

Conservation Status of North America's Birds of Prey

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ABSTRACT.—We assessed the conservation status of 20 species of North American birds of prey by examining historical and recent estimates of trends in counts of raptors at migration watchsites. We compared these trend estimates with trends in *Breeding Bird Surveys* (BBSs), *Christmas Bird Counts* (CBCs) (terms in italics are defined in the book's glossary), and other available population indexes for areas believed to be either the origin or destination of migrants passing watchsites in each of three geographic regions. Long-term trend estimates indicated mostly increasing migration counts for nine species, mostly decreasing trends for five species, and mixed trends for six species. In the most recent decade, trends were geographically mixed for most species, with annual declines beginning in the late 1990s for many species in the West. We found evidence of widespread declines in populations of American Kestrels (*Falco sparverius*), and long-term increases for Bald Eagles (*Haliaeetus leucocephalus*), Swainson's Hawks (*Buteo swainsoni*), Merlins (*F. columbarius*), and Peregrine Falcons (*F. peregrinus*). Species with geographically mixed trends included the Broad-winged Hawk (*B. platypterus*), Red-shouldered Hawk (*B. lineatus*), Red-tailed Hawk (*B. jamaicensis*), Rough-legged Hawk (*B. lagopus*), and Golden Eagle (*Aquila chrysaetos*). Considered together, evidence from migration counts, BBSs, and CBCs suggests changes in migratory activity, rather than population changes, as the cause of decreasing migration counts of several species since 1974.

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INTRODUCTION

This chapter consists of conservation-status reports that include physical and ecological descriptions and historical and current population trends, together with assessments of the current conservation status of 20 species of North American raptors. Italicized terms in the chapter are defined in the book's glossary. Each report is divided into six sections: Species Description, Ecology and Migration, Population Status, Historical Conservation Concern, Current Status and Concerns, and Summary.

SPECIES DESCRIPTION

- **Common name** and **Scientific name**.—The common name and species binomial according to the American Ornithologists' Union's (AOU) Check-list of North American Birds, seventh edition (AOU 1998) and its supplements.
- **French name**.—Common name(s) in French according to Poole and Gill (2005).
- **Spanish name**.—Common name(s) in Spanish according to Poole and Gill (2005).
- **Body length**.—Range in centimeters (cm) (with female and male means or ranges as available) according to Clark and Wheeler (1987) and Poole and Gill (2005).
- **Wingspan**.—Range in centimeters (cm) (with female and male means or ranges as available) according to Clark and Wheeler (1987) and Poole and Gill (2005).
- **Mass**.—Range in grams (g) (with female and male means or ranges as available) according to Clark and Wheeler (1987) and Poole and Gill (2005).
- **Type of migrant**.—Either a *complete*, *partial*, *local*, or *irruptive migrant* according to Bildstein (2006).
- **Nest type**.—Brief description of a typical nest according to Poole and Gill (2005).
- **Food habits**.—Summary of principal dietary components according to Poole and Gill (2005).
- **Migration flight**.—Principal type of flight during migration according to Poole and Gill (2005).
- **Estimated world population**.—According to Ferguson-Lees and Christie (2001).

ECOLOGY AND MIGRATION

The ecology of the species, including migration, according to Poole and Gill (2005), and references therein.

POPULATION STATUS

A synopsis of historical population trends and more recent trend estimates from migration monitoring, presented in subsections for three geographic regions: Northeastern North America including the Great Lakes, Western North America, and around the Gulf of Mexico. For each region, there are separate sections detailing (1) previous watchsite analyses, (2) Raptor Population Index (RPI) analyses, and (3) other analyses (*Breeding Bird Surveys* [BBSs], *Christmas Bird Counts* [CBCs], and other surveys where applicable). We present RPI trend estimates for the most recent decade, and refer to long-term RPI trend estimates presented in the regional trends reports (Chapters 5–7). We use the following regions in the analysis of BBS and CBC data:

- **BBS northeastern North America.**—Connecticut, Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, New Brunswick, Nova Scotia, Ontario east of 79°W, and Québec.
- **BBS western region.**—Arizona, California, Idaho, Nevada, Oregon, Utah, Washington, western Montana, western Wyoming, western Colorado, western New Mexico, and British Columbia.
- **CBC northeastern North America.**—Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, New Brunswick, Nova Scotia, Ontario, and Québec.
- **CBC southeastern North America.**—Delaware, Florida, Georgia, Kentucky, Maryland, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.
- **CBC western North America.**—Alaska, Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, Alberta, British Columbia, Northwest Territories, and Yukon Territory.
- **Northeastern United States.**—Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia (i.e., U.S. Fish and Wildlife Service Region 5).
- **Southwestern United States.**—Arizona, New Mexico, Oklahoma, and Texas (i.e., U.S. Fish and Wildlife Service Region 2).
- **Southeastern United States.**—Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Puerto Rico and the U.S. Virgin Islands, South Carolina, and Tennessee (i.e., U.S. Fish and Wildlife Service Region 4).

J. Sauer provided an analysis of a BBS northeastern North American region. All other analyses of BBS and CBC data were performed using the web-based utilities at the respective survey websites.

Trend estimates are interpreted in light of the biology of each species. We consider trends to be significant if the probability of getting the stated estimate is $\leq 5\%$ (i.e., $P \leq 0.05$) when the actual trend equals zero. We consider trends to be marginally significant if $0.05 < P \leq 0.10$, and non-significant if $P > 0.10$. Actual P -values are reported in the regional-trends reports (Chapters 5–7).

HISTORICAL CONSERVATION CONCERNS

A summary of historical conservation threats in North America.

CURRENT STATUS AND CONCERNS

A synopsis of current conservation status of each species in North America, drawn from migration monitoring, U.S. Fish and Wildlife Service and Canadian Wildlife Service status estimates, Partners in Flight North American Landbird Monitoring Plan status, and International Union for Conservation of Nature and Natural Resources (IUCN) status estimates. The following terminology, derived from these sources, is used to characterize the conservation status of each species:

- **Species of concern.**—Species that, without additional conservation actions, are likely to become candidates for listing in the United States under the Endangered Species Act.
- **Endangered.**—In danger of extinction throughout all or a significant portion of the species' range.
- **Extirpated.**—Eliminated from an area.
- **Not at Risk.**—Evaluated and found to be not at risk of extinction given current circumstances.
- **Secure.**—Common; widespread and abundant.
- **Special Concern.**—May become threatened or endangered because of a combination of biological characteristics and identified threats.
- **Threatened.**—Likely to become an endangered species within the foreseeable future throughout all or a significant portion of the species' range.

FIGURES

Each species conservation status report contains a figure depicting the geographic pattern of migration monitoring trends (% change per year). The trend at each raptor-migration count is represented by an arrow. Arrows pointing upward indicate increasing trends; downward arrows indicate declines. Arrows to both sides indicate that the estimated rate of change is 0% per year. Solid arrows indicate significant trends ($\alpha = 0.05$);

open arrows indicate marginally significant and nonsignificant trends. The relative size of each arrow indicates the magnitude of the trend ($\leq 1\%$, 1–5%, or $>5\%$ per year). Standard periods of analysis for the maps are 1994 to 2004 for northeastern sites, and 1995 to 2005 for western and Gulf Coast sites. Footnotes indicate the period of analysis for shorter-term counts. Inset maps depict long-term (1974 to 2004) trends in northeastern North America.

TABLES

Tables 1–2 in the Appendix provide detailed conservation status estimates for bird conservation regions, states, and provinces.

DATA SOURCES

Estimates of world population are from Ferguson-Lees and Christie (2001). Estimates of the percentage of world population in the United States and Canada are taken from Rich et al. (2004). Population status is drawn from the U.S. Fish and Wildlife Service (2002), Canadian Wildlife Service (2006), IUCN (IUCN 2004), and Partners in Flight North American Landbird Monitoring Plan (Rich et al. 2004). The sources listed below were used for migration-count data, BBS trend estimates, CBC data, and conservation-status summaries. The list includes locations of watchsites referred to by name in the conservation status reports. Geographic coordinates of these watchsites are in Chapters 5–8.

1. AUDUBON'S HAWK WATCH AT WAGGONER'S GAP. 2005. Hourly raptor migration count data 1974–2004. Audubon Pennsylvania, Harrisburg, Pennsylvania. [Online.] Available at www.hawkcount.org.
2. CANADIAN WILDLIFE SERVICE. 2006. Species at Risk. [Online.] Available at www.speciesatrisk.gc.ca.
3. CAPE MAY BIRD OBSERVATORY. 2005. Hourly raptor migration count data 1976–2004. New Jersey Audubon Society, Cape May Bird Observatory, Cape May Court House, New Jersey. [Online.] Available at www.njaudubon.org/research/index.html#capemay.
4. HAWK MOUNTAIN SANCTUARY. 2005. Hourly raptor migration count data, 1934–2004. Hawk Mountain Sanctuary Association, Kempton, Pennsylvania.
5. HAWK RIDGE BIRD OBSERVATORY. 2005. Hourly raptor migration count data 1974–2004. Hawk Ridge Bird Observatory, Duluth, Minnesota. [Online.] Available at www.hawkcount.org.
6. HAWKWATCH INTERNATIONAL. 2006. Hourly raptor migration count data. Bonney Butte, Oregon, Bridger Mountains, Montana, Chelan Ridge, Washington, Goshute Mountains, Nevada, Lipan Point,

- Arizona, Manzano Mountains, New Mexico, Wellsville Mountains, Utah, and Yaki Point, Arizona. HawkWatch International, Salt Lake City, Utah.
7. HOLIDAY BEACH MIGRATION OBSERVATORY. 2005. Hourly raptor migration count data, 1974–2004. Holiday Beach Migration Observatory, Detroit, Michigan. [Online.] Available at www.hawkcount.org.
 8. INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES. 2004. IUCN red list of threatened species: A global species assessment. [Online.] Available at www.iucn.org/themes/ssc/red_list_2004.
 9. LIGHTHOUSE POINT HAWK WATCH. 2005. Hourly raptor migration count data, 1974–2004. [Online.] Available at www.hawkcount.org.
 10. BOISE RIDGE. 2006. Hourly raptor migration count data, 1995–2005. Idaho Bird Observatory, Boise, Idaho.
 11. MONTCLAIR HAWK LOOKOUT. 2005. Hourly raptor migration count data 1974–2004. New Jersey Audubon Society, Cape May Bird Observatory, Cape May Courthouse, New Jersey. [Online.] Available at www.hawkcount.org.
 12. MOUNT LORETTE. 2006. Hourly Golden Eagle migration count data, 1993–2005. Rocky Mountain Eagle Research Foundation, Calgary, Alberta.
 13. NATIONAL AUDUBON SOCIETY. 2002. The Christmas Bird Count Historical Results. [Online.] Available at www.audubon.org/bird/cbc.
 14. RICH, T. D., C. J. BEARDMORE, H. BERLANGA, P. J. BLANCHER, M. S. W. BRADSTREET, G. S. BUTCHER, D. W. DEMAREST, E. H. DUNN, W. C. HUNTER, E. E. IÑIGO-ELIAS, J. A. KENNEDY, A. M. MARTELL, A. O. PANJABI, D. N. PASHLEY, K. V. ROSENBERG, C. M. RUSTAY, J. S. WENDT, AND T. C. WILL. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology, Ithaca, New York. [Online.] Available at www.partnersinflight.org/cont_plan.
 15. SAUER, J. R., J. E. HINES, AND J. FALLON. 2004. The North American Breeding Bird Survey, Results and Analysis 1966–2003, version 2004.1. U.S. Geological Survey Patuxent Wildlife Research Center, Laurel, Maryland. [Online.] Available at www.mbr-pwrc.usgs.gov/bbs/bbs.
 16. SEMARNAT. 2006. Instituto Nacional de Ecología. [Online.] Available at www.ine.gob.mx.
 17. UNITED STATES FISH AND WILDLIFE SERVICE. 2002. Birds of conservation concern, 2002. [Online.] Available at <http://migratorybirds.fws.gov/reports/bcc02/bcc2002.pdf>.
 18. VERACRUZ RIVER OF RAPTORS. 2006. Hourly migration count data, 1992–2005. Pronatura, Veracruz, Mexico. [Online.] Available at www.hawkcount.org.

BLACK VULTURE

Scientific name:	<i>Coragyps atratus</i>
French name:	<i>Urubu noir</i>
Spanish name:	<i>Zopilote negro</i>
Body length:	59–74 cm
Wingspan:	141–160 cm
Mass:	1,600–2,300 g
Type of migrant:	Partial
Nest type:	Does not build a nest. Lays eggs directly on ground under cover (e.g., caves, abandoned buildings, hollow logs, etc.).
Food habits:	Carrion, plant material, and some live prey.
Migration flight:	Short glides interspersed with rapid, shallow flapping. Soars with wings held flat.
Estimated world population:	>1,000,000

ECOLOGY AND MIGRATION

The Black Vulture is one of the most abundant vultures in the New World and is often seen in large groups at communal roosts and large animal carcasses. Many roost sites are occupied year-round, and some are used for many years. Black Vultures occur in open and partially forested habitats, often close to human settlements or farms. The species recently expanded its range northward in the eastern United States and increasingly is seen in New England and southern Canada. Black Vultures are opportunistic feeders that feed on many types of animal carcasses and that sometimes kill domestic piglets, lambs, and calves, and also take bird eggs and young birds, small mammals, hatchling turtles, small fish, vegetable material, and animal feces. The species lacks the sense of smell of the Turkey Vulture, and often watches the behavior of Turkey Vultures to locate carcasses.

Many individuals are sedentary. In northern parts of the breeding range most migrate south during autumn.

POPULATION STATUS

Partners in Flight estimates that <10% of the estimated worldwide population of >1,000,000 breeds in the United States and Canada (Appendix). Data from *raptor migration counts*, *BBSs*, and *CBCs* indicate that populations of Black Vultures have (1) increased in northeastern North America since 1974, coinciding with an expansion of breeding range northward and westward, and (2) increased or remained stable around the Gulf of Mexico.

Eastern North America

Previous watchsite analyses.—None.

RPI analysis.—Migration counts indicate that populations of the Black Vulture have increased substantially in parts of northeastern North America since the mid-1970s (Chapter 5). From 1994 to 2004, a significant annual increase of 5.2% was recorded at Waggoner's Gap, Pennsylvania. During this period, a significant annual decline of -6.7% occurred at Cape May, New Jersey, and a nonsignificant decline of -4.2% occurred at Hawk Mountain, Pennsylvania (Fig. 1). Holiday Beach Migration Observatory, Ontario, and Hawk Ridge Bird Observatory, Minnesota, occasionally recorded migrating Black Vultures, whereas no sightings were recorded at l'Observatoire d'oiseaux de Tadoussac, Québec, and Lighthouse Point Hawk Watch, Connecticut. The species' breeding range has recently expanded north into southern New England.

Population indexes and fitted trajectories for Black Vultures at these sites (Chapter 5) suggest that this species first occurred as a migrant in Pennsylvania in the 1980s and that numbers have stabilized after a period of rapid increase. Counts at Cape May appear to have declined since 2000, but it is unknown whether this represents a normal fluctuation, change in migration geography, or population decline. Continued population change at the 1994–2004 rates would lead to a 50% increase of Black Vulture source populations in ~13 years at Waggoner's Gap, and 50% declines in 10 years at Cape May and in 17 years at Hawk Mountain.

