COMMITTEE ON THE
STATUS OF ENDANGERED
WILDLIFE IN CANADA

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

COMITÉ SUR LE STATUT
DES ESPÈCES MENACÉES
DE DISPARITION AU
CANADA

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

UPDATED STATUS REPORT ON THE COOPER'S HAWK *ACCIPITER COOPERII* IN CANADA

BY

DAVID A. KIRK

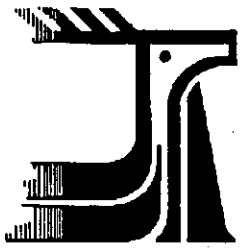
STATUS ASSIGNED IN 1996
NOT AT RISK

REASON: POPULATION HAS SHOWN RECOVERY SINCE THE DDT ERA AND SHOWS CONSIDERABLE ADAPTABILITY TO THE ENVIRONMENT.

OCCURRENCE: ALBERTA, BRITISH COLUMBIA, MANITOBA, NEW BRUNSWICK, NOVA SCOTIA, ONTARIO, QUEBEC, SASKATCHEWAN

COSEWIC - A committee of representatives from federal, provincial and private agencies which assigns national status to species at risk in Canada.

CSEMDC - Un comité de représentants d'organismes fédéraux, provinciaux et privés qui attribue un statut national aux espèces canadiennes en péril.



COMMITTEE ON THE
STATUS OF ENDANGERED
WILDLIFE IN CANADA

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

COMITÉ SUR LE STATUT
DES ESPÈCES MENACÉES
DE DISPARITION AU
CANADA

OTTAWA (ONTARIO) K1A 0H3
(819) 997-4991

JUNE 1994

NOTES

1. This report is a working document used by COSEWIC in assigning status according to criteria listed below. It is released in its original form in the interest of making scientific information available to the public.

2. Reports are the property of COSEWIC and the author. They may not be presented as the work of any other person or agency. Anyone wishing to quote or cite information contained in status reports may do so provided that both the author and COSEWIC are credited. Reports may be cited as in the following example:

   Bredin, E.J. 1989. Status report on the Northern Prairie Skink, Eumeces septentrionalis, in Canada. Committee on the Status of Endangered Wildlife in Canada. 48 pp.

3. Additional copies of this report may be obtained at nominal cost from The Canadian Nature Federation, 1 Nicholas Street., Suite 520, Ottawa, Ontario, K1N 7B7 or from the Co-ordinator, COSEWIC Secretariat, c/o Canadian Wildlife Service, Environment Canada, Ottawa, Ontario., K1A 0H3.

DEFINITIONS

SPECIES:	"Species" means an indigenous species, subspecies, variety or geographically defined population of wild fauna and flora.
VULNERABLE: (V)	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
THREATENED: (T)	A species likely to become endangered if limiting factors are not reversed.
ENDANGERED: (E)	A species facing imminent extirpation or extinction.
EXTIRPATED: (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
EXTINCT: (X)	A species that no longer exists.
NOT AT RISK: (NAR)	A species that has been evaluated and found to be not at risk.
INDETERMINATE: (I)	A species for which there is insufficient scientific information to support status designation.

COSEWIC - A committee of representatives from federal, provincial and private agencies which assigns national status to species at risk in Canada.

CSEMDC - Un comité de reprêsentants d'organismes fédéraux, provinciaux et privés qui attribue un statut national aux espèces canadiennes en péril.

UPDATED STATUS REPORT ON THE COOPER'S HAWK *ACCIPITER COOPERII* IN CANADA

BY

DAVID A. KIRK
AQUILA APPLIED ECOLOGISTS
C.P. 47
WAKEFIELD, QUEBEC
JOX 3G0

AND

NATIONAL WILDLIFE RESEARCH CENTRE
CANADIAN WILDLIFE SERVICE
100 GAMELIN BOULEVARD
HULL, QUEBEC
K1A 0H3

STATUS ASSIGNED IN 1996
NOT AT RISK

Introduction: The purpose of this report is to provide an update on the status of Cooper's Hawk *Accipiter cooperii* since the original COSEWIC report was produced and Vulnerable status assigned in 1983 (Penak 1983). At that time it was known that:

- Cooper's Hawk breeds in both deciduous and coniferous woods, often associated with riparian habitat,
- in Canada, its breeding range spans the southern parts of all the provinces with the possible exception of New Brunswick, PEI, and Newfoundland,
- problems exist in obtaining breeding records because of the secrecy of the species and difficulty in surveying hawks in dense forest,
- the species was on the Blue List from 1972-1981 because of population declines due to pesticide contamination of prey, shooting, predation (by owls, buteos, raccoons, ravens, etc.), and the alteration and destruction of suitable habitat,
- pesticide levels in prey species and the eggs of Cooper's Hawk had declined and population status had improved, but predation and habitat loss still appeared to pose threats.

