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STATUS OF ENDANGERED  
WILDLIFE IN CANADA

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COMITÉ SUR LE STATUT  
DES ESPÈCES MENACÉES  
DE DISPARITION AU  
CANADA

OTTAWA (ONT.) K1A 0H3  
(819) 997-4991

**STATUS REPORT ON THE RED-TAILED HAWK  
*BUTEO JAMAICENSIS***

**IN CANADA**

**BY**

**DAVID A. KIRK**

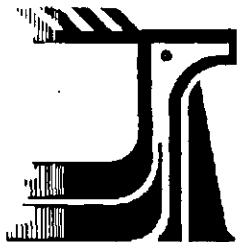
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JUNE 1994

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**STATUS REPORT ON THE RED-TAILED HAWK  
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**IN CANADA**



**BY**

**DAVID A. KIRK  
C/O CANADIAN WILDLIFE SERVICE  
ENVIRONMENT CANADA  
OTTAWA, ONTARIO  
K1A 0H3**

**STATUS ASSIGNED IN 1995  
NOT AT RISK**

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## Executive Summary

**Description.** One of the most common and widespread of hawks in the genus *Buteo*, the large (males 690-1,300 g, females 900-1,460 g) Red-tailed Hawk *Buteo jamaicensis* is probably the most familiar diurnal raptor to Canadians. At least 16 subspecies have been proposed, but not all of these are recognized by some authorities. The five subspecies in Canada are; *B. j. borealis*, *B. j. calurus*, Krider's Hawk *B. j. kriderii*, Harlan's Hawk *B. j. harlani* and *B. j. alascensis*. (However, recent authors do not consider 'kriderii' a valid subspecies.) Except in Harlan's Hawk and some Krider's Hawks which occur in western North America, the best distinguishing characteristic for adult birds is the dorsally reddish-coloured tail and its narrow, subterminal, dark band (Preston and Beane 1993). In light phase birds (e.g. Krider's Hawk), the leading edge of the patagium is lined by dark triangular markings (Preston and Beane 1993). Other distinguishing features are the tarsi which are feathered to the middle of the tarsus unlike the Ferruginous Hawk *B. regalis* and Rough-legged Hawk *B. lagopus*; also, there are four emarginated primaries, which distinguishes the Red-tailed from the Swainson's Hawk which has only three (Preston and Beane 1993). Some distant Red-tailed Hawks can be identified by the square shaped 'window' at the base of the primaries (Palmer 1988).

Although there is a great deal of plumage variation in the species, Red-tailed Hawks can be classified as either dark or light morphs. *B. j. borealis* is described by Godfrey (1986) as: "above dark-brown, variously intermixed with white and rufous. Upper surface of tail chestnut with narrow black subterminal band and whitish tip. From corner of mouth down side of neck a dusky stripe. Under parts whitish with broad (often poorly defined) band across abdomen, formed by blackish longitudinal markings of varying density and extent. Underside of tail greyish, sometimes faintly barred.

Immatures: Similar to adults but upper side of tail pale brownish (sometimes tinged reddish), crossed by ten or more narrow dusky bars; general coloration darker, contrasting more with whites." Although this description applies to other races, the most distinctive subspecies is Harlan's Hawk, which is a 'heavily pigmented form, characterized especially by the tail, which is mottled and freckled with black, grey, white and red in various proportions with longitudinal streaks instead of transverse bars. Underparts vary from black to mainly white, and almost no two are colored alike.." (Godfrey 1986).

**Distribution.** Distributed widely through central Canada, throughout the United States and south to Panama, as well as the Caribbean Islands, the Red-tailed Hawk is one of the most common hawks in the New World. In Canada the Red-tailed Hawk breeds from the Maritimes through southern Québec and Labrador, northern Ontario, north-central Manitoba, Saskatchewan and Alberta to central Yukon. Many individuals from Canada migrate south to winter in the United States.

**Population size and trends.** Red-tailed Hawks are one of the most widespread and abundant *Buteos* in North America. Clearance of forests for agriculture in eastern North America has provided a mosaic of open and wooded country preferred by the species. Fire suppression in the west has caused grassland prairie habitats to be invaded by trees and thus created suitable habitat for Red-tailed Hawks. According to the Breeding Bird Survey (BBS), a roadside count conducted in June throughout North America, Red-tailed Hawks showed a significant increase between 1966-1991 and for a recent 10-year period (1982-1991). Populations have increased in the long-term (1966-1991) most in the west,

particularly British Columbia and Alberta. Populations were apparently stable in Saskatchewan and Ontario with positive, non-significant annual rates of change. There was a non-significant negative trend for Manitoba. Between 1982-1991 non-significant negative trends occurred in Québec, New Brunswick and Nova Scotia, but there were too few routes counted to perform valid trend estimates. According to Breeding Bird Atlases, the Red-tailed Hawk is one of the commonest raptors. Christmas Bird Count (CBC) data for the whole of North America also show an increase in Red-tailed Hawk populations between 1959-1988. However, migration count data from Hawk Mountain (which sample many migrating hawks of Canadian origin) indicate a significant recent decline (1971-1986), but not over the longer period analyzed (1946-1986). Non-significant negative trends were also found at Duluth, Minnesota (1974-1989) and Grimsby, Ontario (1975-1990).

Habitat. Because of its widespread occurrence the Red-tailed Hawk occurs in many habitats from boreal forests to mixed woodland, and deserts to tropical rainforest. The species prefers areas with more trees and higher perches than Swainson's *Buteo swainsonii*, Ferruginous *B. regalis* or Rough-legged Hawks *B. lagopus*. Tall trees are preferred for nesting, but sometimes cliffs and hydro poles are used.