Other analyses.—BBSs show a significant annual increase of 6.9% in Black Vulture populations in the northeastern United States from 1974 to 2004. This region includes the areas from which seven northeastern watchsites receive migrants. CBCs for northeastern North America from 1975 to 2004 suggest a significant annual increase of 12.8%, but the number of counts reporting the species was quite low in most years (1974 was excluded because no Black Vultures were reported), and the estimate should be interpreted in that light. From 1994 to 2004, Black Vultures were reported on ≥ 30 CBCs annually, and the estimated trend was a significant annual increase of 8.0%. Significant annual increases of 3.9% and 4.7% occurred in CBCs for southeastern North America from 1974 to 2004 and from 1994 to 2004.

In sum, migration counts, BBSs, and CBCs indicate that Black Vulture populations are increasing in the eastern United States. Increases in the number of CBC counts reporting the species in the Northeast suggest that the species' range is expanding northward.

Western North America

Black Vultures are not recorded regularly at watchsites in western North America.

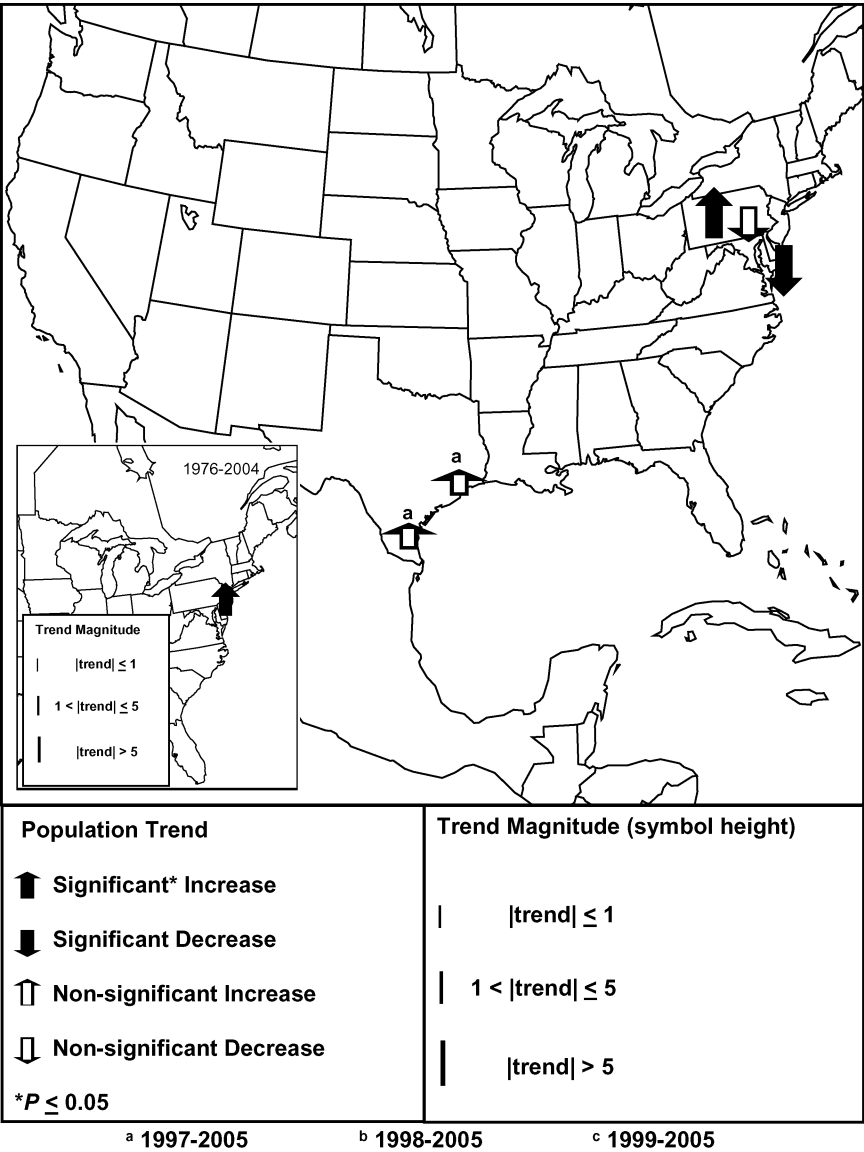


Fig. 1. Population trends for Black Vultures (*Coragyps atratus*) at three northeastern (1994–2004) and two Gulf of Mexico (1997–2005) raptor migration counts in North America, and the long-term (1976–2004) trend at Cape May Bird Observatory, New Jersey (inset). Trends are expressed in percent change per year.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Migration counts indicate that Black Vulture populations migrating through coastal Texas have remained stable or possibly increased slightly since 1997 (Chapter 7), but *P*-values for trend estimates were high (>0.50), and confidence intervals were wide and encompassed zero, giving us little confidence that the actual trends differed from zero.

Other analyses.—BBSs (8.4%) and CBCs (3.5%) indicate significant annual increases in numbers of breeding and wintering Black Vultures in Texas from 1995 to 2005.

HISTORICAL CONSERVATION CONCERNS

Direct persecution in the form of shooting and trapping once threatened Black Vultures, but these activities no longer impose high mortality. Organochlorine pesticides, such as DDT, caused thinning of eggshells between 1947 and 1972 in numerous raptors, but the effects on vulture populations are unknown (Kiff et al. 1983).

Previously published accounts do not report trends for the Black Vulture (e.g., Bednarz et al. 1990, Titus and Fuller 1990, Hussell and Brown 1992) in North America, so little is known about the species' status historically.

CURRENT CONSERVATION CONCERNS

Black Vultures benefit from a variety of human activities, including livestock-rearing, fishing, and garbage dumps. Vultures also benefit from high densities of roads and their attendant road-killed wildlife, but roads also lead to vulture mortalities due to collisions with vehicles. Ingestion of lead shot in carcasses has been known to affect other avian scavengers, and may affect Black Vultures as well, but these effects have not been studied for this species (Mossman 1991).

Globally, the Black Vulture is listed as a species of least concern and it is not a species of concern in the United States (Appendix).

SUMMARY

Raptor migration counts, BBSs, and CBCs all indicate that populations of Black Vultures have increased in eastern North America during the last several decades. Since 2000, breeding range has expanded into southern New England. Although migration trends indicate a decline during the most recent decade in portions of eastern North America, the increased recording of the species at more westerly watchsites suggests that it has recently expanded its range westward. Migration monitoring in coastal Texas indicates that the species is probably stable in southern North America, although breeding and winter surveys indicate population increases during this period.

TURKEY VULTURE

Scientific name:	<i>Cathartes aura</i>
French name:	<i>Urubu à tête rouge</i>
Spanish name:	<i>Zopilote aura</i>
Body length:	64–81 cm
Wingspan:	160–181 cm
Mass:	1,600–2,400 g
Type of migrant:	Partial
Nest type:	Does not build a nest. Lays eggs directly on the ground under cover (e.g., caves, abandoned buildings, hollow logs, etc.); sometimes makes a scrape or rearranges the substrate.
Food habits:	Small and large carrion; sometimes plant material, such as grapes and juniper berries (Hiraldo et al. 1991).
Migration flight:	Soars with wings in a dihedral and often flexed, frequently rocks from side-to-side, occasionally pumps and flaps.
Estimated world population:	>1,000,000

ECOLOGY AND MIGRATION

The Turkey Vulture is the most widely distributed vulture in the world. The species has a keen sense of smell, an unusual trait for a bird, which it uses, along with sight, to find carcasses.

Turkey Vultures search for food in both open and forested habitats, sometimes close to human settlements and farms where carrion, both wild and domestic, is available. Turkey Vultures often form large, communal roosts in trees, rock outcroppings, utility towers, and buildings. Northern populations tend to be highly migratory, whereas southern populations are often sedentary. During migration, northern populations typically pass over southern populations and winter farther to the south, a pattern called *leap-frog migration*. Western individuals are more migratory than their eastern counterparts, and many birds from the western United States and Canada winter in Central and South America. The species also undertakes short-term, local movements in eastern North America when weather becomes unfavorable. Because they are *obligate soaring migrants*, large flocks tend to concentrate along *leading lines*, *diversion lines*, and *thermal corridors*, making them easy to monitor on migration.

POPULATION STATUS

Partners in Flight estimates that approximately one-quarter of the estimated worldwide population of >1,000,000 breeds in the United States and Canada (Appendix). Migration counts along the Mesoamerican Land Corridor (Chapter 7) indicate that the North American population exceeds 2,000,000. Raptor migration counts, BBSs, and CBCs indicate that populations of Turkey Vultures have (1) increased substantially throughout northeastern North America since the 1970s and have expanded their range northward; (2) increased since the early 1980s in western North America, but declined since the onset of regional drought in the late 1990s; and (3) increased or remained stable in regions (primarily western) that contribute migrants seen at watchsites along the Gulf of Mexico.

Eastern North America

Previous watchsite analyses.—Most early accounts of raptor population trends did not include Turkey Vultures. Hussell and Brown (1992) reported a nonsignificant annual increase of 3.9% at Hawk Ridge, Minnesota, from 1974 to 1989 and a significant annual increase of 11.7% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990.

RPI analysis.—Migration counts indicate that populations of Turkey Vultures have increased substantially in northeastern North America since the mid-1970s (Chapter 5). From 1994 to 2004, significant increases of 5.6%, 13.7%, 16.7%, and 3.9% were recorded at Lighthouse Point, Connecticut, Hawk Mountain, Pennsylvania, Waggoner's Gap, Pennsylvania, and Hawk Ridge, respectively. Nonsignificant increases of 1.5%, 1.8%, and 5.0% were recorded at Cape May, New Jersey, Montclair, New Jersey, and Holiday Beach, Ontario, respectively (Fig. 2). Tadoussac, Québec, counted <20 birds per year, and we did not estimate trends at that watchsite. The species first appeared at the site in 1999, and counts increased from 5 in 1999 to 22 in 2003 (unpublished data, available at www.explos-nature.qc.ca/oot).

These patterns suggest that populations of Turkey Vultures have increased substantially in eastern North America since 1990, when watchsites in the region began counting consistently. Continued population change at the 1994–2004 rates would lead to a 50% increase of Turkey Vulture source populations in ~12 years at Lighthouse Point, 39 years at Montclair, 5 years at Hawk Mountain, 4 years at Waggoner's Gap, and 18 years at Hawk Ridge.

Other analyses.—BBSs showed significant annual increases of 4.6% from 1974 to 2004 and 4.2% from 1994 to 2004 in the northeastern United States. CBCs indicated significant annual increases of 7.5% from

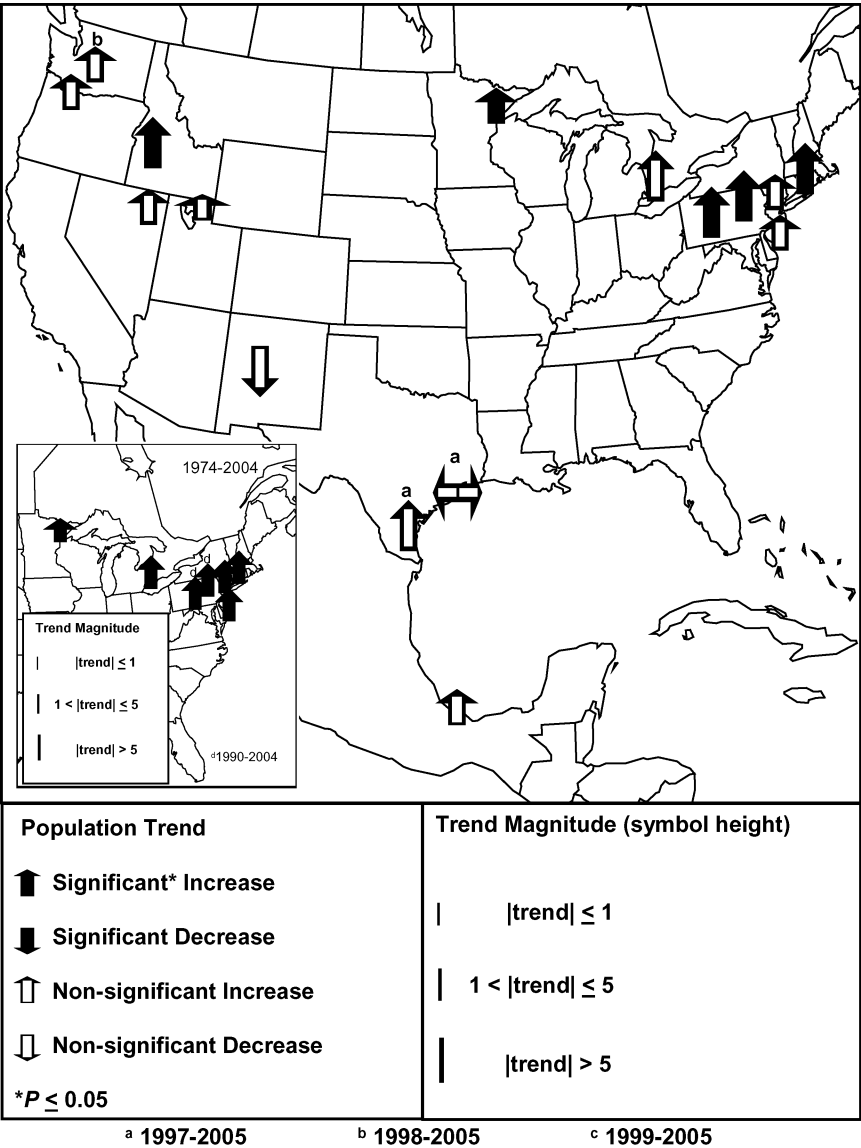


Fig. 2. Population trends for Turkey Vultures (*Cathartes aura*) at eight northeastern (1994–2004), eight western (1995–2005), and three Gulf of Mexico (1995–2005) raptor migration counts in North America and long-term trends (1974–2004) at seven northeastern raptor migration counts (inset). Trends are expressed in percent change per year. A bi-directional arrow indicates that the estimated trend is 0% per year.

1974 to 2004 and 5.2% from 1994 to 2004 in northeastern North America. Significant annual increases of 4.2% and 4.0% were recorded by CBCs in southeastern North America from 1974 to 2004 and from 1994 to 2004, respectively.

In sum, migration counts, BBSs, and CBCs indicate that Turkey Vulture populations are increasing throughout northeastern North America. Migration counts suggest that increases are more pronounced inland than along the coast (Fig. 2).

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported significant increases in numbers of migrating vultures at the Goshute Mountains Raptor Migration Project, Nevada, from 1983 to 2001, the Wellsville Mountains Raptor Migration Project, Utah, from 1987 to 2001, the Manzano Mountains Raptor Migration Project, New Mexico, from 1983 to 2001, and the Sandia Mountains Raptor Migration Project, New Mexico (spring watchsite), from 1985 to 2001. No significant trends were recorded at the Grand Canyon Raptor Migration Project (Lipan Point), Arizona, from 1991 to 2001, or at the Bridger Mountains Raptor Migration Project, Montana, from 1992 to 2001.

RPI analysis.—Migration counts indicate that Turkey Vulture populations increased in the western United States between the mid-1980s and late 1990s and then began to stabilize or decline following the onset of a regional drought in 1999 (Chapter 6). From 1995 to 2005, a significant annual increase of 18.3% occurred at Boise Ridge, Idaho, and a marginally significant annual increase of 5.5% was recorded at Bonney Butte Raptor Migration Project, Oregon. Nonsignificant annual increases of 5.5%, 1.5% and 0.3% occurred at Chelan Ridge Raptor Migration Project, Washington, from 1998 to 2005, the Goshutes from 1995 to 2005, and the Wellsvilles from 1995 to 2004. In contrast to these short-term trends, the Manzanos recorded a marginally significant annual decrease of -8.2%.