A Population size and trends

Populations of Cooper's Hawks declined from the 1900s when they were common, until the 1970s (Rosenfield et al. 1991). It is probable that intensive shooting at hawk migration points had a large effect on populations of this species in the early 1900s (Henny and Wight 1972, Evans 1982). This mortality was augmented in the DDT era of 1947-1973 (Snyder et al. 1973). Banning of DDT in 1972 in North America resulted in recovery of Cooper's Hawk populations in the mid-western United States and apparently elsewhere (Evans 1982).

This species is very difficult to monitor because of its secretive nature and its preferred wooded habitat (Fuller and Mosher 1981). Also, population fluctuations may be related to variation in prey abundance in parts of the Cooper's Hawk's range; in Wisconsin, Rosenfield et al. (1991) found evidence of cyclic fluctuations, necessitating long-term data to estimate population trends. A further problem is that even skilled observers can confuse Cooper's Hawks with Sharp-shinned Hawks *Accipiter striatus* in certain conditions; this is not widely recognized and may bias counts (Rosenfield at al. 1991). Many agencies in the United States have listed the species either as threatened or endangered with little evidence of actual population sizes, breeding densities or reproductive success (Rosenfield et al. 1991).

The Cooper's Hawk population of Canada was estimated at 10,000-50,000 pairs (Kirk et al. 1995, Kirk and Hyslop in press), based on migration counts and interviews with raptor biologists. The species is apparently more common in the west (e.g., Saskatchewan and Alberta; as well as the western states - Hoffman 1985) than the east (e.g., Ontario, where it is considered rare; Austen et al. 1994, ORBBP 1994). Most data sources indicate that populations are stable or increasing.

Migration counts

Migration counts are the only count technique that surveys Cooper's Hawk populations from large

geographical areas; many of the hawks counted on hawkwatches are of Canadian origin. Recent analyses of migration counts from Hawk Mountain in Pennsylvania indicate that Cooper's Hawks showed no significant population trends prior to the use of DDT (1934-1942; % annual decrease -0.719, $P = 0.07$), decreased markedly during the DDT era (1946-1972; % annual decrease -0.077, $P < 0.001$) and increased in the post-DDT era (1973-1986; % annual increase 0.39, $P < 0.05$; Bednarz et al. 1990, Fig. 4). Results from Niagara Peninsula Hawkwatch near Grimsby, Ontario, confirm that populations of Cooper's Hawks have increased since the early 1970s (% annual change was + 5.4, $P < 0.01$, calculated by logistic multiple regression; Hussell and Brown 1992). As well, combined analyses from six sites in eastern North America show significant increases (7.75% per year between 1972-1987; Titus and Fuller 1990). In western North America, a recent analysis of counts from the Goshute Mountains showed a significant increase in Cooper's Hawk populations between 1983-1990 (% change 0.081, $P < 0.05$), while analyses for the Manzano and Sandia Mountains suggested that populations were stable (% annual change -0.996 and 0.032, respectively). An overall analysis of all four count sites also indicated that populations were stable between 1983-1991 (Hoffman et al. 1992).

Breeding Bird Survey (BBS)

Although there were sufficient routes to adequately interpret population trends in Coopers' Hawks at some spatial scales and over certain time periods, the secrecy of the species, combined with its forest habitat make it an unsuitable species for counting using BBS routes. However, analyses of Breeding Bird Survey (BBS) data from 1966-1994 suggest no overall change in population trends of Cooper's Hawks in Canada (proportional annual change 0.28, $n = 83$ routes). However, over a recent decade (1985-1994) there was a signficant increase in Cooper's Hawk over the whole of Canada according to the BBS (proportional annual change, 4.97, $n = 50$ routes, $P < 0.05$; Kirk and Hyslop in press). At the ecozone level, the only ecozone with sufficient routes and individuals (14 routes and 40 individuals is the minimum used by Canadian Wildlife Service, CWS, BBS protocol; Downes and Collins 1996) was the Prairies (proportional annual change 0.21, $n = 28$ routes). There were insufficient data for analyses at the ecozone level for the the more recent 10-year period (1985-1994).