General Biology. Generally monogamous, Red-tailed Hawks pair for life, and show high site fidelity. The onset of breeding is highly variable because of the large geographical range of the species, but egg-laying usually begins in late February or early March. Clutch size depends on food availability and increases from south to north and east to west. Northern populations of Red-tailed Hawks are mainly migratory, but in the far south of their Canadian range (e.g. Maritimes, southern Ontario and British Columbia), birds are year-round residents. A range of prey are taken, mostly medium-sized mammals, birds and reptiles; more species of prey are taken in western North America than in central or eastern North America.

Limiting factors. The main factors limiting populations of Red-tailed Hawks are food abundance and suitable habitat (tall perches and suitable nest sites). Interspecific and intraspecific territoriality limits population size. Predation by Great Horned Owls *Bubo virginianus* impacts local populations of Red-tailed Hawks. Shooting, collisions with road vehicles and human disturbance at nest sites cause most mortality, judging by banding returns.

Special significance of the species. The Red-tailed Hawk is one of the most widespread and familiar birds of prey observed by people in Canada. Because it preys on rodents, it may have a beneficial impact in agricultural areas.

Conclusions The Red-tailed Hawk is an extremely common and widespread raptor and it probably requires no COSEWIC designation. However, recent, apparently long-term declines at certain hawk monitoring stations warrant further investigation.

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## A Abstract

The Red-tailed Hawk *Buteo jamaicensis* is one of the most common birds of prey in North America. It occurs throughout Canada, but is absent from the far north (northern Yukon, n. Northwest Territories, n. Saskatchewan, n. Manitoba, n. Ontario (tundra), n. Québec, Labrador and Newfoundland). It also occurs in all of the United States, as well as several Caribbean islands. Most Red-tailed Hawks migrate from Canada to spend the winter in the United States. Many southern populations are either partially migratory, or resident. According to the latest analyses of the Breeding Bird Survey (BBS), Red-tailed Hawks increased significantly between 1966-1991 and also over a 10-year period (1982-1991). Most increases were in British Columbia and Alberta, while populations were stable (showing no significant trends) in Ontario and Saskatchewan. Non-significant, negative trends occurred in Manitoba. Between 1982-1991, non-significant declines also occurred in Québec, New Brunswick and Nova Scotia, but too few routes were counted for these to be valid and over the long-term populations were apparently stable. Christmas Bird Count (CBC) data also indicated an increase for Red-tailed Hawk populations over the whole of North America between 1959-1988. However, migration counts at Hawk Mountain, Pennsylvania, which sample many birds of Canadian origin, indicate a significant decrease between 1971-1986 (but not over the long-term 1946-1986). Other hawk monitoring sites (e.g., Grimsby, Ontario, Duluth, Minnesota) also showed negative trends, although these were not significant. Low counts between 1947-1967 are likely attributable to contaminants, but some authors dispute this because Red-tailed Hawks feed largely on small mammal prey and these are not as susceptible to persistent organochlorine pesticides as birds. It is not known whether current declines are part of a normal population cycle or perhaps attributable to habitat deterioration caused by removal of tree cover. Red-tailed Hawks inhabit open areas, interspersed with woods or isolated trees; the abundance of tall perching trees is the most important habitat feature selected by the species. Red-tailed Hawks are generally monogamous and pairs remain together throughout the year. The onset of breeding varies greatly according to latitude and habitat. Numbers of prey species and prey weight are highest in western North America, and lowest in east central North America. A wide variety of prey is taken, but small to medium-sized mammals predominate.

## B Distribution

Sixteen subspecies of Red-tailed hawk *Buteo jamaicensis* occur from central Alaska and Canada to Panama and east to the Virgin Islands (Preston and Beane 1993). The range of the Red-tailed Hawk is limited to regions where the average minimum temperature in January does not fall below  $-15^{\circ}\text{C}$  (Root 1988). Johnsgard (1990) indicated 14 subspecies of Red-tailed Hawk which have distinct distributions. Godfrey (1986) recognized five subspecies in Canada.

1) Canada. In Canada the Red-tailed Hawk *Buteo jamaicensis* 'breeds from central Yukon (commonly southwestern part, scarce farther east, breeding north to Forty Mile and Fort Selkirk); northwestern and southwestern Mackenzie (Aklavik; Fort Norman; Slave River, near Fort Smith); northern Saskatchewan (Reindeer Lake); north-central Manitoba (Ilford); central Ontario; and southwestern Québec (north to Mistassini Lake and lower Sainte-Marguerite River, recorded in summer north to Schefferville); south through British Columbia, southern Alberta, southern Saskatchewan, southern Manitoba, southern Ontario, southern Québec, New Brunswick, Prince Edward Island, and Nova Scotia. Recorded in summer on Churchill River, Labrador. Sight records for Newfoundland. Winters in small numbers in southwestern British

Columbia, southern Ontario, and occasionally in the Maritimes. The distribution of Red-tailed Hawks is now known to include 'boreal Labrador' (J. Brazil, pers. comm.) and northern Ontario (R. James, pers. comm.).

