ST	Tennessee	ST
Louisiana	SSC	Texas	
Maine		Utah	SSC
Maryland		Vermont	SE
Massachusetts		Virginia	
Michigan	ST	Washington	
Minnesota		West Virginia	SSC
Mississippi	SSC	Wisconsin	ST
Missouri	SSC	Wyoming	

¹ Breeding = endangered; nesting = threatened.

FE= Federally endangered species
 FT= Federally threatened species
 SE= State endangered species
 ST= State threatened species
 SP= State protected
 SSC= State species of special concern
 WL= State watch list species (no state protection)