The counts suggest either that the regional drought affected Rocky Mountain populations more than those farther west, or that the drought and factors coinciding with it resulted in a geographic shift of vulture migration away from the Rocky Mountains and toward the Pacific Coast. Overall migration-count data suggest that western populations of vultures have been increasing during the past two decades, at an average annual rate of 2.5% since the mid-1980s.

Other analyses.—BBSs detected a significant 1.7% annual increase from 1983 to 2005, and a nonsignificant 0.3% decline from 1995 to 2005. CBCs indicated a significant annual increase of 1.5% from 1983 to 2005, and a nonsignificant annual decline of 0.6% from 1995 to 2005.

Gulf Coast

Previous watchsite analyses.—None.

RPI analysis.—Migration counts indicate that Gulf Coast populations are stable or increasing (Chapter 7).

Other analyses.—Survey-wide (i.e., throughout Canada and the United States) BBSs indicate a significant annual increase of 2.5% in breeding populations of Turkey Vultures in North America from 1995 to 2005. BBSs in Texas also increased significantly at 2.4% annually, but those in Florida underwent a nonsignificant -1.7% annual decline during this period.

HISTORICAL CONSERVATION CONCERN

Direct persecution in the form of shooting and trapping by ranchers and farmers once threatened Turkey Vultures, but these activities no longer kill many birds. Organochlorine pesticides, including DDT, caused eggshell thinning but population effects are unknown (Kiff et al. 1983).

CURRENT STATUS AND CONCERNS

Turkey Vultures benefit from many human actions, including live-stock-rearing, fishing, and garbage disposal at landfills. Vultures benefit from high densities of roads and the road-kills that result, but roadways also kill vultures. Ingestion of lead shot and bullet fragments lodged in carcasses also probably impact this species (Carpenter et al. 2003).

The Turkey Vulture is a species of least concern globally, is not listed as a species of concern in the United States, and is not at risk in Canada (Appendix). Kirk and Hyslop (1998) suggested that the species was increasing or stable and expanding its range in Canada.

SUMMARY

Notwithstanding the indication that drought in western North America may have affected Turkey Vultures in the Rocky Mountains, populations appear to be stable or increasing throughout most of North America, and have been doing so for several decades.

OSPREY

Scientific name:	<i>Pandion haliaetus</i>
French name:	<i>Balbuzard pêcheur</i>
Spanish name:	<i>Gavilán pescador, Águila pescadora</i>
Body length:	51–66 cm
Wingspan:	150–180 cm
Mass:	1,400–2,000 g
Type of migrant:	Complete. Often long-distance and transequatorial.
Nest type:	Large stick nest near water in a tree or other large platform.
Food habits:	Eats fish primarily. Other items, including birds, mammals, mollusks, and snakes reported, but uncommon.
Migration flight:	Slow, deep, stiff-winged flapping flight interspersed with soaring on crooked, “M”-shaped wings. Crosses water regularly.
Estimated world population:	<100,000.

ECOLOGY AND MIGRATION

The Osprey is a cosmopolitan raptor that breeds or over-winters on all continents except Antarctica. In North America, it nests in coastal areas and around lakes, rivers, marshes, and reservoirs, generally within a few kilometers of water. The largest concentrations of breeding pairs occur around marine bodies of water.

The Osprey is a *complete migrant* whose diet of live fish makes migration away from many high-latitude areas necessary as fish move to deeper water in autumn and many bodies of water freeze over in winter. Most North American populations make long migratory movements into Central and South America in winter, but some in Florida, Mexico, and elsewhere in the Caribbean Basin remain on their breeding range year-round. Ospreys from eastern North America generally migrate farther south into South America than those from western North America, which winter mainly in Mexico or Central America.

POPULATION STATUS

Numbers in the United States were estimated at 8,000 breeding pairs in 1983 (Henny 1983) and 16,000–19,000 pairs in 2001 (Poole et al. 2002). The estimated number of breeding pairs in Canada in the early 1990s was 10,000–12,000 (Kirk et al. 1995). Partners in Flight estimates the population of Ospreys in the United States and Canada

to be approximately one-half of the world population of <100,000 (Appendix). Migration counts and BBSs indicate that populations of the Osprey have (1) increased in eastern North America since 1974 and, apparently, stabilized there in the last 10 years; (2) increased or remained stable in western North America since the early 1980s; and (3) increased more strongly in eastern and midwestern North America than in the Great Lakes or western North America, based on count trends in the Gulf of Mexico.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant increase in counts of Ospreys at Hawk Mountain, Pennsylvania, from 1934 to 1942. A significant decline in counts was recorded from 1946 to 1972, and a significant, post-DDT Era increase was reported for the period 1973 to 1986 (Bednarz et al. 1990), but no estimates were made of the rates of change. In a study of six watchsites in eastern North America, Titus and Fuller (1990) reported a significant annual increase of 8.9% from 1972 to 1987. Hussell and Brown (1992) reported a significant annual increase of 5.8% at Hawk Ridge, Minnesota, from 1974 to 1989, and a significant annual increase of 6.2% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990. At Cedar Grove Ornithological Station, Wisconsin, Mueller et al. (2001) reported a significant increase in counts from 1936 to 1999, and a nonsignificant decline from 1989 to 1999.

RPI analysis.—Migration counts indicate that populations of the Osprey have increased steadily in northeastern North America since 1974 (Chapter 5). From 1994 to 2004, nonsignificant annual increases of 2.7%, 1.0%, and 4.1% were recorded at Montclair, New Jersey, Hawk Mountain, and Waggoner's Gap, Pennsylvania, respectively; whereas nonsignificant annual declines of -1.8%, -6.0%, -3.1%, -1.7%, and -0.1% were recorded at Tadoussac, Québec, Lighthouse Point, Connecticut, Cape May, New Jersey, Holiday Beach, Ontario, and Hawk Ridge, respectively, from 1994 to 2004 (Fig. 3). Thus, the species increased throughout the region over the last 30 years, primarily due to increases in the 1970s and 1980s, but was largely stable in the last decade.

Other analyses.—BBSs indicate significant annual increases of 4.6% from 1976 to 2003 in northeastern North America, and 6.7% from 1994 to 2004 in the northeastern United States. Osprey populations are not well sampled by BBSs, and their trend estimates should be considered in this light.

Western North America

Previous watchsite analyses.—The species increased significantly at the Goshutes, Nevada (1983 to 2001), Wellsvilles, Utah (1987 to 2001),

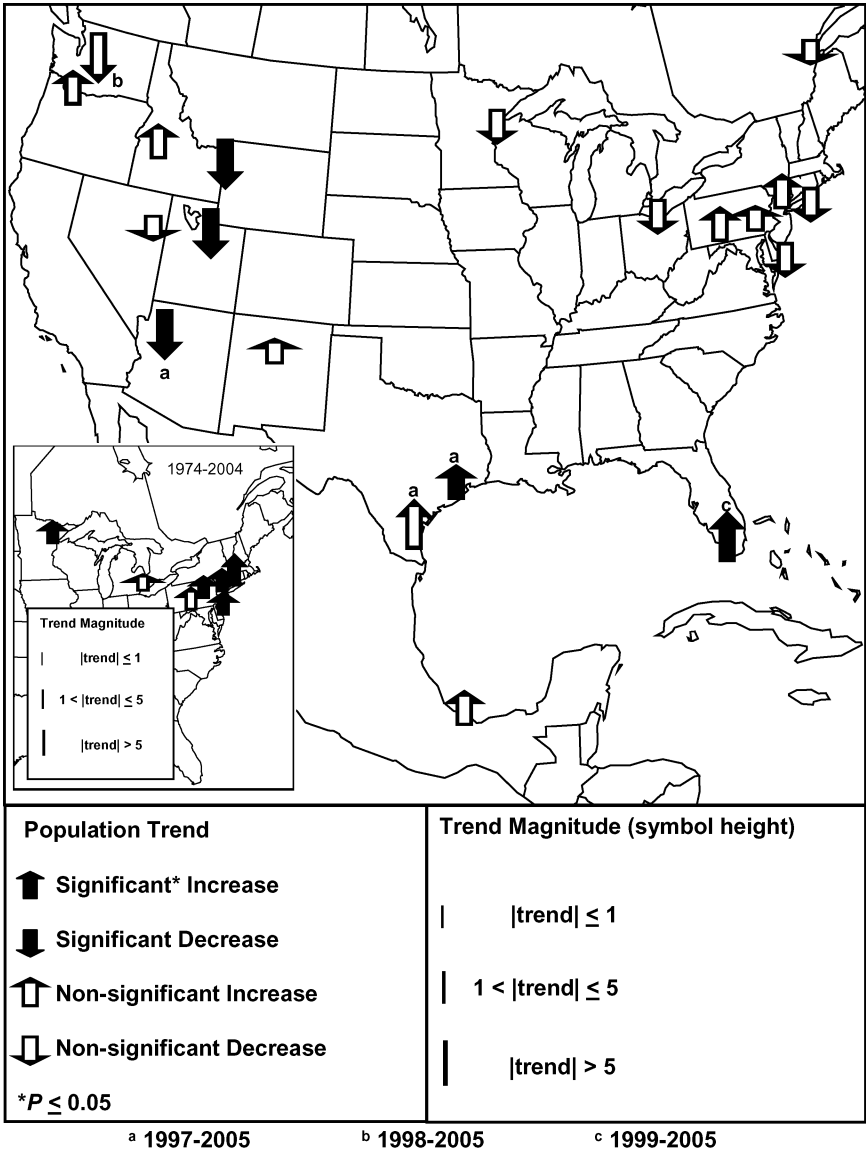


Fig. 3. Population trends for Ospreys (*Pandion haliaetus*) at eight northeastern (1994–2004), eight western (1995–2005), and four Gulf of Mexico raptor migration counts in North America, and long-term trends (1974–2004) for seven northeastern counts (inset). Trends are expressed in percent change per year.

Manzanos, New Mexico (1983 to 2001), Grand Canyon, Arizona (Lipan Point) (1991 to 2001), and the Sandias, New Mexico (a spring watchsite) (1985 to 2001); but no significant trend was recorded at the Bridger Mountains, Montana (1992 to 2001) (Hoffman and Smith 2003).

RPI analysis.—Migration counts suggest that populations of Ospreys have increased or remained stable in parts of the western United States since the mid-1980s (Chapter 6). In the last decade, significant declines of -7.1% , -12.6% , and -5.0% , respectively, occurred in counts at the Wellsvilles and at shorter-term watchsites at the Bridger Mountains and the Grand Canyon (Lipan Point). The Grand Canyon, Arizona (Lipan Point and Yaki Point, combined), recorded a marginally significant annual decline of -4.4% from 1997 to 2005, and there were nonsignificant declines of -1.0% , -6.0% , and -2.2% at the Goshutes, Chelan Ridge, Washington (1998 to 2005), and Bonney Butte, Oregon, respectively. No net change (0.0%) was observed at the Manzanos in the last decade (Fig. 3).

When trend estimation is restricted to the drought period (i.e., post-1998), there were significant annual declines of -10.0% and -4.4% , respectively, at the Wellsvilles and the Grand Canyon (Lipan Point and Yaki Point, combined). A significant annual increase of 4.4% occurred at Boise Ridge, Idaho, whereas a nonsignificant annual increase of 2.2% occurred at Bonney Butte.

Other analyses.—BBSs showed significant annual increases of 6.3% and 6.0% from 1983 to 2004 and 1995 to 2005, respectively.

Overall, these data suggest an expansion of western Osprey populations between the early 1980s and mid-1990s, most likely reflecting a combination of recovery from the effects of DDT and increased use of reservoirs and artificial nesting structures (Hoffman and Smith 2003). The positive effects of moist El Niño periods in the early to mid-1980s and early to mid-1990s on foraging habitat also may have aided this expansion. It appears that the onset of a regional drought in 1998, which dried up some water courses and caused large fish kills, may have altered the migration geography of the species.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Migration counts recorded annual increases throughout the Gulf region (Chapter 7, Fig. 3). Migrants recorded in the Florida Keys and Smith Point, Texas, are primarily of eastern and midwestern origin, whereas those counted at Corpus Christi, Texas, and Veracruz originate primarily in the Great Lakes and western North America (Martell et al. 2001), and differences in the magnitude and significance of trends among these watchsites suggest that Ospreys have increased more strongly in eastern

than in western North America during the last decade. Unfortunately, confidence intervals around the trends in this region are relatively wide due to the relatively short time series available for analysis, limiting our ability to distinguish between stable and increasing trends.

Other analyses.—BBSs estimate a nonsignificant annual decline of -0.7% in Florida from 1995 to 2005, and a nonsignificant annual increase of 0.7% in the southeastern United States.

HISTORICAL CONSERVATION CONCERNS

Ospreys in many parts of North America, particularly those breeding in coastal areas in the Northeast, were negatively affected by organochlorine pesticides, including DDT, in the middle of the last century (Spitzer et al. 1978). Osprey populations also were affected, historically, by shooting, although to a lesser extent than many raptors. Poole and Agler (1987) reported that U.S. banding data from 1972 to 1984 showed 30% of recovered banded Ospreys were shot, mostly on the winter range in Central and South America.

CURRENT STATUS AND CONCERNS

Shooting still occurs at low levels in North America, and there are higher rates of shooting in South America. Ospreys are generally tolerant of human activity, and land development *per se* does not appear to affect them negatively. However, limitation of suitable nest sites can limit populations unless mitigated with artificial nest platforms (e.g., Watts et al. 2004).

The Osprey is a species of least concern globally and is not listed as a species of concern in the United States (Appendix). Kirk and Hyslop (1998) rated the Osprey as increasing or stable in most of Canada.

SUMMARY

Migration monitoring and BBSs indicate that Osprey populations in eastern and western North America increased over the last 20–30 years but that these gains have slowed or been reversed in the most recent decade. Overall numbers are believed to be close to pre-DDT Era levels (A. Poole pers. comm.), and the recent changes probably indicate stabilization of populations after a period of increase. Recent trends at raptor migration counts around the Gulf of Mexico suggest that more southerly populations are increasing.

SWALLOW-TAILED KITE

Scientific name:	<i>Elanoides forficatus</i>
French name:	<i>Le Milan de la Caroline</i>
Spanish names:	<i>Gavilán tijereta, Gavilán cola de tijera</i>
Body length:	50–64 cm
Wingspan:	119–136 cm
Mass:	325–500 g
Type of migrant:	Complete
Nest type:	Loose, circular to oval, twig-and-lichen nest high in a dominant tree near the edge of open habitat.
Food habits:	Preys primarily on insects, frogs, and lizards, but also takes nestling birds, lizards, snakes, small mammals, and, occasionally, bats, fruit, and small fish.
Migration flight:	Graceful, buoyant soaring with frequent changes in position of long, forked tail. Powered flight with slow, flexible flaps.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

The Swallow-tailed Kite is a gregarious, medium-sized raptor that breeds in the southeastern United States, southern Mexico, and Central America. Individuals spend much of their day aloft, gracefully soaring while flapping only rarely but constantly adjusting their tail. The species frequently “kites” or hangs motionless by turning into the wind.

Swallow-tailed Kites nest primarily in dominant trees in woodlands with open, uneven canopy structure, adjacent to open habitats. Most common nesting habitats in the United States consist of hardwood and cypress swamps, lowland pine forests, and marshes.

Most individuals that breed in the United States migrate south out of North America. Two main pathways are used, from Florida to the Yucatan across the Gulf of Mexico, and around the Gulf Coast south through eastern Mexico. Satellite-tracking has revealed that most migrants spend the winter in South America after having flown across the Gulf of Mexico from Florida (K. Meyer pers. comm.). Late-summer staging of thousands of birds at communal roosts occurs in south-central Florida, especially near Lake Okeechobee. The timing of the species’ migration, with departure in late July for many birds, limits its detection at watchsites that begin their counts in mid-August.