Of the five subspecies, *B. j. borealis* breeds from western Ontario eastwards, *B. j. calurus* breeds from mid-Manitoba west to the interior of British Columbia, Krider's Hawk *B. j. kriderii* occurs in the southern prairies, 'Harlan's Hawk' *B. j. harlani* breeds in the Yukon and northern British Columbia and finally *B. j. alascensis* breeds in the Queen Charlotte Islands (Godfrey 1986). Some recent authors (e.g. Palmer 1988) do not recognize the 'Harlan's Hawk' as a subspecies, but only as a melanistic form of the nominate race (but see Mindell 1983). Preston and Beane (1993) suggest that '*kriderii*' is not a valid subspecies. In winter many Red-tailed Hawks remain in Canada, while large numbers move southwards (markedly so in eastern Canada) to spend the winter in the United States. There has been an increasing trend for Red-tailed Hawks to overwinter in southern Ontario, perhaps in response to changes in winter habitat or climate outside Ontario (R. James in pers. comm. to Freedman and Riley 1980).

2) Americas Red-tailed Hawks breed from coastal and central Alaska across Canada, southward to the Baja Peninsula, Sinaloa, Oaxaca, and Tamaulipas in Mexico, and across southern Texas and the Gulf Coast to Florida (Figure 1). The species also breeds on various island groups; Tres Marias and Socorro, northern Bahamas, the Greater Antilles and northern Lesser Antilles. In Central America, Red-tailed Hawks breed south through the highlands in Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama (AOU 1983, Preston and Beane 1993). The winter range is similar to that of the breeding range except that most northern individuals move further south (AOU 1983). In the United States, Harlan's Hawk is found in interior Alaska, 'north nearly to a line from south of the Seward Peninsula to the southern foothills of the Brooks Range.' (Palmer 1988). South of its British Columbia range the Harlan's Hawk becomes mongrelized (Palmer 1988). In winter, the Harlan's Hawk is most abundant in northeastern Arkansas, central Oklahoma and central Missouri, according to analysis of CBC data (Root 1988).

3) Worldwide The Red-tailed Hawk is restricted to the New World. However, a form of this species evolved in South America and led to the evolution of numerous *Old World Buteos* (Johnsgard 1990).

### C Protection

In Canada, Red-tailed Hawks, as well as all other raptors, are protected by legislation drawn up by the individual provinces and territories between 1957 and 1967 (Hilton 1977). In the United States and Mexico, raptors are protected by an agreement signed by the two countries on 10 March 1972 (Olendorff et al. 1980).

### D Population size and trends

Red-tailed Hawks are currently one of the most abundant *Buteos* in North America. In eastern North America, clearance of forests for agriculture has provided a mosaic of open country and wooded areas favoured by the species, while in the west, fire suppression has created suitable habitat. Because of



dramatic increases in their abundance they have largely replaced Red-shouldered Hawks *Buteo lineatus* in eastern North America. In parts of their range in western North America the species has replaced both Swainson's Hawks *Buteo swainsonii* and Ferruginous Hawks *Buteo regalis*. Because they feed largely on mammal prey, Red-tailed Hawks were apparently not affected detrimentally by the use of accumulative organochlorine pesticides between 1947-1973 (see Newton 1979). In a review of the status of Canadian raptors Fyfe (1976) referred to populations as of medium abundance and stable in the Maritimes; of high abundance and stable or increasing in Ontario and southern Québec; of high abundance and stable in the prairies (except for one area in Saskatchewan with a marked decline); of high abundance and stable in British Columbia; and of low to medium abundance and population trends unknown in the Northwest Territories and Yukon.

There are five principal sources of data on population status and trends of Red-tailed Hawks; 1) Breeding Bird Surveys, 2) Christmas Bird Counts, 3) Breeding Bird Atlases, 4) Migration counts and 5) Nature Conservancy Rankings.

1) Breeding Bird Survey For many raptors, the Breeding Bird Survey (BBS) is unsuitable for assessment of population trends because too few routes are surveyed. However, the Red-tailed Hawk (together with the American Kestrel *Falco sparverius*) is so common that the BBS may provide some of the best information on population trends (see Fig. 2).

According to the latest analysis of the BBS for Canada as a whole, Red-tailed Hawk populations showed a significant increase between 1966-1991 (annual change 2.2%,  $n = 262$  routes,  $P < 0.01$ ; mean abundance per route was 0.65; Table 1; B. Peterjohn pers. comm.). Similarly an increase was detected over a more recent decade (1982-1991); (annual increase 2.8%,  $n = 199$ ,  $P < 0.1$ ; mean abundance 0.85). Western populations of Red-tailed Hawks have increased significantly over the long term (1966-1991; e.g. British Columbia, 5.4%,  $n = 49$  routes,  $P < 0.01$ ; Alberta increase 3.0%,  $n = 47$ ,  $P < 0.05$ ; B. Peterjohn pers. comm.). The significant increase was also evident for a more recent period (1982-1991) for Alberta (increase 5.6%,  $n = 39$ ,  $P < 0.1$ ), but not for British Columbia (annual change 3.3%,  $n = 37$ , not significant). In Saskatchewan populations appeared stable with no significant increases for either 1966-1991 (annual change 2.2%,  $n = 40$ , ns) or 1982-1991 (annual change 1.0%,  $n = 29$ , ns). Trends were non-significant and negative for both periods in Manitoba (1966-1991: annual change -2.5%,  $n = 28$ , ns; 1982-1991: annual change -3.4%,  $n = 28$ , ns) and non-significant and positive for Ontario (1966-1991: 0.2%,  $n = 51$ , ns; 1982-1991: 1.4%,  $n = 38$ , ns). However, notably nonsignificant negative trends over a recent 10-year period (1982-1991) occurred in Québec (annual change -4.9%,  $n = 13$ ), New Brunswick (-1.7%,  $n = 8$ ) and Nova Scotia (-6.0%,  $n = 7$ ) though too few routes were counted to calculate a valid trend estimate. Longer term data (1966-1991) shows no trend for any of these provinces (Québec 0.4%,  $n = 22$ ; New Brunswick 0.6%,  $n = 12$ , or Nova Scotia 1.2%,  $n = 13$ ). Red-tailed Hawks were not recorded on the BBS on Prince Edward Island (B. Peterjohn pers. comm.).