Christmas Bird Counts

A recent analysis of Christmas Bird Count (CBC) data using route regression for the whole of North America (1959-1988) indicated that populations were stable (% annual change 0.8, $n = 1,624$ circles, $P < 0.1$; Sauer et al. 1996).

Breeding bird atlases

Very few breeding records (one probable, four possible) were obtained for the Cooper's Hawk during the Maritime Breeding Bird Atlas (1986-1990; Erskine 1992), partly due to low densities of the species at the northern edge of its range and partly due to difficulties in proving breeding in this secretive raptor. Erskine (1992) estimated a population of only 20 pairs in the Maritimes (all in New Brunswick).

During Québec's breeding bird atlas (1984-1989) there were only six confirmed nests (0.2% of the total of 2,464 squares surveyed), five were probable (0.2%) and 30 possible squares (0.9%) where the species bred. The remaining records (n = 8) involved sightings (Barnhurst et al. 1995, J. Gauthier pers. comm.). Analysis of check-list data using linear regression (1969-1989) indicated a significant decline in the Cooper's Hawk in Québec (% annual change -0.015%, $P < 0.05$; Cyr and Larivée 1995).

In Ontario, James (1991) stated that the Cooper's Hawk is a rare summer resident; it is found mainly near or on the Canadian Shield in southern Ontario and is rare or scattered in the north. Thirty-two occupied nests were found during the atlas (1981-1985); in southern Ontario the species was present in 18% of 1,824 squares during the breeding bird atlas and breeding was confirmed in 76 (23%) of these (Weir 1987). In Ontario as a whole, breeding records of Cooper's Hawks were from 43 (31%) out of 137 blocks (Weir 1987). There are an estimated 555-1,529 pairs of Cooper's Hawks in southern Ontario (Austen et al. 1994; ORBBP 1994).

In Saskatchewan, breeding records of Cooper's Hawks were from 103 quadrants (14% of the province); breeding was confirmed in 37 quadrants (4%), it was probable in 6 (1%) and possible in 69 (10%). Other records were from spring and fall migration (nine each) and winter residents (n = 7). Smith (1996) considers the species a 'fairly common summer resident', although it is rarely seen.

During the Alberta atlas (1987-1991), breeding was confirmed in 36 squares (1.6%), it was probable in 18 (0.8%) and was possible in a further 60 squares (2.7%; n = 2,206 squares). Most records were from the parkland (55) followed by the boreal forest (41), Rocky mountain (20), grassland (24), foothills (16) and Canadian Shield ecoregions (1) (G. Semenchuk pers. comm.).

In British Columbia, the Cooper's Hawk is considered an uncommon resident in southeastern Vancouver Island, the Gulf Islands, the Fraser Lowlands and the Okanagan Valley. It is a widespread breeding species on the south coast and in the southern interior, but rarer elsewhere (including the southern Kootenays; Campbell et al. 1990). Campbell et al. (1990) reported 107 breeding records.

Nature Conservancy rankings

The Nature Conservancy ranking for the Cooper's Hawk in Ontario is an S3 (i.e. rare or uncommon in the province, 21-100 occurrences) but this is likely an S3/S4 (i.e. intermediate between S3 and S4; widespread, abundant and apparently secure in province; D.S. Sutherland pers. comm.). The species is considered an S2 in Québec (imperiled in province because of rarity, 6-20 occurrences; M. Huot pers. comm.), an S3B in Manitoba (J. R. Duncan pers. comm.), S4B in Saskatchewan (J. Duncan pers. comm.) and an S4 in British Columbia (S. Cannings pers. comm.). In Alberta, the Cooper's Hawk is on the blue list, because it is 'vulnerable throughout much of its Canadian range and population status and trend information is required'.

Recent research

Rosenfield et al. (1991) questioned the reliability of standard census techniques for monitoring status of accipiters and suggested that long-term nesting studies are important in providing information on productivity (numbers of young fledged) and reoccupancy rates. A nine-year study in Wisconsin found densities and reproductive success equivalent or higher than that in historical times (Rosenfield and Anderson 1983) and that the surplus of hawks was sufficient to ensure occupancy of nest sites (Rosenfield et al. 1991). Rosenfield et al. (1994) found that of 378 nests examined over a 14 year period, 79% produced young. The highest density of nesting pairs known for the species (one nest per 272 ha) was found in a Wisconsin suburb (Rosenfield et al. 1994). In the east, areas used around active nests were 331-5,000 ha (Rosenfield et al. 1991), whereas in the west they were 671-2,326 ha (Reynolds 1989). Between 1985-1992 in discontinuously wooded areas in Wisconsin areas used around nests were < = 635-845 ha per active nest (Rosenfield and Bielefeldt 1993).