POPULATION STATUS

Partners in Flight estimates that the population of Swallow-tailed Kites in the United States and Canada comprises <10% of the global population of 100,000 to 1,000,000 (Appendix; Meyer and Collopy 1990). Data from migration counts and BBSs suggest that Swallow-tailed Kite populations have increased since 1995 in southeastern North America. Previously published summaries of raptor migration counts in North America have not included trend estimates for this species.

Eastern North America

Swallow-tailed Kites are not regularly seen at watchsites in eastern North America and, consequently, migration trends cannot be calculated.

Western North America

Swallow-tailed Kites are not seen at watchsites in western North America and, consequently, migration trends cannot be calculated.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Migration counts in this region indicate that at least some northern populations are increasing (Chapter 7), with increases reported in counts in Texas and Mexico (Fig. 4). The average counts at all three watchsites were relatively small and represent only a small sample of the species' overall North American population. Swallow-tailed Kites also are observed at the Florida Keys, Florida, but counts there begin too late to cover the early-season (i.e., late July to early August) movements of this species. The relatively high magnitudes of the estimated increases in Texas and Veracruz indicate that the migration volume of Swallow-tailed Kites passing around the northern and western Gulf of Mexico is increasing. Whether this reflects a population increase or a shift in migration geography is unknown. Improved seasonal coverage of this early-season migrant and an expansion of efforts across a broader network of sites are needed to improve our understanding of the species' status. Other sites with useful data for monitoring this species include Kekoldi, Costa Rica, and the Ocean-to-Ocean count in Panama (Chapter 2). Systematic monitoring at the large pre-migration roosts in Florida also represents a potentially valuable tool for monitoring the species.

Other analyses.—BBSs suggest a nonsignificant annual increase of 2.2% in Florida from 1995 to 2005. BBS trend estimates for the species are of low reliability, because the species is detected on a low number of routes, and this trend should be considered in this light.

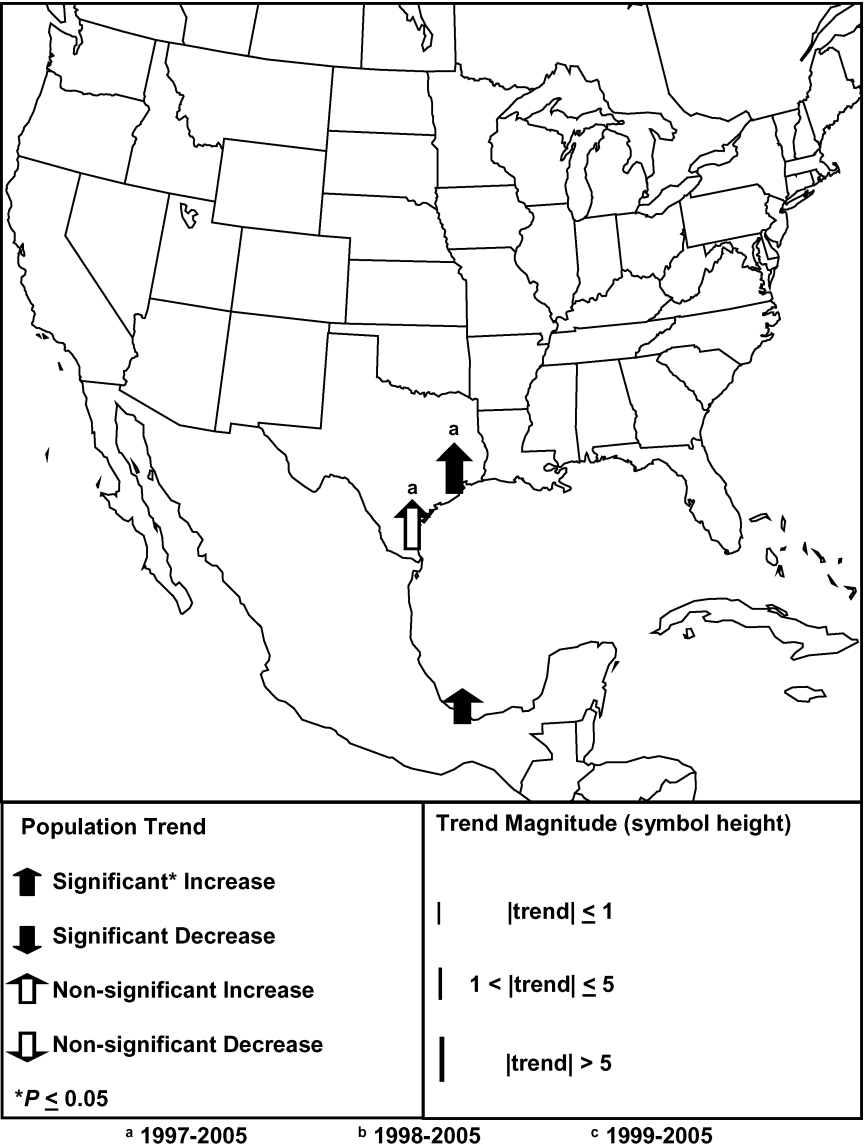


Fig. 4. Population trends (1995–2005) for Swallow-tailed Kites (*Elanoides forficatus*) at three Gulf Coast raptor migration counts. Trends are expressed in percent change per year.

HISTORICAL CONSERVATION CONCERNS

Historically, the species nested throughout Florida, the southeastern coastal United States, and along major drainages of the Mississippi River Valley north to Minnesota. The species declined dramatically and its range in the United States contracted between 1880 and 1940 (Cely 1979), likely because of agricultural development in the Mississippi Valley, logging of many bottomland forests, and direct persecution. Persecution included collecting eggs and shooting the conspicuous adults.

CURRENT STATUS AND CONCERNS

Changes in land use in the southeastern United States pose the greatest threat to Swallow-tailed Kites. Activities such as logging, human development, and flood control lead to loss or degradation of nesting, foraging, and roosting habitats. Short timber rotations in actively managed coastal pine forests reduce nesting habitat and prey abundance in some areas. Some nesting attempts fail because poor quality, exotic nest trees are selected for nesting, which provide marginal support in high winds. Shooting and pesticides may threaten birds on their winter range and during migration. The propensity of this species to form large pre-migration and winter roosts increases its vulnerability to disturbance events. The Yucatan Peninsula of Mexico appears to be an important stopover point for this species, and more research is needed to identify sites or habitats being used and their level of protection.

The Swallow-tailed Kite is a species of least concern globally, but is a species of concern in the United States and receives special protection in Mexico (Appendix).

SUMMARY

Monitoring programs suggest that Swallow-tailed Kite populations may be increasing in North America, but current data are not sufficient to resolve the rates of increase accurately. Given the range of conservation threats to the species, rates of land-use change in its breeding range, and the fragmented nature of the population, increased monitoring is needed. Conservation and monitoring at critical habitats, including long-term nesting, roosting, and migration-stopover sites, also should be considered.

MISSISSIPPI KITE

Scientific name:	<i>Ictinia mississippiensis</i>
French name:	<i>Milan du Mississippi</i>
Spanish names:	<i>Milano de Mississippi, Gavilán de Mississippi, Gavilán grisillo, Milano migratorio</i>
Body length:	Female: 35–37 cm Male: 34–36 cm
Wingspan:	Range: 75–83 cm
Mass:	Female: 270–388 g Male: 214–304 g
Type of migrant:	Complete
Nest type:	Loosely compacted, circular to oval twig nest in the fork of a limb or main trunk.
Food habits:	Preys primarily on medium to large insects; also takes small mammals, small birds, amphibians, reptiles, and road kills. Known for acrobatic aerial hunting.
Migration flight:	Light, buoyant flight, dominated by soaring and gliding on flat wings with tips often flared upward. Migrates in flocks.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

The Mississippi Kite is a medium-sized raptor whose eastern populations are associated primarily with old-growth forests or mature riparian habitat. Individuals often forage and roost in groups. This gregarious habit, combined with a tendency to hunt in open areas, from exposed perches or on the wing, makes the species relatively conspicuous.

In the Southeast, Mississippi Kites nest primarily in old-growth trees within large (>80 ha) contiguous stands, near the edge of more open habitats. In the Great Plains, the species nests in individual trees, woodlots, and “shelterbelts” of trees planted to act as wind barriers. Sometimes nests in suburban and even urban woodlots.

Most individuals migrate south into South America in autumn.

POPULATION STATUS

The Mississippi Kite is a North American endemic with a breeding population of 100,000 to 1,000,000 (average count at Veracruz, Mexico is >200,000). The estimate from Veracruz represents a substantial increase over the population estimate of Ferguson-Lees and Christie (2001; 10,000 to 100,000) (Appendix). Migration counts and BBSs suggest that Mississippi Kite populations have increased since 1995. Previously

published summaries of raptor migration counts in North America have not included trend estimates for this species.

Eastern North America

Mississippi Kites are seen only rarely at watchsites in eastern North America and, consequently, no migration trends can be calculated for the species in this region. Since 1974, autumn counts have included a total of seven individuals at Cape May, New Jersey, and two at Hawk Mountain, Pennsylvania. Ten other eastern watchsites have reported sightings (Chapter 2).

Western North America

Mississippi Kites are seen only rarely at watchsites in western North America and, consequently, no migration trends can be calculated for the species in this region. Single individuals have been recorded in the Grand Canyon, Arizona, and at the Sandia Mountains, New Mexico (spring watchsite).

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Migration counts indicate that populations of this species are increasing, with large annual increases recorded in counts in Texas and Mexico (Chapter 7, Fig. 5). Counts at the two Texas watchsites and, particularly, at Veracruz monitor nearly the entire population of North America. Unfortunately, high variability at these watchsites provides low confidence in estimates of rates of increase. Other sites with useful data for monitoring this species include Kekoldi, Costa Rica, and the Ocean-to-Ocean count in Panama (Chapter 2).

Other analyses.—BBSs recorded nonsignificant annual increases from 1995 to 2005 in the southwestern (3.0%) and southeastern (5.0%) United States. Due largely to its patchy distribution and inconspicuous nature in parts of the breeding range, the species was detected on a low number of BBS routes in each region, and the resulting high variance in counts gives these trend estimates low precision.

HISTORICAL CONSERVATION CONCERNS

Breeding populations in the southeastern United States are believed to have declined in the late 19th and into the early 20th century. Nesting success was low in some areas in the 1970s (Glinski and Ohmart 1983), when weather and predation caused many failures. Habitat destruction, persecution, egg-collecting, pesticide use, and shooting are believed to have contributed to earlier widespread declines and range retractions (Meyer 1990, Franson 1994). This species' low reproductive rate and its

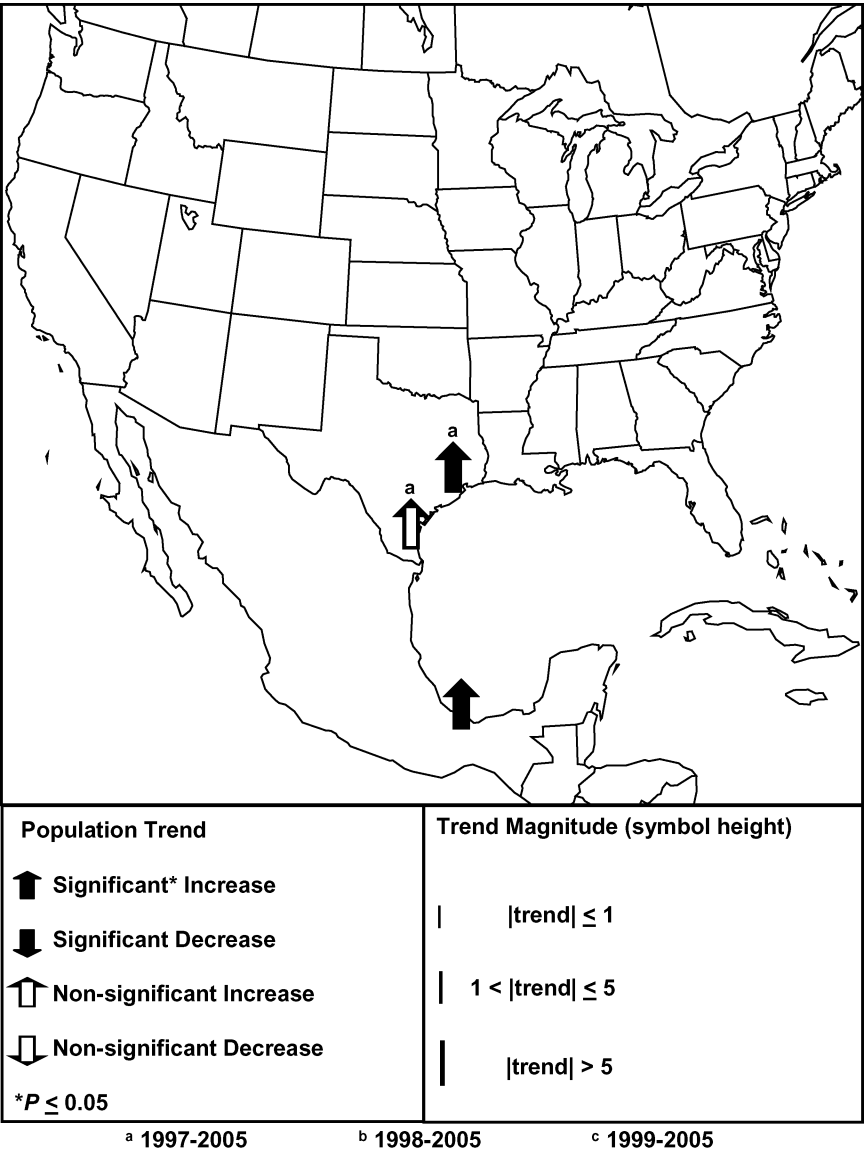


Fig. 5. Population trends (1995–2005) for Mississippi Kites (*Ictinia mississippiensis*) at three Gulf Coast raptor migration counts. Trends are expressed in percent change per year.

penchant for invertebrate prey may make it particularly susceptible to negative impacts from pesticide applications, although apparently it was not heavily affected by DDT (Parker 1976). Further research and monitoring of nesting success and pesticide loads is warranted.

CURRENT STATUS AND CONCERNS

Breeding populations began increasing in the Great Plains region in the mid-20th century, coinciding with the establishment of shelterbelts throughout the region. Less pronounced increases occurred at the same time in the southeastern United States (Parker and Ogden 1979, Meyer 1990). More recently, urban populations of kites have grown rapidly (Parker 1996). Although shooting and egg-collecting have decreased, some individuals are shot in response to aggressive nest defense at golf courses and houses (Parker 1988).

The Mississippi Kite is a species of least concern globally, and is not listed as a species of concern in the United States (Appendix).

SUMMARY

Monitoring programs suggest that Mississippi Kite populations are increasing in North America, but the precision of current trend estimates is not sufficient to resolve the rates of increase. The use of data from additional watchsites in Central America will aid in monitoring. The low reproductive rates that characterize some populations merit further study.