2) Breeding Bird Atlases During the Maritime atlas, the Red-tailed Hawk was found to be widespread, especially in Nova Scotia. However, in the past the species was described as uncommon to rare, which may have been due to misguided persecution by people in the interests of game preservation (Erskine 1992). Red-tailed Hawks were confirmed as breeders in 100 squares (nests were seen in 42 of these, newly fledged young in 48 squares), they were probable breeders in 133 squares and possible breeders

in 314 squares (or 35.8% of the 1,529, 10 x 10 km squares surveyed; Erskine 1992). Erskine (1992) further estimated the total population at  $3,800 \pm 500$  pairs; of these  $1,400 \pm 300$  were estimated in New Brunswick,  $2,300 \pm 300$  in Nova Scotia and  $100 \pm 50$  on Prince Edward Island. During Québec's breeding bird atlas, breeding was confirmed in 35 squares, it was probable in a further 113 and possible in 468 squares (J. Gauthier pers. comm.). Evidence of breeding for the species thus represented 25.0% of all 2,464 squares surveyed.

Before the deforestation associated with human settlement, the Red-tailed Hawk was outnumbered in Ontario by its close relative the Red-shouldered Hawk *Buteo lineatus* by a ratio of 4:1 (Macoun and Macoun 1909). Now the Red-tailed Hawk is an extremely common raptor in the province (Weir 1987) and greatly outnumbers the Red-shouldered Hawk. It was recorded in almost all of the squares in the Great Lakes-St. Lawrence and Carolinian forests and in 75% of squares in southern Ontario (1,361 out of 1,824; Weir 1987). Breeding was confirmed in 603 (44%) of these squares, it was probable in 380 (28%) and possible in 378 (28%). Over the whole of Ontario, Red-tailed Hawks bred in 98 (72%) of 137, 10 x 10 km blocks. Within these breeding was confirmed in 30 (31%) it was probable in 21 (21%) and possible in 47 (48%; Weir 1987).

In Manitoba, the Red-tailed Hawk is probably one of the commonest hawks (Holland and Curtis in press). Both Krider's Red-tail and Harlan's Red-tail occur in southern Manitoba, while *B. j. calurus* occurs in the northeastern part of the province (Holland and Curtis in press).

In Saskatchewan, Smith (in press) describes the Red-tailed Hawk as a common summer resident in the aspen parkland region, but uncommon in the subarctic and boreal forest regions, as well as the grasslands. Some evidence suggests that numbers increased to a peak in the 1970s with the southward spread of aspen bluffs; since then deforestation may have caused a decline (Houston and Bechard 1983). Breeding was confirmed in 138 squares, probable in 21 and possible in a further 138 squares. The remaining records were of winter resident individuals (14), spring (3) and fall transients (5). Of the three races, the subspecies *B. j. calurus* is most common, followed by *B. j. krideri*, which is a 'rare summer resident of the southern grasslands (Smith in press). The melanistic *B. j. harlani* is 'an uncommon migrant through the west and south'.

Semenchuk (1992) considered populations of Red-tailed Hawks to be 'healthy and not at risk' in Alberta. The species breeds throughout the province but is most common the central region. Red-tailed Hawks were recorded in 60% of squares in the parkland natural region, 47% in the foothills, 43% in the boreal forest and 30% in the Rocky Mountain region. Breeding was confirmed in 390, probable in 147 and possible in 326 squares (a total of 863 breeding records, or 56.4% of the 1,529 squares surveyed).

In British Columbia, the Red-tailed Hawk is a widespread breeder; it is an 'uncommon resident along the coast, including Vancouver Island and the Queen Charlotte Islands, and in the Okanagan, Shuswap and South Thompson regions of the Thompson-Okanagan plateau. A total of 352 breeding records was collected during the atlas and 13,653 nonbreeding records (Campbell et al. 1990). The highest breeding densities were in the Fraser Lowlands (one pair/3.6 km<sup>2</sup>; Runyan 1987, Campbell et al. 1990).

Finally, there are few data on Red-tailed Hawks from the Yukon Territory; at the Kluane Lake Ecosystem Project densities of Harlan's Hawk were estimated at about 10 pairs per 100 km<sup>2</sup> (fluctuating between eight and 13) between 1988-1994. No cyclical changes in populations were

observed, as occurred in other raptors over the same period (F. Doyle pers. comm., Kluane Lake Ecosystem Project unpubl. data).

3) Christmas Bird Counts Consistent with the overall BBS trends for Canada, Red-tailed Hawks also increased significantly according to Christmas Bird Counts CBCs between 1959-1988 for the whole of North America (annual increase 2.1%,  $n = 1,936$  circles,  $P < 0.01$ , mean hawks/100 party hours 2.90; B. Hoover, J.R. Sauer pers. comm.). CBCs in the Fraser River Delta and Pitt Meadows in British Columbia indicated an increase in numbers of Red-tailed Hawks from 1972-1987 (Campbell et al. 1990; Fig. 18).

In a qualitative analysis of CBC data from southern Ontario between 1929-1977, Freedman and Riley (1980) found that numbers of Red-tailed Hawks had increased markedly. A mean of 492 hawks were recorded on censuses since 1970 and a 'cyclic trend' was detected since 1950. The mean periodicity of cycles was three years (Freedman and Riley 1980).