Synopsis

Most of the main data sources suggest that Cooper's Hawk populations are stable or increasing in Canada. There is good evidence that the species declined during the DDT-era. Its numbers have been reduced from previous levels in areas devoid of forest cover, such as in extreme southern Ontario. There was also evidence that the species declined recently in Québec (Cyr and Larivée 1995), but over the last six years there has been an increase in reported sightings (M. Gosselin pers. comm.). The species is thought to be increasing in Saskatchewan and is found in a wide variety of habitats, including urban ones (P.C. James pers. comm.).

B Habitat

Of the three Accipiters occurring in Canada, the Cooper's Hawk has the most southern distribution. Therefore, its populations coincide with areas holding dense human populations and consequently where there is most development. The species occurs throughout the northern and southern Great Lakes forest regions; there are relatively few records from the Carolinian forests of southern Ontario, or the boreal forest zone region. Rosenfield and Bielefeldt (1993) described Cooper's Hawk breeding habitat as deciduous, mixed or evergreen forest; deciduous stands are also used in riparian habitats. In Ontario, this hawk occurs in a variety of forest types from mature shade-tolerant hardwoods (pure or mixed) or mature deciduous/coniferous, mixed forest. Nest sites have high canopy cover (60-70%), little ground cover and occur near openings or edges of forested areas (James 1984). Of 28 nests examined recently, most (22) were in white pine (*Pinus strobus*), followed by red pine *P. resinosa* (4) with single nests in Scot's pine *P. sylvestris* and sugar maple *Acer saccharum* (Plosz 1990). In Saskatchewan, Cooper's Hawks are characteristic of the aspen groves and parkland woodlots. They also occur in the wooded coulees and riparian forests of the grassland, in the wooded areas of the Cypress Hills and in the fragmented southern boreal forest (Smith 1996). In British Columbia, the species breeds in a variety of forests; from mixed deciduous/coniferous to riparian woodlands, Garry oak - arbutus woodlands and trembling aspen, birch or alder (Campbell et

al. 1990).

At the landscape level, Cooper's Hawks prefer areas with extensive forest cover and at the stand (nest site) level they need closed canopy (70%) conditions with a high basal area. Forest fragmentation has at least three effects on Cooper's Hawks. It removes overall forest cover within territories; it increases the level of direct human disturbance to breeding hawks (even selective cutting during the breeding season can cause pairs to abandon territories permanently; Plosz 1990) and it augments populations of nest predators (e.g., raccoon *Procyon lotor* or opossum *Didelphis virginiana*) as well as other raptors that compete with, or prey on, Cooper's Hawks (e.g., Great Horned Owl *Bubo virginianus*). Finally, fragmentation reduces the regional abundance of forest interior songbirds (Robbins et al. 1989), that form the most important component of Cooper's Hawk diet (Rosenfield and Bielefeldt 1993).

Relatively little is known about winter habitat of Cooper's Hawks. It is frequently fouod preying on birds attracted to winter bird feeders (Dunn 1991). During winter in southeastern and central Texas, Cooper's Hawks were observed along canal banks and in agricultural fields and often perch on fence posts and oak trees (D. Gawlick in pers. comm. to Rosenfield and Bielefeldt 1993). Finally, in Arizona, the same plant communities are used in winter as in summer (Millsap 1981).

Trends in habitat

Deforestation and fragmentation have reduced Cooper's Hawk populations in several parts of their range. For example, in extreme southern Ontario, very few pairs breed, because of the lack of tree cover (Austen et al. 1994, ORBBP 1994). Because the species prefers to nest in pine associations (Naylor 1994) the dramatic decrease in extent of white and red pine caused by logging may in turn have reduced Cooper's Hawk populations. Furthermore, Baker and Euler (1989) describe the species as area sensitive in Ontario. On the other hand, there is considerable evidence that plantations (particularly of white pine, with some deciduous trees) are important nesting sites for Cooper's Hawks (e.g. in Ontario; Plosz 1990; Ohio; Peterjohn and Zimmerman 1991).