BALD EAGLE

Scientific name:	<i>Haliaeetus leucocephalus</i>
French name:	<i>Pygargue à tête blanche</i>
Spanish name:	<i>Águila cabeza blanca, Águila calva</i>
Body length:	70–96 cm
Wingspan:	180–244 cm
Mass (northern subspecies):	Female: 4,600–6,400 g Male: 3,700–4,800 g
Type of migrant:	Partial
Nest type:	Large stick nest in a high fork, typically in an emergent, usually live, tree.
Food habits:	Opportunistic. Eats primarily fish, but takes small mammals, reptiles and amphibians, crustaceans, birds, including waterfowl, and carrion, including carcasses of fish, birds, and mammals. Sometimes frequents garbage dumps. Also steals food from other raptors, including Ospreys.
Migration flight:	Slow, powerful gliding and soaring flight, interspersed with flapping. Soars mainly on flat wings.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

One of 10 species of “sea eagles” worldwide. Migration in Bald Eagles is complex, with the degree of movement changing with age and breeding status. Most non-adults migrate or move nomadically. Adults are migratory in some populations and largely sedentary in others. Outbound migrations occur from August through January in most areas, with some individuals moving shorter distances than others. Bald Eagles begin nesting in Florida in November and December, and young fledge in late winter. In spring and summer, young-of-the-year and many older “Florida birds” fly north and over-summer in the mid-Atlantic States, New England, and eastern Canada. They return to Florida in late summer to early winter. As a result, eastern watchsites, such as Hawk Mountain, Pennsylvania, experience two peaks in eagle migration in autumn; a late-August to September flight of Florida birds on return migration, and a lesser November–December flight of outbound northern birds.

POPULATION STATUS

Bald Eagles are North American endemics with an estimated breeding population of 100,000–1,000,000 birds (Appendix). Surveys of breeding

pairs conducted for the U.S. Fish and Wildlife Service indicate a total of ~10,000 breeding pairs in the lower 48 states, and an estimated additional 40,000 total birds in Alaska (U.S. Fish and Wildlife Service 2007). Data from migration counts, BBSs, and CBCs indicate that populations of the Bald Eagle have (1) increased since 1974 in northeastern North America and (2) increased slightly or remained stable in much of western North America.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant decline in autumn numbers of Bald Eagles at Hawk Mountain, Pennsylvania, from 1934 to 1942, a significant decline from 1946 to 1972, and a significant post-DDT-era increase from 1973 to 1986. Titus and Fuller (1990) reported a significant annual increase of 13.5% per year from 1972 to 1987 in counts at six autumn watchsites in the Northeast. Hussell and Brown (1992) reported significant annual increases of 18.7% at Hawk Ridge, Minnesota, from 1974 to 1989, and 13.5% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990. Mueller et al. (2001) reported a significant increase in autumn counts at Cedar Grove, Wisconsin, from 1936 to 1999 and a nonsignificant decline from 1989 to 1999.

RPI analysis.—Migration counts indicate that populations of the Bald Eagle have increased steadily in northeastern North America since 1974 (Chapter 5). From 1994 to 2004, significant annual increases of 4.7%, 9.8%, 8.6%, 5.3%, 8.7%, and 7.9% were recorded at Tadoussac, Québec, Lighthouse Point, Connecticut, Montclair, New Jersey, Hawk Mountain, Waggoner's Gap, Pennsylvania, and Hawk Ridge, respectively. Cape May, New Jersey (4.2%), and Holiday Beach, Ontario (5.1%), recorded nonsignificant annual increases from 1994 to 2004 (Fig. 6). Continued change at 1994–2004 rates would lead to a 50% increase in ~15 years at Tadoussac, 7 years at Lighthouse Point, 8 years at Montclair, 13 years at Hawk Mountain, 8 years at Waggoner's Gap, and 9 years at Hawk Ridge.

Other analyses.—BBSs in northeastern North America increased a nonsignificant 5.9% annually from 1976 to 2003, and 2.4% from 1994 to 2004 in the northeastern United States. Bald Eagles increased a significant 19.9% per year from 1976 to 2003, and 12.2% per year from 1994 to 2004 in the southeastern United States over the same time span. CBCs in northeastern North America increased a significant 7.2% annually from 1976 to 2003. In southeastern North America, they increased a significant 6.7% annually from 1974 to 2004. Steenhof et al. (2002) reported a significant 6.1% annual increase in northeastern winter counts from 1986 to 2000, as well as a nonsignificant 1.5% annual increase in southeastern counts.

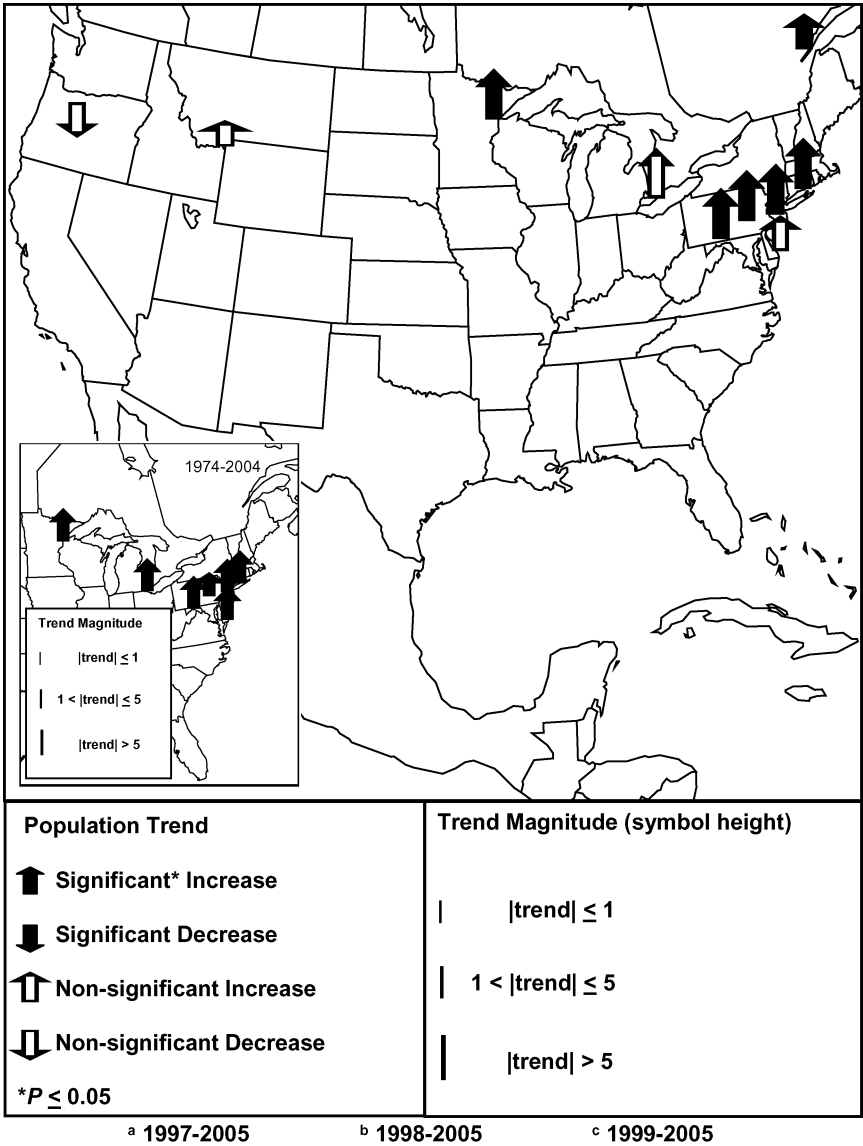


Fig. 6. Population trends for Bald Eagles (*Haliaeetus leucocephalus*) at eight northeastern (1994–2004) and two western (1995–2005) raptor migration counts in North America, and long-term trends (1974–2004) for seven northeastern counts (inset). Trends are expressed in percent change per year.

Western North America

Previous watchsite analyses.—None.

RPI analysis.—Sufficient numbers of Bald Eagles to estimate trends (≥ 20 per year) occurred only at Bonney Butte, Oregon, and the Bridger Mountains, Montana (Chapter 6), where, from 1995 to 2005, the two sites recorded nonsignificant annual declines of -2.0% and -0.4% , respectively (Fig. 6).

Other analyses.—Steenhof et al. (2002) reported nonsignificant annual increases of 1.3% in winter counts of Bald Eagles in the Great Basin from 1983 to 2005, as well as a nonsignificant 1.6% annual increase for the Pacific Coast, a nonsignificant -0.3% decline for the Rocky Mountains, and a nonsignificant -1.2% decline for the Southwest Desert region of the United States for the same period. BBSs showed a nonsignificant annual increase of 3.3% from 1983 to 2004 and a significant annual increase of 4.0% from 1995 to 2004. CBCs indicated a significant 2.5% annual increase from 1983 to 2005, and nonsignificant 1.0% annual increase from 1995 to 2005.

HISTORICAL CONSERVATION CONCERNS

The Bald Eagle was endangered and nearly extirpated in the lower 48 states by the middle of the 20th century, mainly because of persecution and the use of organochlorine pesticides, including DDT. Hawk Mountain Sanctuary was the only watchsite where eagles were counted before, during, and after the DDT Era, and Rachel Carson (1962) used these counts to help make her case against the widespread use of pesticides in *Silent Spring*. Of individual Bald Eagles examined by the U.S. Geological Survey from 1963 to 1984, 23% died of trauma (mostly collisions), 22% from gunshots, 11% from poisoning, 9% from electrocution, 5% from trapping, and 30% from malnutrition, disease, or unknown causes (Wood et al. 1990).

Counts of immature and adult Bald Eagles at Hawk Mountain reveal a pattern that is characteristic of population recovery. Numbers of immature Bald Eagles began to increase steadily in the early 1970s, corresponding closely with bans on the widespread use of DDT in Canada and the United States (Fig. 7), whereas counts of adults continued to decline and did not begin to increase consistently until nearly a decade later. Most likely, this time lag was caused by the ≥ 5 -year generation time of the species.

CURRENT STATUS AND CONCERNS

Migration counts, BBSs, and CBCs for Bald Eagles indicate a strong comeback since the DDT Era. Humans remain the greatest single threat to eagles, both directly, through persecution and poisoning, and indirectly, through land-use change, including recreational activities along rivers

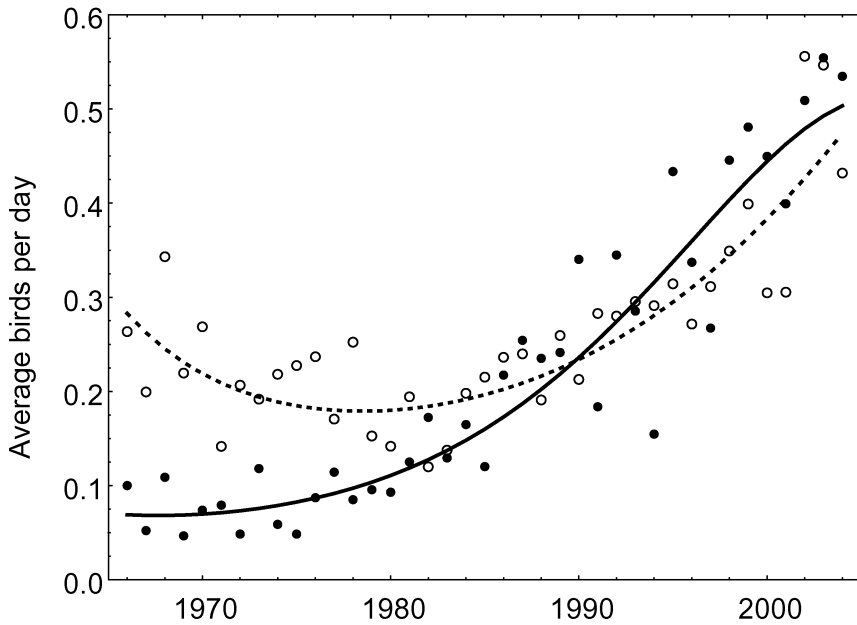


Fig. 7. Bald Eagle (*Haliaeetus leucocephalus*) population indexes (average birds per day) for Hawk Mountain Sanctuary, Pennsylvania. From 1966 to 2004, the overall count increased a significant 3.1% annually. Adults (open circles) increased an annual 1.7%, whereas immatures (solid circles) increased 5.3%. The lines indicate trajectories in these counts.

in western and northwestern North America (Steidl and Anthony 1996, 2000). Like other scavengers, Bald Eagles also are at risk from lead shot.

The Bald Eagle is a species of least concern globally, is not at risk in the United States or Canada, but is listed as endangered in Mexico (Appendix). It is protected in the United States by The Bald and Golden Eagle Protection Act, and by the Migratory Bird Treaty Act of 1918 as amended in 1972. Until June 2007 it also was protected under The Endangered Species Act. Most nest sites in the United States are protected by buffer zones, but the size of these zones varies among regions and states.

SUMMARY

Overall, evidence suggests that Bald Eagles are increasing in much of their range. Even so, trajectories from migration counts in northeastern North America (Chapter 5) suggest that populations are now stable. In western North America, where migration counts are less useful because of the low numbers of birds counted at watchsites in the lower 48 states, BBSs and CBCs indicate that Bald Eagles are increasing or stable.

NORTHERN HARRIER

Scientific name:	<i>Circus cyaneus</i>
French name:	<i>Busard Saint-Martin</i>
Spanish name:	<i>Aguilucho colinegro, Aguilucho pálido, Gavilán rastrero</i>
Body length:	41–50 cm
Wingspan:	97–122 cm
Mass:	290–600 g
Type of migrant:	Partial
Nest type:	Small ground-nest of herbaceous plants in a clump of tall vegetation in upland meadows, hay fields, and marshes.
Food habits:	Preys primarily on small mammals and birds.
Migration flight:	Buoyant soaring, often close to vegetative cover, with wings in a shallow dihedral, interspersed with deep, slow flapping.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

North America's only harrier, the Northern Harrier is sexually dimorphic, with females 13% to 50% heavier than males. Northern Harriers hunt primarily on the wing, while coursing low over the open habitats, including farmland. The species uses sound to locate prey to a greater extent than do other diurnal raptors (Rice 1982).

Generally, individuals breeding in northern parts of the species' range are long-distance migrants. Although harriers concentrate along *leading lines* and *diversion lines* during migration, they do so less than many other species. Harriers migrate in a variety of weather conditions, including light rains and snow. Harriers also make long flights over water. Migrants use a mixture of flapping and gliding flight close to the ground and are less frequently observed soaring on *thermals* and deflection updrafts.

POPULATION STATUS

Partners in Flight estimates that one-quarter to one-half of the global population (100,000 to 1,000,000) of Northern Harriers nests in the United States and Canada (Appendix). Migration counts, BBSs, and CBCs indicate that populations of Northern Harriers have (1) remained stable or declined in northeastern North America since 1974; (2) increased in western North America during the 1980s and early to mid-1990s, then declined thereafter; and (3) declined around the Gulf of Mexico since 1995.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a significant, long-term increase in counts of Northern Harriers at Hawk Mountain, Pennsylvania from 1934 to 1986 and a nonsignificant increase from 1971 to 1986, but did not estimate rates of change. In a study of six raptor migration counts in eastern North America, Titus and Fuller (1990) reported a nonsignificant annual increase of 5.1% from 1972 to 1987. Hussell and Brown (1992) reported a nonsignificant annual decline of -3.7% at Hawk Ridge, Minnesota, from 1974 to 1989 and a significant annual increase of 5.3% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990. At Cedar Grove, Wisconsin, counts declined significantly from 1936 to 1999 and from 1951 to 1999 but increased nonsignificantly from 1989 to 1999 (Mueller et al. 2001).