4) Migration counts Recent analyses of migration count data from Hawk Mountain, Pennsylvania suggest that between 1971-1986 Red-tailed Hawk populations declined significantly (annual change -2.033%,  $P = 0.01$ ), though no significant long-term trend (1946-1986) was detected (annual change -0.264%,  $P > 0.1$ ; Bednarz et al. 1990). Bednarz et al. (1990) suggest that this might be due to urban development and intensive agriculture reducing habitat quality for this species.

Interestingly, a recent analysis of migration counts from Duluth, Minnesota, also reveals an almost significant decline in Red-tailed Hawks and a negative, but non-significant trend was found for Grimsby, Ontario (Hussell and Brown 1992). A similar, negative correlation was found for numbers of Red-tailed Hawks banded at Hawk Cliff on the north shores of Lake Erie in Ontario (standardized for effort) and year between 1971 and 1982 ( $r_s = -0.571$ ,  $P = 0.1$ ; data from Duncan 1983). Whether these downward trends are the beginning of a long-term decline or part of normal population fluctuations is unknown and will be revealed only by continued counts. Earlier declines in the Red-tailed Hawk population between 1946-1967 at Hawk Mountain, when counts were lower than previous years (Hussell and Brown 1992) may be attributed to the use of persistent organo-chlorine pesticides, which were widely available to Red-tailed Hawks in their preferred open agricultural land habitat, and which impacted many other raptor species. However, most studies show that these contaminants occurred at low levels in Red-tailed Hawks and their eggs even during peak organochlorine use (e.g., Henny et al. 1984, Noble and Elliot 1990), and Preston and Beane (1993) believe the species is not susceptible to contaminants because of its small mammal prey, which do not accumulate high levels of organochlorine pesticides (Dustman and Stickel 1969). For example, 11 eggs collected in 1971 from the Niagara region had lower levels of organochlorines, PCBs and mercury than fish-eating bird species examined at the same time (Frank et al. 1975). Nonetheless, Red-tailed Hawks do eat birds, in considerable numbers (Palmer 1988) and not just mammals, so it is perhaps rash to dismiss the possibility of contaminants affecting populations of this species.

Although results from migration counts seemingly contradict those from the BBS, the slight increase found in Red-tailed Hawks between 1966-1987 in the BBS (see Bednarz et al. 1990) was not apparent when data were separated regionally; non-significant trends were found in southern and central New England, Adirondack Mountains, St. Lawrence Plain and spruce-hardwood forest strata; C. Robbins in pers. comm. to Bednarz et al. 1990). Also, when Titus and Fuller (1990) pooled data

from six count locations in eastern North America Red-tailed Hawk populations appeared to be stable. Although some authors attribute possible declines in Red-tailed Hawks to habitat loss (e.g., Bednarz et al. 1990), unless woodlots and trees are removed entirely from a region this appears unlikely. This may be true of the state of Illinois, where fragmentation of forests is extreme (Robinson 1992) and where Red-tailed Hawk numbers have consistently declined according to the BBS (Robbins et al. 1986).

5) Nature Conservancy rankings According to Nature Conservancy rankings the Red-Tailed Hawk is demonstrably widespread, abundant and secure in all provinces where status was estimated (i.e. S5 in Québec, M. Huot pers. comm.; Ontario, D. Sutherland, pers. comm.; Saskatchewan, J. Duncan pers. comm. and British Columbia, S. Cannings pers. comm.).

Outside Canada In the northeastern United States, Titus et al. (1989) found that according to the BBS, Red-tailed Hawks increased in the more developed regions between 1966-1987. Red-tailed Hawks also increased significantly according to CBCs conducted between 1963-1983 (Titus et al. 1989). In the western United States responses by state agencies indicated that Red-tailed Hawks were common everywhere (Harlow and Bloom 1989, Wingfield 1991).

## E Habitat

General The widespread distribution of the Red-tailed Hawk means that it occurs in a large number of habitats - from boreal forests to mixed and deciduous woodland, and from saguaros in desert situations to tropical rainforest (Palmer 1988). Palmer (1988) lists habitats ranging from 'spruce forest in Alaska and Canada, aspen bluffs and wooded streams in the prairies, trees in canyons, all habitats from sea level to 9,000 ft [2,743 m] in California, and mixed deciduous forests, woodlots and groves almost anywhere. However, all these habitats have in common open areas with abundant, high elevation perch sites that can be used for hunting (see Preston and Beane 1993). Compared to the *Buteos* typical of open prairie habitats or western grasslands (i.e. Swainson's Hawk *Buteo swainsoni*, Ferruginous Hawk *B. regalis* and Rough-legged Hawk *B. lagopus*), the Red-tailed Hawk prefers areas with more trees and taller perches (Schnell 1968, Smith 1971, Schmutz et al. 1980, Janes 1985). That it prefers intermediate habitats is indicated by its absence from the densely forested areas frequented by Broad-winged *B. platypterus* and Red-shouldered Hawk (e.g., Titus and Mosher 1981, Bednarz and Dinsmore 1982, Risley 1983, Janes 1985). In New York state Minor and Minor (1981) found that Red-tailed Hawks have adapted to human disturbance and nest even in suburban and urban areas close to open country suitable for hunting. However, intensification of agriculture, including the removal of trees and creation of larger units may destroy preferred habitat for the Red-tailed Hawk.