The evidence regarding the sensitivity of the species to human disturbance and adaptations to fragmented landscapes is conflicting. Rosenfield (1988) suggests that fragmentation of forests has enhanced Cooper's Hawk populations. In Wisconsin, Rosenfield and Bjelefeldt (1993) report studies where nests have been found in suburban habitats; in one study, nest spacing was similar in urban and rural habitats (Rosenfield and Bjelefeldt unpubl. data). High breeding densities have also been found in suburban and fragmented habitats in Saskatchewan (P. C. James pers. comm.). By contrast, Bosakowski et al. (1993) document the negative impacts of deforestation and development on Cooper's Hawk populations in New Jersey. They found that breeding Cooper's Hawks are secretive and tend to avoid human disturbance. Although some birds nested close to roads or houses, Bosakowski et al. (1993) stress that this does not indicate that hawk populations are viable in urban areas; probably the

birds involved are young, inexperienced breeders, that breed in suboptimal habitat when forested areas are fully saturated.

C Evaluation and recommended status

The Cooper's Hawk is considered common in the western United States (Reynolds 1989). Rosenfield et al. (1991) suggested that the species should no longer be considered threatened in the midwestern United States. This may be the case for many other states and provinces, but until more data are available from long-term nesting studies, it is difficult to generalise. However, in the southeastern United States, Adkisson (1990) suggested that the species was at 10% or less of its former abundance and the reasons for this are unknown. The persistent pesticide Mirex, used to control fire ants, which are then eaten by Northern Flickers *Colaptes auratus*, a preferred prey of Cooper's Hawks, may be be blame. Adkisson suggests pesticide use is the most likely causal factor affecting Cooper's Hawk populations in the southeastern states. In 16 eastern states the Cooper's Hawk is still considered extirpated, endangered, threatened or of special concern without any supporting data on demography or populations (Mosher 1989, Rosenfield et al. 1991). In the eastern United States Cooper's Hawk populations fluctuate according to prey population levels making population trends difficult to detect (Rosenfield and Bielefeldt 1993).

In 1983 COSEWIC designated the Cooper's Hawk as 'vulnerable' in Canada (Penak 1983). Although the main data sources indicate increasing or stable populations in Canada, there are insufficient data on breeding densities, productivity and reoccupancy rates to change this designation. However, it is highly likely that in Canada, as throughout its range, populations of Cooper's Hawks are grossly underestimated (see Mosher 1989). Birds may still be shot (Rosenfield and Bielefeldt 1993), but this is not considered an important mortality factor (Evans 1982, Bednarz et al. 1990). However, there are no indications that organochlorine pesticide levels have decreased in samples of Canadian eggs (Noble et al. 1993) suggesting that the species is still vulnerable to contamination on the nonbreeding grounds. In many parts of its range (e.g., southern Ontario) forest clearance has resulted in decreased populations (Rosenfield 1988, ORBBP 1994), although there is some evidence to suggest that in some areas the species is tolerant of human disturbance and adapting to fragmented landscapes (e.g., see Rosenfield and Bielefeldt 1993). Long-term breeding studies on Cooper's Hawks are needed in Canada to 1) determine breeding habitat requirements, breeding densities, productivity and re-occupancy rates in a range of forest types and 2) to critically compare these demographic parameters between continuous forest areas and fragmented landscapes.

D References

Adkisson, C.S. 1990. Accipiters. Pp. 63-69 *in* Proc. southeast raptor management symposium and workshop. National Wildlife Federation, Scientific and Technical Series No. 14.

Austen, M. J. W., Cadman, M. D. and James, R. D. 1994. Ontario birds at risk. Status and conservation needs. Federation of Ontario Naturalists and Long Point Bird Observatory.

Baker, J. and Euler, D. 1989. Featured species management in Ontario. Unpubl. Rep., Ont. Min. Nat. Res., Wildl. Br., Toronto. Ontario. 17 pp.

Barnhurst, B., McIntosh, M. W. and Henderson, D. 1995. Épervier de Cooper Accipiter cooperii. Pp. 376-379 *in* Les Oiseaux nicheurs du Québec: Atlas des oiseaux nicheurs du Québec méridional. J. Gauthier and Y. Aubry, sous la direction de. Association québécoise des groupes d'ornithologue, Société québécoise de protection des oiseaux, Service Canadien de la Faune, Environnement Canada, Région du Québec, Montréal. 1295 pp.