RPI analysis.—Migration counts indicate that populations of Northern Harriers generally have remained stable or declined in northeastern North America since 1974 (Chapter 5). From 1994 to 2004, significant annual declines of -3.7%, -4.3%, and -13.1% were recorded at Lighthouse Point, Connecticut, Hawk Mountain, and Holiday Beach, Ontario, respectively. Nonsignificant annual increases of 1.3%, 2.4%, 2.5%, and 0.6%, respectively, occurred at Tadoussac, Québec, Montclair, New Jersey, Waggoner's Gap, Pennsylvania, and Hawk Ridge; and a nonsignificant decline of -0.7% occurred at Cape May, New Jersey (Fig. 8). Continued change at the 1994–2004 rates would lead to a 50% decline in ~19 years at Lighthouse Point, 16 years at Hawk Mountain, and 5 years at Holiday Beach.

Other analyses.—BBSs showed a nonsignificant annual decline of -2.1% from 1976 to 2003 in northeastern North America. Unfortunately, the inconspicuous nature of this species during the breeding season limits the value of BBSs as a population-monitoring tool. CBCs indicate significant annual increases in winter counts of 1.5% in northeastern North America and 0.5% in southeastern North America from 1974 to 2004. In the last decade (1994 to 2004), annual increases in CBCs were nonsignificant in northeastern (0.8%) and southeastern (0.9%) North America.

In sum, raptor migration counts and BBSs suggest that populations in northeastern North America have declined over the last 30 years. Increases in CBCs during the same period, however, suggest alternative explanations, including increased *broad-frontal migration*, population losses in northern populations coincidental with population increases in more southerly populations, *migratory short-stopping*, or combinations of these possibilities.

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported a significant increase from 1983 to 2001 in the Goshutes, Nevada, and

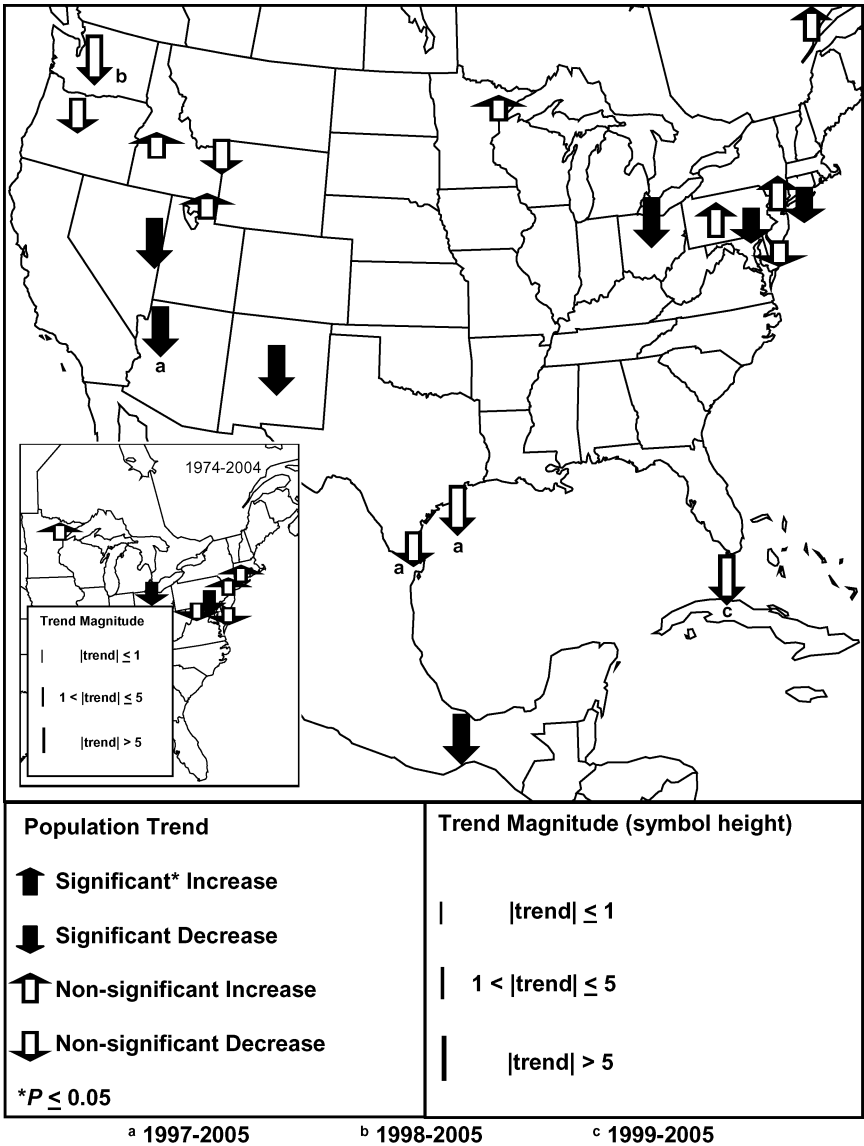


Fig. 8. Population trends for Northern Harriers (*Circus cyaneus*) at eight north-eastern (1994–2004), eight western (1995–2005), and four Gulf of Mexico raptor migration counts in North America, and long-term trends (1974–2004) for seven northeastern counts (inset). Trends are expressed in percent change per year.

nonsignificant increases or stable counts at the Wellsvilles, Utah (1987 to 2001), Manzanos, New Mexico (1983 to 2001), Sandias, New Mexico (a spring watchsite, 1985 to 2001), Bridger Mountains, Montana (1992 to 2001), and Grand Canyon, Arizona (Lipan Point) (1991 to 2001).

RPI analysis.—Migration counts suggest that populations of Northern Harriers increased markedly in some areas of western North America between the early 1980s and mid- to late 1990s, but declined in concert with a regional drought subsequently (Chapter 6). Since 1998, when drought occurred across much of the interior West, significant declines of -10.6%, -8.2%, and -10.6%, respectively, were recorded in the Goshutes, in the Manzanos, and at the Grand Canyon (Lipan Point and Yaki Point, combined), and a marginally significant annual decline of -10.1% also occurred at Chelan Ridge, Washington. Nonsignificant annual declines of -3.3%, -2.4% and -0.3%, respectively, were recorded at Bonney Butte, Oregon, the Bridger Mountains, and the Wellsvilles, and a nonsignificant annual increase of 0.3% was recorded at Boise Ridge, Idaho (Fig. 8).

Other analyses.—BBSs showed nonsignificant annual declines of -0.9% from 1983 to 2004, and -2.0% from 1995 to 2005. Unfortunately, the fact that Northern Harriers normally do not nest near roads limits the value of BBSs as a population monitoring tool. CBCs indicated that wintering populations underwent nonsignificant annual declines of -0.5% from 1983 to 2005 and -2.1% from 1995 to 2005.

In sum, Northern Harriers may have responded favorably to the relatively moist El Niño period of the early to mid-1990s, but have shown marked declines in most areas since the late 1990s, when a regional drought began across much of the interior West (Chapter 6). Significant annual declines since 1998 ranging from -5.3 to -10.6% occurred at five of nine western sites. There were nonsignificant declines ranging from -2.3 to -3.3% at two other sites, and no significant increases for any sites. A sustained annual decline of 5% per year would result in a 50% decline in the population in ~14 years.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Migration counts indicate declines in Northern Harrier counts throughout the Gulf region (Chapter 7, Fig. 8). Although each count exhibited a high degree of annual variability, all suggest that substantial declines occurred after highs between 1998 and 2000. These declines are consistent with a possible decline in northern, long-distance migrants coincidental with an increase in mid-Atlantic and southeastern short-distance migrants.

HISTORICAL CONSERVATION CONCERNS

Northern Harriers were shot less often than most other raptors at migration hot spots in the early 20th century, both because they were considered beneficial because of their diet of small mammals and because they tended not to concentrate at such sites. Use of DDT caused decreased egg-shell thickness in harriers between 1947 and 1969 (Anderson and Hickey 1972), and this likely led to population declines prior to the banning of DDT use.

CURRENT STATUS AND CONCERNS

The Northern Harrier, a species of least concern globally, is a species of concern in the United States but is not at risk in Canada (Appendix). The U.S. Fish and Wildlife Service ranks the Northern Harrier as a species of concern in Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming, in most of the Bird Conservation Regions from the Mississippi River to the Rockies, south of the Dakotas, and nationally (Appendix). Harriers are threatened in these areas primarily by the draining of wetlands, the conversion of prairies to intensive agricultural use, the overgrazing of pastures, and the early mowing of grasslands. Shooting also remains a concern for harriers in communal roosts in the southeastern United States.

Kirk and Hyslop (1998) rated the species as stable in Canada but noted that it was declining in some of the Boreal Plains ecozone due to intensive agriculture. Monitoring of the Northern Harrier at watchsites is particularly important because it is not well-monitored by BBSs on the breeding grounds, and much of its breeding range is north of BBS coverage.

SUMMARY

The Northern Harrier is considered secure in most of North America, but is a species of concern regionally in many of the Bird Conservation Regions east of the Mississippi River. Migration monitoring suggests that the species has recently declined in all three of the regions for which migration counts are currently available. Totals from CBCs have increased slightly in eastern North America during the same period, which suggests that changes in the species' migration geography may have occurred. Inclusion of additional raptor migration counts and addition of focused breeding-season surveys should help clarify the Northern Harrier's conservation status.

SHARP-SHINNED HAWK

Scientific name:	<i>Accipiter striatus</i>
French name:	<i>Épervier brun</i>
Spanish name:	<i>Gavilán pajarero</i>
Body length:	Female: 29–34 cm Male: 24–27 cm
Wingspan:	Female: 58–65 cm Male: 53–56 cm
Mass:	Female: 150–218 g Male: 87–114 g
Type of migrant:	Partial
Nest type:	Small, broad, flat, twig nest, often lined with bark or greenery.
Food habits:	Preys mainly upon small birds. Occasionally takes small mammals and large insects.
Migration flight:	A series of three to six quick, shallow wingbeats, interspersed with gliding and soaring.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

Sharp-shinned Hawks are secretive breeders that typically nest in dense forests, usually containing conifers. Difficult to detect and survey on breeding grounds, populations are best monitored by migration counts.

Feeds primarily on small songbirds, although it sometimes takes birds as large as American Robins (*Turdus migratorius*) and jays (e.g., *Cyanocitta* spp.) (Storer 1966, Duncan 1980, Joy et al. 1994). Sharp-shinned Hawks hunt from perches and from low-level flapping flight, darting rapidly at their target, while using natural and manmade structures to conceal their approach. They are common predators at bird feeders (Dunn and Tessaglia 1994).

In eastern North America, northern populations are more migratory than southern populations. In western North America, the species exhibits *chain migration*, with northern birds migrating later in autumn and wintering farther north than southern birds (Smith et al. 2003).

POPULATION STATUS

Partners in Flight estimates that half or more of the estimated world population of 100,000 to 1,000,000 breeds in the United States and Canada (Appendix). The remainder breeds in Central and South America. Data from migration counts, BBSs, and CBCs indicate that Sharp-shinned Hawks have (1) become less migratory in the Northeast since the 1970s; (2) increased slightly in western North America from the early 1980s to the

mid-1990s, and then declined with the onset of a drought in the late 1990s; and (3) declined along the Gulf Coast at least since 1995.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a significant increase in autumn migration counts of Sharp-shinned Hawks at Hawk Mountain, Pennsylvania, from 1934 to 1942, with a nonsignificant decline during the DDT Era from 1946 to 1972, and a nonsignificant increase from 1971 to 1986. Titus and Fuller (1990) reported a nonsignificant annual increase of 0.4% from 1972 to 1987 at six autumn watchsites in the Northeast. Hussell and Brown (1992) reported a nonsignificant -0.8% annual decline from 1974 to 1989 at Hawk Ridge, Minnesota, and a significant annual increase of 4.8% at Grimsby, Ontario (spring watchsite). At Cedar Grove, Wisconsin, Mueller et al. (2001) reported a significant increase in autumn counts from 1936 to 1999, but a nonsignificant trend from 1951 to 1999.

RPI analysis.—Long-term trend estimates are mixed but indicate that the species decreased in the Mid-Atlantic states and was stable or increased in New England and the western Great Lakes (Chapter 5). From 1994 to 2004, significant annual declines of -9.3% and -3.7% occurred at Cape May, New Jersey, and Hawk Mountain, respectively, whereas no net change was recorded at Lighthouse Point, Connecticut (0.0%), a nonsignificant increase (0.9%) was recorded at Tadoussac, Québec, and nonsignificant declines of -0.5%, -0.6%, -2.7%, and -1.8% occurred at Montclair, New Jersey, Waggoner's Gap, Pennsylvania, Holiday Beach, Ontario, and Hawk Ridge, respectively. Continued change at the 1994-2004 rates would lead to a 50% decline in Sharp-shinned Hawk numbers in ~7 years at Cape May and 19 years at Hawk Mountain.

Other analyses.—BBSs showed a nonsignificant annual increase of 3.0% in northeastern North America. These surveys, however, do not sample this secretive forest species well, and trends derived from them should be considered in this light. CBCs from 1974 to 2004 indicated significant annual increases of 2.1% in southeastern and 5.4% in northeastern North America.

Differences among trends from seven northeastern watchsites, as well as differences between migration counts and other population indexes, highlight the need to include counts from multiple watchsites and multiple surveys when attempting to assess population status. One possible explanation for the differences is a decline in the more migratory northern populations together with an increase in less-migratory individuals farther south. Another is increased migratory *short-stopping* (see Viverette et al. 1996). A significant decline in counts in Florida (see below) is consistent with both of these hypotheses.

Western North America

Previous watchsite analyses.—Sharp-shinned Hawks increased significantly at the Goshutes, Nevada, from 1983 to 2001, and nonsignificantly at the Wellsvilles, Utah (1987 to 2001), Grand Canyon, Arizona (Lipan Point) (1991 to 2001), the Bridger Mountains, Montana (1992 to 2001), the Manzanos, New Mexico (1985 to 2001), and the Sandias, New Mexico (a spring watchsite) (1985 to 2001) (Hoffman and Smith 2003), but counts at most of these sites began to decline in 1998.

RPI analysis.—Long-term trends were positive or stable at most western watchsites until 1997 (Chapter 6). Significant annual declines of -12.8%, -8.3%, -5.7%, and -3.4% occurred in the last decade at Chelan Ridge, Washington, the Goshutes, the Wellsvilles, and the Grand Canyon (Lipan Point), respectively. Nonsignificant annual declines of -0.1% and -6.3% occurred at Bonney Butte, Oregon, and the Bridger Mountains, Montana. On the other hand, the Manzanos recorded a significant annual increase of 2.2%, and nonsignificant annual increases of 4.4% and 0.7% were recorded at the Grand Canyon (Lipan Point and Yaki Point combined) and Boise Ridge, Idaho (Fig. 9).

Other analyses.—BBSs indicated a nonsignificant, long-term annual increase of 1.5% from 1983 to 2005 and a nonsignificant annual increase of 2.2% from 1995 to 2005. CBCs recorded a significant annual increase of 0.7% from 1983 to 2005 and a nonsignificant annual decline of 1.0% from 1995 to 2005.

In sum, Sharp-shinned Hawks increased between the 1980s and mid-1990s but began to decline overall in the late 1990s, coincidental with a regional drought in western North America. Continued declines in the central Great Basin (Goshutes) and Grand Canyon may reflect drought-related shifts in migration routes (Chapter 6).

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Declines were recorded at all watchsites in the Gulf region, but significant or marginally significant declines occurred only at the Florida Keys, Florida, and Veracruz, Mexico (Chapter 7). Confidence intervals for trends in this region are broad, presumably because of their brief runs. The high magnitudes of the trend estimates, however, suggest that the declines are real.