Erskine (1992) described the Red-tailed Hawk as favouring cut-over areas for foraging and woodlands for nesting. Similarly, Weir (1987) described typical habitat as 'dry woodland near open country, where the birds hunt for food'. In Saskatchewan, Smith (in press) described Red-tailed Hawks as being most common in aspen parklands, but uncommon in the subarctic and the continuously forested boreal forest region. Fire control in the prairies and tree-planting has created a semi-open grassland landscape interspersed by trees and resulted in an increase in the Red-tailed Hawk population (Houston and Bechard 1983). In Alberta, most records are from the parkland region, followed by the

foothills, boreal forest and Rocky Mountain region (see above Population status and trends; Semenchuk 1992). Semenchuk (1992) stated that preferred habitat is 'at the edges of mixed, deciduous or coniferous woodland, in agricultural areas with woodlots, along wooded streams and rivers, in woods bordering lakes, ponds or wetlands, and, occasionally, in coulees.' In British Columbia, Red-tailed Hawks are found in most open or semi-open habitats from sea-level to above the tree line (Campbell et al. 1990). Preferred habitats are open woodlands, grasslands, parklands, rangeland and agricultural fields containing scattered trees (Campbell et al. 1990).

Nesting Red-tailed Hawks nest in a wide variety of habitat types but the most preferred nest location is in a tall tree with unrestricted aerial access and a good view of surrounding countryside, as well as open country in close proximity for foraging (Palmer 1988). Several authors record the nest tree being higher than surrounding trees or on slopes (see Petersen 1979, Titus and Mosher 1981; other references in Preston and Beane 1993). Nests are in taller locations and in closer proximity to water than those of Ferruginous and Swainson's Hawks (Smith 1971, Schmutz et al. 1980). Where trees are absent, tall buildings (Pinel and Wallis 1972, Bechard et al. 1990) or saguaro *Carnegiea gigantea* (in Arizona) (Mader 1978), cliffs or power line poles are used (Peck and James 1983). Of 723 nests examined by Peck and James (1983) in Ontario, 699 were in mainly living trees. Most of these nests were in deciduous trees (437 nests in 16 species), while 107 were in conifers (five species). In order of importance the trees were elm species (153), pine species (100), maple species (70), beech (66), oak species (65) and ash (26) (Peck and James 1983). Other nests were on cliff ledges (14) or hydro poles (10). Nest heights were from 4.6-27 m, with an average of 12-18 m for 181 nests (Peck and James 1983). Of 212 nests examined in British Columbia (Campbell et al. 1990), 92% were in trees. More coniferous than deciduous trees were used (48%, eight species versus 44%, four species). In order of importance preferred tree species were black cottonwood *Populus trichocarpa* (38%), Douglas-fir *Pseudotsuga menziesii* (19%) and ponderosa pine *Pinus ponderosa* (19%) (Campbell et al. 1990). Nest height ranged from 6-46 m (51% of nests were between 12-18 m; Campbell et al. 1990), which are very similar to the heights found in Ontario by Peck and James (1983).

Migration and wintering. Red-tailed Hawks require both elevated perches and open country for foraging on migration and in their wintering areas. Interestingly, Preston (1980) found that light and dark phase birds differed in their winter habitat use, with the former occupying higher, more open perch sites. There is evidence to suggest that juvenile birds will winter closer to urban areas than adults because they do not fear people (Palmer 1988).

## F General Biology

1) Reproductive Generally monogamous and paired for life, non-migratory pairs of Red-tailed Hawks stay together throughout the year and show high site fidelity, especially females (Preston and Beane 1993). Aerial displays associated with courtship are most common in spring. Given the wide latitudinal range in which the Red-tailed Hawk breeds, there is great variation in the onset of nest

-building, although generally it is in late February or early March (Preston and Beane 1993). Depending on latitude, nest-building may be in late December (Arizona; Mader 1978), late January (Wisconsin; Orians and Kuhlman 1956) or late April (Alberta; Luttich et al. 1971). Several nest sites are selected by both birds and subsequently refurbished; later, one is selected. Laying dates depend on snow cover in Wisconsin (Petersen 1979) and probably elsewhere. In Alberta, the mean date for egg-laying was 1 May (range 12 April to 26 May) (Luttich et al. 1971). Preston and Beane (1993) report that over most of interior North America the first egg is laid in mid to late March and the clutch is completed between two and five days afterwards. Average clutch size varies from 2.11-2.94, and increases from south to north and from east to west (Appendix 1 in Preston and Beane 1993, data from Henny and Wight 1972). Clutch size may depend on food supply, but this has not been well documented (Preston and Beane 1993). The 229 nests reported by Peck and James (1983) had 1-4 eggs, with an average of 2-3 eggs (191 nests). Similarly, 81 clutches in British Columbia ranged from 1-4 eggs (one egg - eight, two eggs - 38, three eggs - 28 and four eggs 7); thus 81% had 2-3 eggs (Campbell et al. 1990).

The white eggs are marked either lightly or heavily with purple, dark brown, pale reddish-brown or buff and are incubated by both adults, mainly by the female (Petersen 1979). Generally, eggs are laid every other day and the incubation period is 28-35 days (Bent 1937, Hardy 1939). In Ontario, Peck and James (1983) reported three nests with an incubation period of 29-33 days. In Rochester, Alberta, Adamcik et al. (1979) reported incubation as 32 days. Young hatch asynchronously and fledge at 42-46 days old (Preston and Beane 1993). Depending on geographical location (and thus migratory strategy), juvenile Red-tailed Hawks may associate with parents for up to six months in resident populations (Petersen 1979) and 10 weeks in migratory populations (Johnson 1973). Fledging success varies from 0.91 (n=22) in Michigan (Craighead and Craighead 1956) 1.8 (n=309), 1.4 (n=27) and 1.1 (n=33) in Wisconsin to 1.36 (n=137) in Montana and 1.40 (n=15) in the Appalachians (Janik and Mosher 1982).