Bednarz, J.C., Klem, D. Jr., Goodrich, L.J. and Senner, S.E. 1990. Migration counts of raptors at Hawk Mountain, Pennsylvania, as indictors of population trends, 1934-1986. Auk 107:96-109.

Bosakowski, T., Speiser, R.E., Smith, D.G. and Niles, L.T. 1993. Loss of Cooper's Hawk nesting habitat to suburban development: inadequate protection for a state endangered species. J. Raptor Res. 27:26-30.

Campbell, R.W., Dawe, N.K., McTaggart-Cowan, I., Cooper, J.M., Kaiser, G.W. and McNall, M.C.E. 1990. The birds of British Columbia. Vol. 2: Nonpasserines. Royal British Columbia Museum, Victoria.

Downes, C. M. and Collins, B. T. 1996. The Canadian Breeding Bird Survey, 1966-1994. Canadian Wildlife Service Progress Note No. 210, Canadian Wildlife Service, Ottawa, Canada.

Cyr, A. and Larivée, J. 1995. L'Atlas saisonnier des oiseaux du Québec. Univ. Sherbrooke and La Sociétie de Loisir Ornithologique de l'estrir.

Dunn, E. 1991. Predation at feeders: close encounters of the fatal kind. Feederwatch News 4:1-
2.

Erskine, A.J. 1992. Atlas of breeding birds of the Maritime Provinces. Nimbus Publishing Ltd. and the Nova Scotia Museum, Halifax.

Evans, D.L. 1982. Status reports on twelve raptors. U.S. Dep. Inter., Fish and Wildl. Serv. Spec. Sci. Rep. Wildl. 238. 68 pp.

Fuller, M.R. and Mosher, J.A. 1981. Methods of detecting and counting raptors: a review. Pp. 235-246 *in* Estimating numbers of terrestrial birds. (C.J. Ralph and J.M. Scott, eds.). Stud. Avian Biol. 6.

Henny, C.J. and Wight, H.M. 1972. Population ecology and environmental pollution: Red-tailed and Cooper's Hawks. Pp. 229-250. *in* Population ecology of migratory birds: a symposium. U.S. Dep. Inter., Fish and Wildl. Serv. Res. Rep. 2.

Hoffman, S.W. 1985. Autumn Cooper's Hawk migration through northern Utah and northeastern Nevada, 1977-1982. Pp. 149-165 *in* Proc. Hawk Migration Conf. IV (M. Harwood, ed.). Hawk Migration Association of North America.

Hoffman, S., DeRagon, W.R. and Bednarz, J.C. 1992. Patterns and recent trends in counts of migrant hawks in western North America. HawkWatch International, P.O. Box 35706, Albuquerque, NM 87176-5706, USA.

Hussell, D.J.T. and Brown, L. 1992. Population changes in diurnally-migrating raptors at Duluth, Minnesota (1974-1989) and Grimsby, Ontario (1975-1990). Report to Ontario Ministry of Natural Resources. 67 pp.

James, R.D. 1984. Habitat management guidelines for Ontario's forest nesting Accipiters, Buteos and Eagles. Ontario Ministry of Natural Resources, Unpubl. report.

James, R.D. 1991. Annotated checklist of the birds of Ontario, 2nd ed., Life Sci. Misc. Publ., R. Ont. Mus., Toronto.

Kirk, D.A., Hussell, D.J. and Dunn, E. 1995. Raptor population status and trends in Canada. Bird Trends 4. Canadian Wildlife Service.

Kirk, D.A. and Hyslop, C. in press. Population status and recent trends in Canadian raptors: a review. *Biol. Conserv.*

Millsap, B.A. 1981. Distributional status of Falconiformes in west central Arizona with notes on ecology, reproductive success, and management. USDI-Bureau Land Management Tech. Note 355.

Mosher, J.A. 1989. Accipiters. Pp. 47-52 *in* Proc. northeast raptor management symposium and workshop. National Wildlife Federation, Scientific and Technical Series No. 13.

Naylor, B.J. 1994. Managing wildlife habitat in red pine and white pine forests of Ontario. The Forestry Chronicle 70:411-419.

Noble, D.G., Elliot, J.E. and Shutt, J.L. 1993. Environmental contaminants in Canadian raptors, 1965-1988. Tech. Rep. No. 91, Canadian Wildlife Service, Ottawa.