HISTORICAL CONSERVATION CONCERNS

Sharp-shinned Hawks were heavily persecuted in the early and mid-20th century, when they were perceived by many to be “vicious enemies”

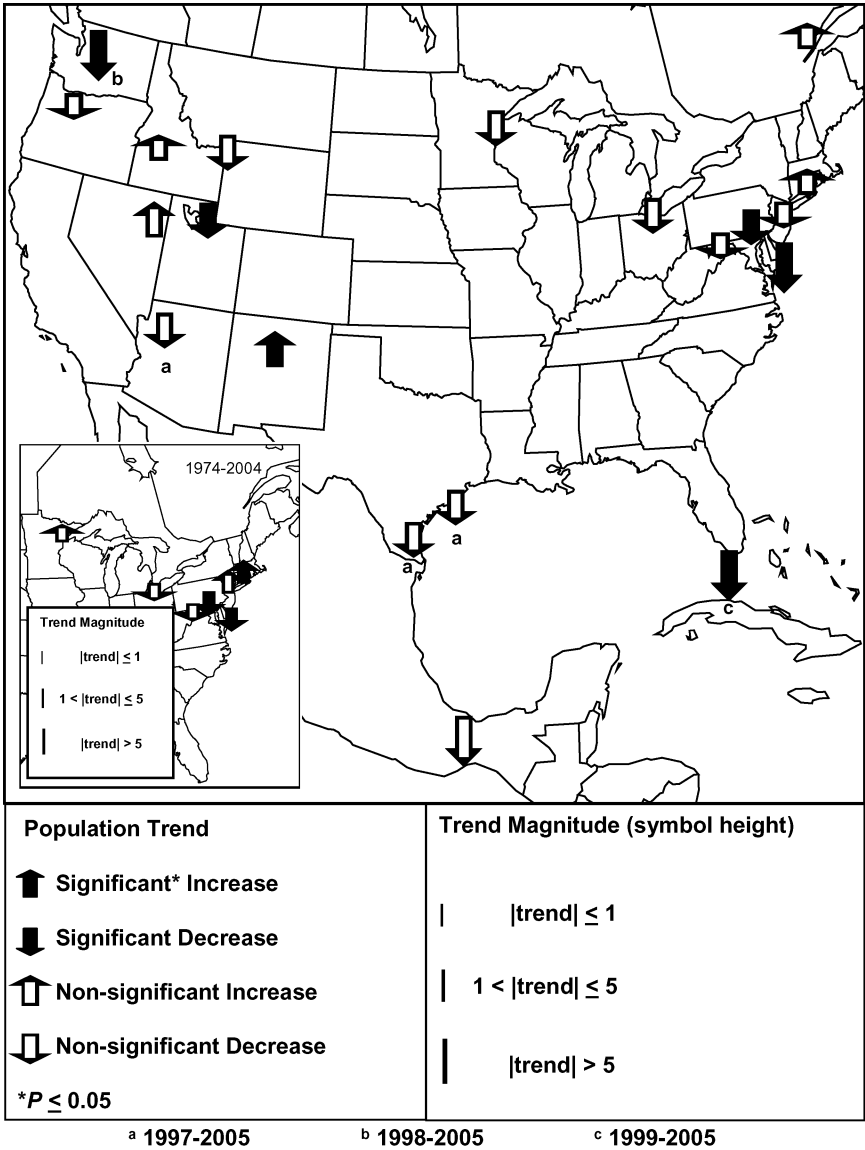


Fig. 9. Population trends for Sharp-shinned Hawks (*Accipiter striatus*) at eight northeastern (1994–2004), eight western (1995–2005), and four Gulf of Mexico raptor migration counts in North America, and long-term trends (1974–2004) for seven northeastern counts (inset). Trends are expressed in percent change per year.

of small songbirds (Chapter 1). Persecution all but ceased in 1972, when the Migratory Bird Treaty Act was amended to include birds of prey. The use of organochlorine pesticides (particularly DDT) also likely contributed to population declines between the late 1940s and early 1970s (Bednarz et al. 1990).

CURRENT STATUS AND CONCERNS

Declines in eastern watchsites in the late 1980s and early 1990s have been attributed to pesticides, natural population cycles, aging forests, declining populations of Neotropical migrant songbirds, migratory short-stopping, and cycles of spruce budworm infestation in the boreal forests of eastern Canada (Duncan 1996, Viverette et al. 1996, Wood et al. 1996, Kirk and Hyslop 1998, Bolgiano 2006). Our analyses indicate no consistent geographic pattern of change for counts in the region.

The Sharp-shinned Hawk is a species of least concern globally, is not listed as a species of concern in the United States, and is not at risk in Canada. It is accorded special protection in Mexico (Appendix). Kirk and Hyslop (1998) rated the species as potentially declining in Atlantic Canada, possibly because of spruce budworm population cycles, acid rain, changes in insect abundance, and the use of organochlorine contaminants. Blood samples of migrant Sharp-shinned Hawks collected in the early 1990s showed some individuals carried organochlorine loads that might impede reproduction (Wood et al. 1996). Throughout Canada, BBSs suggest stable or increasing trends.

SUMMARY

The number of Sharp-shinned Hawks counted at watchsites in the Northeast and along the Gulf Coast has declined since the early 1980s. Taken together, migration counts and CBCs suggest that at least some of the count declines are due to migratory short-stopping (Duncan 1996, Viverette et al. 1996). Although numbers at watchsites in western North America have increased overall in the last 20 years, declines since the late 1990s may be linked to widespread drought in the region.

COOPER'S HAWK

Scientific name:	<i>Accipiter cooperii</i>
French name:	<i>Épervier de Cooper</i>
Spanish name:	<i>Gavilán pollero</i>
Body length:	Female: 42–47 cm Male: 37–41 cm
Wingspan:	Female: 79–87 cm Male: 70–77 cm
Mass:	Female: 479–678 g Male: 302–402 g
Type of migrant:	Partial
Nest type:	Broad, flat or conical twig nest, often lined with bark or greenery.
Food habits:	Preys mainly upon medium-sized birds and mammals, and occasionally on reptiles, amphibians, and large insects.
Migration flight:	A series of three to six quick, shallow wingbeats, separated by brief periods of gliding; regularly soars on migration.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

The species nests in a variety of wooded and non-forested habitats, sometimes in solitary trees in prairie habitats, and, increasingly, in suburban and urban settings, and are common predators at bird feeders (Dunn and Tessaglia 1994). Cooper's Hawks can be difficult to detect and survey on breeding grounds, and migration counts provide an important monitoring opportunity in many parts of North America.

Some individuals migrate, whereas others remain on the breeding range year-round. Northern populations tend to be more migratory than southern populations.

POPULATION STATUS

Partners in Flight estimates that >90% of the species' global population of 100,000 to 1,000,000 breeds in the United States and Canada (Appendix). Data from migration counts, BBSs, and CBCs indicate that populations of Cooper's Hawks have (1) increased in northeastern North America since 1974; (2) increased in western North America since the early 1980s, but recently declined in the northern Rocky Mountains and intermountain regions coincidental with a regional drought that began in the late 1990s; and (3) increased around the Gulf of Mexico since 1995.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant, long-term decline at Hawk Mountain, Pennsylvania, from 1934 to 1986 and a significant increase for the period 1971 to 1986, but no estimates were made of the rates of change. In a study of six raptor migration counts in eastern North America, Titus and Fuller (1990) reported a significant annual increase of 7.8% from 1972 to 1987. Hussell and Brown (1992) reported a nonsignificant decline at Hawk Ridge, Minnesota, from 1974 to 1989 and a significant annual increase of 4.6% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported a significant decline in counts of Cooper's Hawks from 1936 to 1999 and a significant increase from 1951 to 1999.

RPI analysis.—Migration counts provide evidence of long-term increases in populations in northeastern North America since 1974 (Chapter 5). Significant annual increases of 10.2%, 4.1%, and 5.1% continued from 1994 to 2004 at Montclair, New Jersey, Hawk Mountain, and Waggoner's Gap, Pennsylvania, respectively. A nonsignificant increase of 0.3% was recorded at Cape May, New Jersey, during this period. A significant decline of -3.7% occurred at Holiday Beach, Ontario, and nonsignificant declines of -1.6% and -3.0%, respectively, were recorded at Lighthouse Point, Connecticut, and Hawk Ridge (Fig. 10). Cooper's Hawks do not occur regularly at Tadoussac, Québec. Continued population change at the 1994–2004 rates would lead to a 50% increase in ~7 years at Montclair, 17 at Hawk Mountain, and 14 at Waggoner's Gap, and a 50% decline in 19 years at Holiday Beach.

Other analyses.—BBSs showed a nonsignificant annual increase of 3.6% in northeastern North America from 1976 to 2003 and a significant annual increase of 4.9% in the northeastern United States from 1974 to 2004. CBCs from 1974 to 2004 indicated significant annual increases of 6.8% in northeastern North America and 5.2% in southeastern North America.

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported a significant increase from 1983 to 2001 at the Goshutes, Nevada, but no significant trends at other western watchsites. Most western migration counts increased through the mid-1990s and then declined beginning in 1999, coincidental with the onset of a regional drought (Hoffman and Smith 2003).

RPI analysis.—Migration counts indicated mostly increasing trends in the western United States between the mid-1980s and late 1990s, but mostly strong declines since then, coincidental with the occurrence of regional drought (Chapter 6). From 1995 to 2005, a significant annual

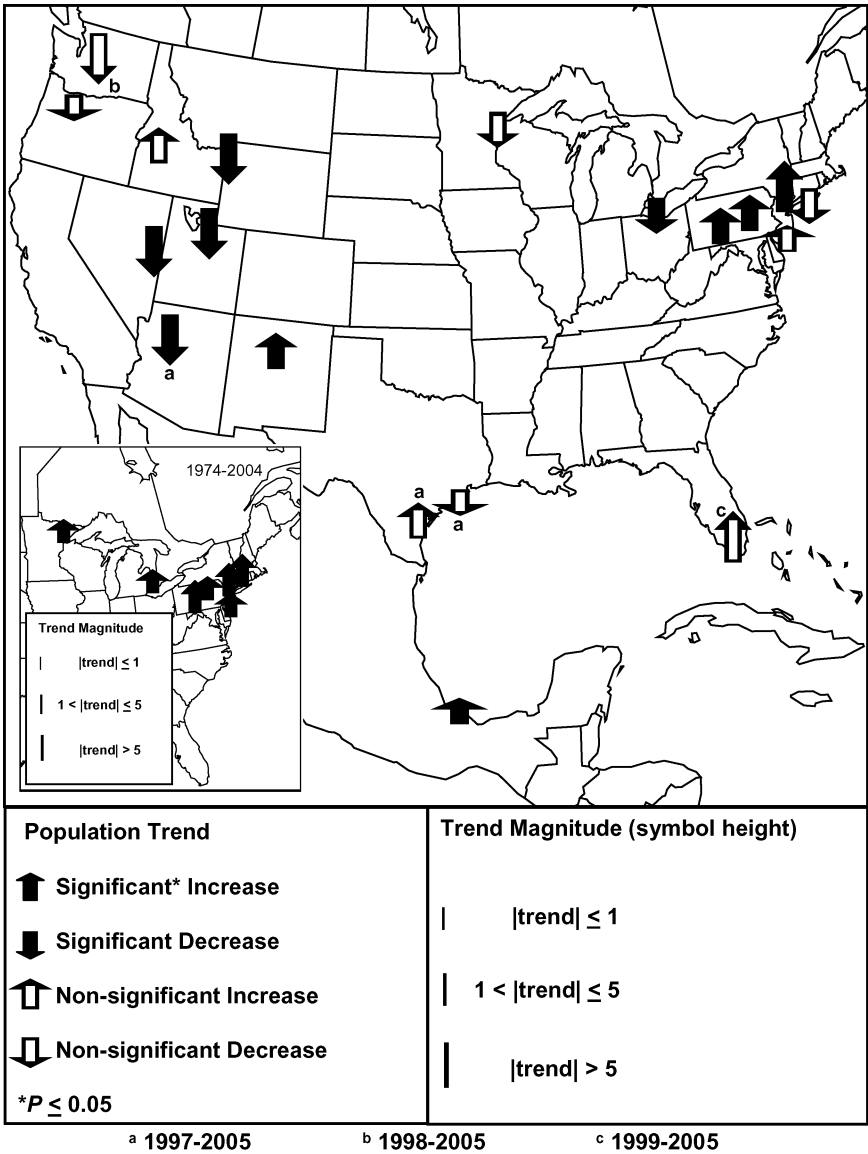


Fig. 10. Population trends for Cooper's Hawks (*Accipiter cooperii*) at seven northeastern (1994–2004), eight western (1995–2005), and four Gulf of Mexico (1995–2005) raptor migration counts in North and Central America, and long-term trends (1974–2004) at seven northeastern raptor migration counts (inset). Trends are expressed in percent change per year.

increase of 4.5% occurred at the Manzanos, New Mexico. Significant annual declines of -6.2%, -7.0%, -10.9%, and -12.0%, respectively, occurred at the Bridger Mountains, Montana, the Goshutes, the Wellsvilles, Utah (1995 to 2004), and the Grand Canyon, Arizona (Lipan Point and Yaki Point combined). A marginally significant annual decline (-6.3%) was recorded at Chelan Ridge, Washington, from 1998 to 2005, a nonsignificant decline occurred at Bonney Butte, Oregon (-0.9%), from 1995 to 2005, and a nonsignificant increase occurred at Boise Ridge, Idaho (2.1%) (Fig. 10).

Other analyses.—BBSs for western North America indicate a nonsignificant annual decline of -0.4% from 1983 to 2004 and a significant annual increase of 7.7% from 1995 to 2004. These estimates, however, are based on a low number of routes (e.g., 65 for 1995 to 2004), and they should be considered in that light. CBCs for western North America indicate a significant annual increase of 0.5% annually from 1983 to 2005, and an identical 0.5% annual increase from 1995 to 2005.

It appears that Cooper's Hawks fared well between the 1980s and mid-1990s in the interior West, increasing gradually across most monitored sites. Declines started with the onset of a regional drought in 1998, except at the Manzanos. Ongoing declines in the Great Basin (Goshutes) and in the Grand Canyon (Lipan Point and Yaki Point) suggest that the drought may have reshaped the migration geography of migrants there (Chapter 6).

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Migration counts recorded nonsignificant annual increases at most watchsites in the Gulf region during the last decade (Chapter 7). Overall, the species appears to be increasing slightly in this region.

Other analyses.—BBSs for the southeastern United States indicated a nonsignificant annual increase of 2.1% from 1995 to 2005.

HISTORICAL CONSERVATION CONCERNS

The Cooper's Hawk was heavily persecuted in the early 20th century, primarily because it was perceived as a "vicious enemy" of songbirds and domestic chickens. Hundreds of Cooper's Hawks were shot annually while migrating past concentration points such as Hawk Mountain and Cape May (Stone 1937, Broun 1949). With the passage of protective legislation, most notably when the Migratory Bird Treaty Act was amended to include raptors in 1972 (Chapter 1), shooting ceased to be a significant source of mortality in North America.

The use of pesticides (particularly DDT) is believed to have contributed to Cooper's Hawk population declines in eastern North America from the 1940s to early 1970s (Bednarz et al. 1990).

CURRENT STATUS AND CONCERNS

The Cooper's Hawk, a species of least concern globally, is not of concern in the United States or Canada but receives special protection in Mexico (Appendix). Kirk and Hyslop (1998) rated the Cooper's Hawk stable in most of Canada, but noted that demographic data were lacking for the species.