The annual lifetime reproductive success of the Red-tailed Hawk has not yet been determined. However, the average number of young reared per pair each year was 0.91 (n=22) for Michigan (Craighead and Craighead 1956), 1.36 (n=137) in Montana (Johnson 1975) and 1.40 (n=15) in the Appalachians (Janik and Mosher 1982).

Survival. Luttich et al. (1971) calculated average first year mortality at 54%, and annual mortality for adults at 20%. However, they included invalid data on numbers of first year birds that breed and the incidence of non-breeding in adults (Palmer 1988, Preston and Beane 1993).

Nesting densities. These vary according to food supply and habitat; highest densities are where prey are abundant and where there are tall trees and open areas for hunting (Preston and Beane 1993). In Wisconsin, Petersen (1979) found male home ranges were 117 ha in summer, 390 ha in the fall, 157 ha in winter and 163 ha in spring. Corresponding figures for females were 117 ha, 123 ha, 167 ha and 85 ha.

2) Movements. Migration in Red-tailed Hawks is complex. Most northern birds migrate south for 3-5 months during the winter (Preston and Beane 1993), while other populations are partially migratory depending on weather and food availability (see Craighead and Craighead 1956, Palmer 1988). Local

movements also occur in response to the above factors, even among normally resident populations in mid-latitudes (Preston and Beane 1993). Southern populations (e.g., south of northern Mexico are year-round residents) (Preston and Beane 1993). In the southern United States and Mexico, resident hawks coexist with numerous migrants during winter. Migrating birds avoid expanses of water and concentrate along shorelines and peninsulas. This means that their migrations are amenable to counts at bird observatories, but only in eastern North America (see Kerlinger 1989). Southward movements of northern birds from the eastern population begin in August and end by the beginning of December. Although return movements may begin in February some northern birds do not reach their breeding grounds until June. At Hawk Mountain, mean counts were 3,231 between 1934-1991, and 3,770 from 1982-1991 inclusive (Allen 1993). In western North America, movements of individual birds occur but no concentrations of migrating hawks have been found there (Campbell et al. 1990).

**3) Behaviour/Adaptability** Red-tailed Hawks are 'sit and wait' predators and need elevated perches with good all round vision from which to pounce on their prey (Fitch et al. 1974). They are versatile hunters and use a variety of other techniques to capture prey including quartering, hunting through trees or soaring at high altitude; they also feed on invertebrates on the ground and will eat carrion (Palmer 1988).

The diet of Red-tailed Hawks varies greatly according to region, season and on an individual basis; most information comes from pellet analysis and prey remains recovered from nest sites. Many more prey species are taken in western North America (130) compared to 66 in mid-central North America and 38 in east-central North America (Marti et al. 1993). Prey weights in the three regions follow the same pattern (129.6 g, 109.6 g and 64.9 g, respectively). The large size of prey in western North America is due to the predominance of snowshoe hares *Lepus americanus*, black-tailed jackrabbits *Lepus californicus* (92-95% of prey in Smith and Murphy's [1973] study) and ground squirrels *Spermophilus* spp. in the diet in this region (and the north) (Meslow and Keith 1966, Luttich et al. 1970, McInville and Keith 1974). The chief prey of the Red-tailed Hawk are small to medium mammals (80% of diet in most studies) and birds. Other prey include reptiles, amphibians, fish, invertebrates, and carrion (Palmer 1988).

### G Limiting factors

The main factors limiting populations of Red-tailed Hawks are habitat and food supply. One habitat feature limiting their density is the abundance of perches used for foraging; for example Preston (1990) found more wintering Red-tailed Hawks in areas of abundant perches, despite other habitats harbouring more prey. Lack of suitable nesting trees (e.g. in the prairie provinces) may also limit populations despite the abundance of food in this region (Preston and Beane 1993). Red-tailed Hawks are intraspecifically and interspecifically territorial which limits overall breeding numbers. For example a seven-year study in Alberta demonstrated that despite annual fluctuations in prey species, breeding rates and densities remained constant (McInville and Keith 1974). Productivity is also reduced when Red-tailed Hawks nest close to Swainson's or Ferruginous Hawks *Buteo regalis* (Schmutz et al. 1980).

Evidence suggests that predation by Great Horned Owls *Bubo virginianus* may impact local populations of Red-tailed Hawks (Preston and Beane 1993). Predation on young Red-tailed Hawks was directly related to increases in breeding densities of Great Horned Owls (Luttich et al. 1971). Young Red-tailed Hawks are susceptible to blood-sucking flies (*Eusimulium* spp.) (Fitch et al. 1946). Human disturbance at nest sites, collisions with vehicles and shooting cause the largest current mortality in Red-tailed Hawks (Keran 1981, Preston and Beane 1993). Banding recoveries are mostly of birds that were shot (Houston 1967), although Henny and Wight (1972) later reported that the proportion of birds recovered that had been shot had declined.

#### **H Special significance of the species**

Together with the Broad-winged Hawk, the Red-tailed Hawk is probably one of the most familiar and widespread *Buteos* in Canada. Because it preys on small rodents, the species is beneficial to humans in agricultural areas.

#### **I Evaluation and proposed status**

Because of its extremely large range and abundance, it is recommended that the Red-tailed Hawk needs no COSEWIC designation. However, continued analyses of migration counts are needed to analyse future population trends, particularly as recent counts suggest that at least eastern populations of the Red-tailed Hawk are declining. Also needed are regional analyses of CBC data (now computerized) for Canada.