Ontario Rare Breeding Bird Program (ORBBP) 1994 draft. The status of the Cooper's Hawk (*Accipiter cooperii*) in Ontario. Federation of Ontario Naturalists.

Penak, B.L. 1983. Status report on the Cooper's Hawk *Accipiter cooperii* in Canada. Committee on the status of endangered wildlife in Canada, Ottawa.

Peterjohn, B. and Zimmerman, W. 1991. The birds of Ohio. Indiana Univ. Press, Bloomington.

Plosz, C.M. 1990. Nest site selection of Cooper's Hawk (*Accipiter cooperii*) in southern Ontario. Unpubl. report to OMNR.

Reynolds, R.T. 1989. Accipiters. Pp. 92-101 *in* Proc. western raptor management symposium and workshop. National Wildlife Federation, Scientific and Technical Series No. 12.

Robbins, C.S., Dawson, D.K. and Dowell, B.A. 1989. Habitat area requirements of breeding forest birds of the middle Atlantic states. Wildl. Monogr. 103:1-34.

Rosenfield, R.S.. 1988. Cooper's Hawk. Habitat. Pp. *328-330 in* Handbook of North American birds, Vol. 4, Part 1: Diurnal raptors (R.S. Palmer, ed.). Yale Univ. Press, New Haven, Conn.

Rosenfield, R.N. and Anderson, R.K. 1983. Status of the Cooper's Hawk in Wisconsin. Unpubl. Rep. Wis. Dept. Nat. Res., Madison.

Rosenfield, R.N., Bielefeldt, J., Anderson, R.K. and Papp, J.M. 1991. Accipiters. Pp. 42-49 *in* Proc. midwest raptor management symposium and workshop. National Wildlife Federation, Scientific and Technical Series No. 15.

Rosenfield, R.N. and Bielefeldt, J. 1993. Cooper's Hawk (*Accipiter cooperii*). *in* The birds of North America, No. 75 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia; The American Ornithologists' Union, Washington, D.C.

Rosenfield, R.N., Bielefeldt, J., Affeldt, J. and Beckmann, D. 1994. Productivity and nesting density of Cooper's Hawk in Wisconsin. J. Raptor Res. 28: 64. Abstract.

Sauer, J. R., Schwartz, S. and Hoover, B. 1996. Christmas Bird Count home page. Version 95.1. Patuxent Wildlife Research Center, Laureal, Maryland, USA. (Unpublished home page).

Semenchuk, G.P. 1992. The atlas of breeding birds of Alberta. Fed. Alberta Natur., Edmonton.

Smith, A.R. 1996. The atlas of Saskatchewan birds. SNHS special publ.

Snyder, N.F.R., Snyder, H.A., Lincer, J.L. and Reynolds, R.T. 1973. Organochlorines, heavy metals and the biology of North American accipiters. Bioscience 23:300-305.

Titus, K. and Fuller, M.R. 1990. Recent trends in counts of migrant hawks from northeastern North America. J. Wildl. Manage. 54:463-470.

Weir, R.D. 1987. Cooper's Hawk. Pp. 116-117 *in* (Cadman, M.D., Eagles, P.F.J. and Helleiner, F.M., eds.). Atlas of the breeding birds of Ontario. Federation of Ontario Naturalists and Long Point Bird Observatory.

D Acknowledgements

I thank Environment Canada for funding and C. Hyslop for the opportunity to prepare this update. C. M. Downes and J.R. Sauer provided BBS and CBC data, respectively; J.R. Sauer performed the trend analyses on CBC data. S. Cannings, J. Duncan, M. Huot and D. Sutherland provided nature conservancy rankings for the species. A.J. Erskine, J. Gauthier, G. Semenchuk and A.R. Smith provided atlas data for the Maritimes, Québec, Alberta and Saskatchewan, respectively. B.J. Naylor sent me copies of unpublished reports for which I am grateful. I would like to thank K. De Smet, C. Hyslop and R.D. James for comments on earlier drafts of this report.

Authorities on Cooper's Hawk:

P.C. James, Royal Saskatchewan Museum, 2340 Albert Street, Regina, SK S4P 3VP (Tel. 306 787 9058)
R.N. Rosenfield, Department of Biology, University of Wisconsin, Stevens Point, WI 54481 U.S.A.
D.L. Evans, 2928 Greysolon Rd, Duluth, Minnesota, 55812, USA.