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### **Appendix 1 Authorities on Red-tailed Hawks**

Dr C.R. Preston, Department of Zoology, Denver Museum of Natural History, Denver, CO 80205 USA

Dr. G.N. Schnell, Department of Zoology, Sutton Hall, University of Oklahoma, OK

Dr C.S. Houston, 863 University Drive, Saskatoon, Saskatchewan S7N 0J8.

Dr J.K. Schmutz, Department of Biology, University of Saskatchewan, Saskatoon, Canada S7N 0W0

Table 1 Summary of Breeding Bird Survey Indices for the Red-tailed Hawk for different regions (B. Peterjohn pers. comm.).

	BBS trends 1966-1991				BBS trends 1982-1991			
	Abundance	Trend	Sig.	N	Abundance	Trend	Sig.	N
Canada	0.65	2.2	***	262	0.85	2.8	*	199
British Columbia	0.45	5.4	***	49	0.59	3.3	ns	37
Alberta	2.14	3.0	**	47	2.74	5.6	*	39
Saskatchewan	1.48	2.2	ns	40	2.43	1.0	ns	29
Manitoba	1.98	-2.5	ns	28	2.29	-3.4	ns	28
Ontario	0.22	0.2	ns	51	0.29	1.4	ns	38
Québec	0.09	0.4	ns	22	0.14	-4.9	ns	13
New Brunswick	0.05	0.6	ns	12	0.11	-1.7	ns	8
Nova Scotia	0.18	1.2	ns	13	0.24	-6.0	ns	7

ns = not significant, \* =  $P < 0.1$ , \*\* =  $P < 0.05$ , \*\*\* =  $P < 0.01$ .

Fig. 1 Distribution of Red-tailed Hawk in North America (after Preston and Beane 1993). Note that the range should extend further north in eastern North America (i.e. to southern Labrador).

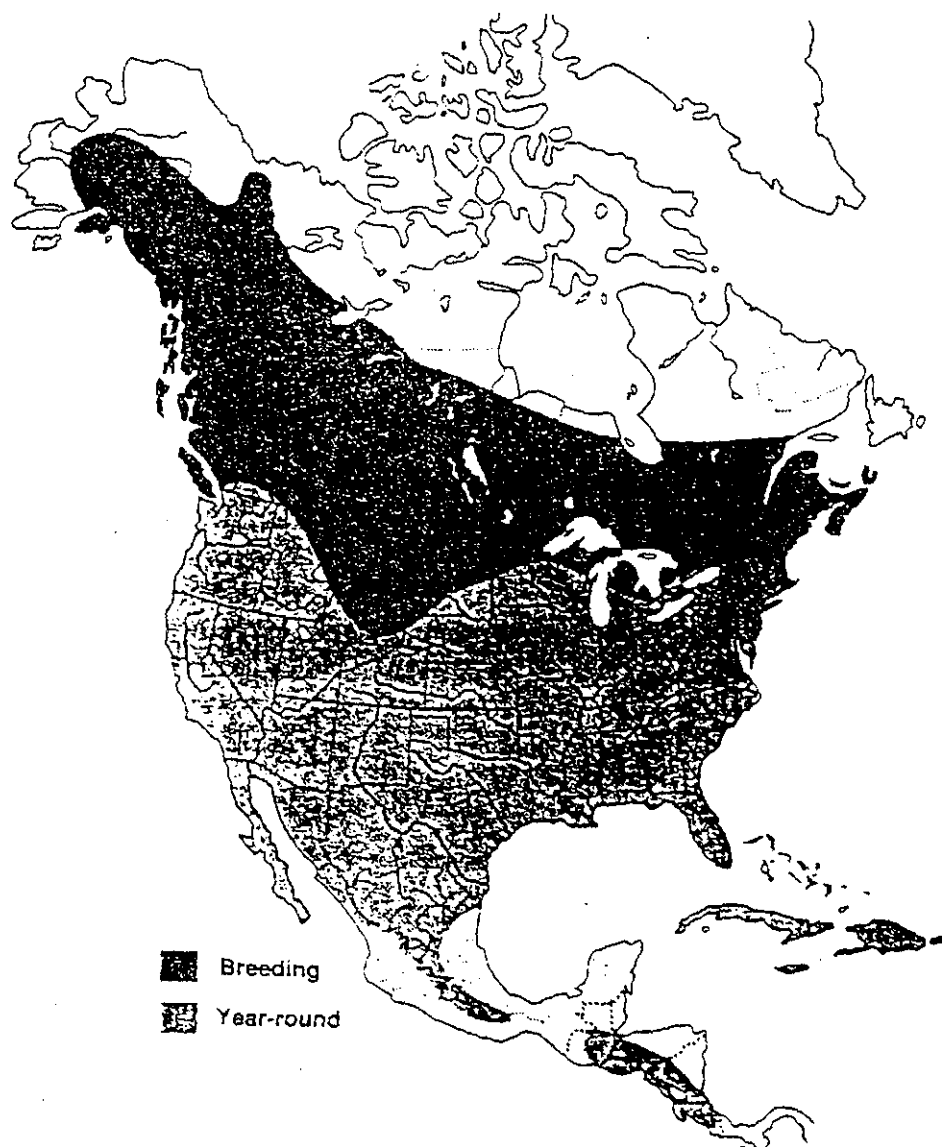


Fig. 2 Relative abundance of Red-tailed Hawks according to BBS 1966-1992

(map courtesy of B. Peterjohn, USFWS)