Recovery of populations from DDT-Era lows was well underway by the late 1970s to early 1980s (Bednarz et al. 1990, Titus and Fuller 1990). Our analyses reveal a consistent geographic pattern of population increase for Cooper's Hawks in northeastern North America since 1974. These increases continued through the last decade at watchsites in the Atlantic Coastal Plain and Appalachian Mountains, but weakened or were reversed in coastal New England, New Jersey, and the southern Great Lakes. Western populations showed stable or increasing trends since the early to mid-1980s in the intermountain and Rocky Mountain regions, but counts at most watchsites have declined in the last decade, coincidental with a regional drought. Breeding populations of Cooper's Hawks appear to be increasing in at least some areas in the Midwest (e.g., North Dakota; Nenneman et al. 2002). Whether or not other factors are involved in the recent declines is unknown. Several factors, including release from persecution and pesticide use, reforestation and forest maturation throughout the region, and the increased use of suburban and urban habitats, may be responsible for long-term increases in migration counts. Recent stable and decreasing trends in the Northeast may be the result of habitat saturation.

SUMMARY

Migration count data suggest that Cooper's Hawks have increased throughout North America over the last 20–30 years, with recent stability or declines at some sites in the Northeast, and declines in the West. On the other hand, BBSs and CBCs do not indicate recent declines in these areas. Long-term increases also appear to have occurred in the southeastern United States and Mexico. These increases are probably the result of recovery from the declines in the DDT Era and the ability of the species to exploit urban and suburban habitats, now that direct persecution has ended.

NORTHERN GOSHAWK

Scientific name:	<i>Accipiter gentilis</i>
French name:	<i>Autour des palombes</i>
Spanish name:	<i>Gavilán pollero, Gavilán azor, Gavilán norteño</i>
Body length:	Female: 53–62 cm Male: 46–51 cm
Wingspan:	Female: 105–115 cm Male: 98–104 cm
Mass:	Female: 860–1,364 g Male: 631–1,099 g
Type of migrant:	Partial (Europe and Asia); irruptive (North America).
Nest type:	Broad, flat, or conical stick nest lined with green branches or, occasionally, bark.
Food habits:	Preys mainly upon small to medium-sized birds and mammals.
Migration flight:	A series of quick, shallow wingbeats, separated by brief periods of gliding. Wingbeats are slower and deeper than those of Cooper's Hawks and Sharp-shinned Hawks.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

Northern Goshawks typically nest in deciduous, mixed-deciduous, and evergreen forests with large trees and open understories. Generally intolerant of intruders near the nest, they are known to attack humans approaching nests. The species can be extremely secretive and elusive and often nests in remote forests.

Northern populations are more migratory than those breeding to the south, and juveniles disperse and wander more during winter than adults. Satellite tracking of breeding adults in Utah demonstrates diverse winter movement patterns ranging from completely sedentary, to altitudinal migration, to short-distance latitudinal migrations of ≤ 200 km (Sonsthagen et al. 2006). Satellite tracking of mainly juveniles that were captured in autumn in Oregon, Washington, Nevada, New Mexico, and Wyoming indicated regional residency for most individuals (HawkWatch International unpubl. data). *Irruptive migrations*, primarily of northern populations, occur periodically in years of low prey availability.

POPULATION STATUS

Partners in Flight estimates that the United States and Canada contain approximately one-half of the global population of 100,000 to 1,000,000 birds (Appendix). Migration counts, BBSs, and CBCs indicate that Northern Goshawks have (1) declined or remained stable in eastern North America

since 1974, perhaps following an increase since the early 20th century; and (2) declined in much of western North America since the early 1980s.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant increase in counts of Northern Goshawks at Hawk Mountain, Pennsylvania, from 1934 to 1986 and a significant decline for the period 1971 to 1986, but no estimates were made of the rates of change. In a study of six migration counts in eastern North America, Titus and Fuller (1990) reported a nonsignificant annual decline of -3.8% from 1972 to 1987. At Cedar Grove, Mueller et al. (2001) reported no significant changes in counts from 1936 to 1999, but noted that the periodic irruptive migrations made it difficult to identify population trends in the species.

RPI analysis.—Migration counts provide mixed evidence of changes in populations of the Northern Goshawk in northeastern North America since 1974 (Chapter 5). From 1994 to 2004, nonsignificant annual declines of -2.8% and -4.5% were recorded at Tadoussac, Québec, and Cape May, New Jersey, respectively. Nonsignificant annual increases of 0.3% , 0.1% , 4.6% , and 1.7% were recorded at Hawk Mountain, Waggoner's Gap, Pennsylvania, Holiday Beach, Ontario, and Hawk Ridge, respectively (Fig. 11). Low counts (<20 per year) at Lighthouse Point, Connecticut, and Montclair, New Jersey, precluded analyses there.

With the exception of Hawk Ridge and Tadoussac, watchsites in the region are near the southern edge of the species' winter range, and each counts fewer than 100 individuals annually (range of 5 to 78), so trends in these counts may not accurately reflect population trends. Furthermore, their interpretation is complicated by the *irruptive* nature of migratory movements of the species. Migration counts probably reflect reproductive output of local populations in non-irruption years.

Several irruptions can be inferred from indexes presented in Chapter 5 (e.g., early 1980s and 1990s). Trends reported for eastern North America therefore may represent either population change or a change in the frequency of irruption years. To test the latter possibility, we deleted from the Hawk Mountain data set years or sets of years in which the count exceeded $1.5\times$ the previous year's count (i.e., 1975, 1981–83, 1986, 1993, 1995, 1999, and 2001). We then recalculated the long- and short-term trends in the reduced data set. The resulting trend estimates of -3.4% annually from 1974 to 2004 and 0.7% annually from 1994 to 2004 differed only slightly from those in the complete data set, which suggests that the trends are not attributable to the appearance of irruption years.

Other analyses.—BBSs in northeastern North America recorded a non-significant annual increase of 3.0% from 1976 to 2003. The BBS may not adequately sample this species, however, and this trend estimate should be

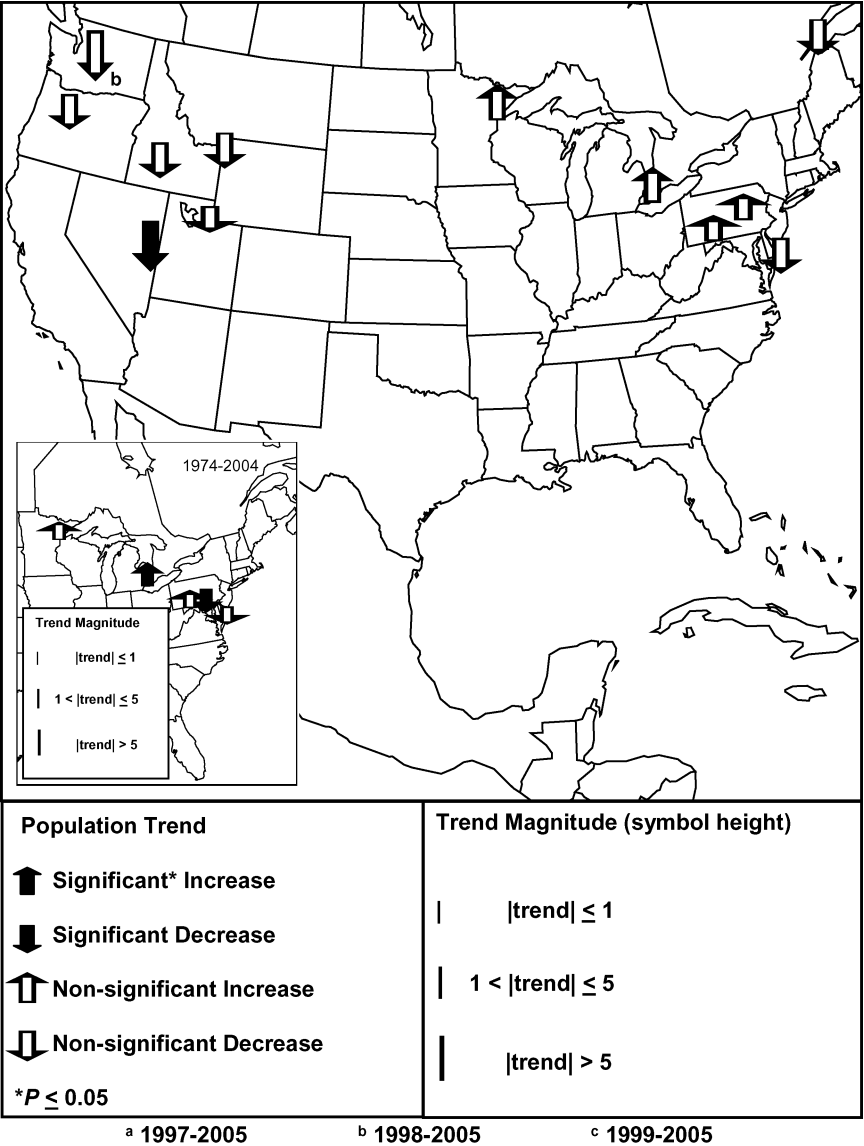


Fig. 11. Population trends for Northern Goshawks (*Accipiter gentilis*) at six northeastern (1994–2004) and six western (1995–2005) raptor migration counts in North America, and long-term trends (1974–2004) for six northeastern counts (inset). Trends are expressed in percent change per year.

considered in that light. CBCs in northeastern North America indicated a significant decline of -0.9% from 1974 to 2004. Goshawks were too rarely detected in CBCs in southeastern North America to provide a useful trend estimate.

Western North America

Previous watchsite analyses.—Although Hoffman and Smith (2003) reported a significant decline from 1992 to 2001 at the Bridger Mountains, Montana, the result was caused primarily by a high first-year count of adults due to an irruption. No significant trend was reported for immatures. Nonsignificant trends for adults and immatures occurred at the Wellsvilles, Utah, from 1987 to 2001, but a significant decline in the ratio of immatures to adults, and a significant reduction in the average abundance of immature birds counted occurred from 1977 to 1979 versus 1987 to 2001. A nonsignificant trend for immatures, but significant declines in adults and the ratio of immatures to adults, occurred at the Sandia Mountains, New Mexico (a spring watchsite), from 1985 to 2001. No significant trends were reported for the Goshutes, Nevada, from 1983 to 2001, the Grand Canyon, Arizona (Lipan Point) (1991 to 2001), or the Manzano Mountains, New Mexico (1985 to 2001) (Hoffman and Smith 2003).

RPI analysis.—Migration counts indicate that populations have declined in some areas of the western United States since the mid-1980s (Chapter 6). In the last decade, a marginally significant annual decline of -12.9% occurred at Chelan Ridge, Washington from 1998 to 2005, and nonsignificant annual declines of -2.3% , -4.6% , and -3.9% , respectively, occurred at Bonney Butte, Oregon, the Bridger Mountains, Montana, and Boise Ridge, Idaho (Fig. 11), from 1995 to 2005. Low sample sizes at other western watchsites precluded estimating trends there.

Overall, long-term migration counts suggest that two regional drought cycles have significantly affected goshawks in the northern Great Basin and Grand Canyon, but not in the southern Rocky Mountains, where populations appear to have remained relatively stable (Chapter 6).

Other analyses.—BBSs indicated a nonsignificant annual increase of 0.5% from 1983 to 2004, and a significant annual increase of 13.2% from 1995 to 2005. The precision of these estimates was low, due to the low number of routes on which the species was recorded, and they should be interpreted in this light. CBCs declined nonsignificantly at annual rates of -1.3% and -0.8% from 1983 to 2005 and 1995 to 2005, respectively.

HISTORICAL CONSERVATION CONCERNS

Historically, the Northern Goshawk likely was a regular but uncommon breeding bird throughout much of northeastern North America, including

portions of Pennsylvania (Bent 1937, Street 1955). With the extinction of the Passenger Pigeon (*Ectopistes migratorius*), goshawks became less common in Pennsylvania and other areas where pigeons had nested in abundance (Simpson 1909). The species was heavily persecuted in the early 20th century, primarily because it was perceived as a “vicious enemy” of poultry and upland game. The Pennsylvania Game Commission placed a bounty on the species from 1929 to 1951, and ~3,000 bounties were paid during this period (Broun 1949).

CURRENT STATUS AND CONCERNS

With the passage of protective legislation, most notably the amendment of the Migratory Bird Treaty Act of 1918 to include raptors in 1972, shooting ceased to be a major source of mortality (Chapter 1). Goshawk populations in New England and the mid-Atlantic region subsequently rebounded, and a southward expansion of breeding range also may have occurred (Temple and Temple 1976, Root and Root 1978, Andrle and Carroll 1988, Kimmel and Yahner 1994).

The Northern Goshawk is a species of least concern globally and is not of concern in the United States. In Canada, the species is not at risk, but the *laingi* subspecies found in coastal British Columbia is listed as threatened. The goshawk also is listed as threatened in Mexico (Appendix). Kirk and Hyslop (1998) ranked the species as stable in most of Canada and possibly declining in coastal British Columbia.

The widespread use of pesticides (particularly DDT) is not believed to have had a major effect on goshawk populations in North America. Timber harvest, particularly in western North America, is believed to be a threat to populations because of the removal of suitable nesting habitat (Reynolds 1989, Crocker-Bedford 1990). Secondary growth, maturity, and expansion of forests in some areas of the northeastern United States and, perhaps, in parts of the Upper Great Lakes, may have contributed to population increases and range expansions there. A recent review of the status of the Northern Goshawk in western North America concluded that too little is known about population trends, demography, and habitat relations to adequately assess the conservation status of the species and recommended intensive, long-term research to address these data gaps (Anderson et al. 2004).

Migration counts alone do not adequately estimate population trends for this species. At the more southerly latitudes sampled by six of the eastern watchsites, migration counts consist mostly of juveniles and, as such, probably monitor local productivity. In western North America, recent migration counts from the Grand Canyon (Lipan Point and Yaki Point) and goshawk productivity data from the Kaibab Plateau north of the canyon appear

to be correlated (R. Reynolds pers. comm.). In addition, satellite tracking indicates that most western juveniles are regional residents that remain within 150 km of where they were caught. All of this suggests that age-specific watchsite counts may yield particularly valuable insight about local productivity. It also suggests that additional watchsites in boreal Canada may be needed to monitor populations there.

SUMMARY

Goshawks appear to have remained stable or undergone long-term increases around the Great Lakes and in the Rocky Mountains. Long-term declines have occurred in the Great Basin and may have occurred inland in eastern North America as well (Chapter 5). The Northern Goshawk is not well monitored by BBSs or CBCs, and effective population monitoring will require a combination of migration monitoring in the north and breeding-season surveys throughout the breeding range.

RED-SHOULDERED HAWK

Scientific name:	<i>Buteo lineatus</i>
French name:	<i>Buse à épaulettes</i>
Spanish name:	<i>Cavilán ranero</i>
Body length:	38–47 cm
Wingspan:	94–107 cm
Mass:	460–930 g
Type of migrant:	Partial
Nest type:	Large stick nest in a fork of the main trunk of a tree or where a primary branch meets the trunk.
Food habits:	Preys primarily on small mammals, birds, amphibians, reptiles, and invertebrates.
Migration flight:	Flapping interspersed with gliding in a manner that resembles that of an <i>Accipiter</i> . Also soars on thermals and glides between them.
Estimated world population:	10,000–100,000

ECOLOGY AND MIGRATION

Although the species is vocal early in the breeding season, it is secretive later, and populations are not well-monitored on the breeding grounds. Nests primarily in deciduous and mixed deciduous–conifer forests. In California, often nests in oak or mixed oak–sycamore stands with dense canopies and open, park-like understories.

In most years, most individuals from the northern half of the eastern breeding range migrate south $\leq 1,500$ km. Southern populations do not appear to be migratory.

POPULATION STATUS

The Red-shouldered Hawk was once a common breeding bird in forests of eastern North America, but studies indicate that it has declined as contiguous forests have diminished (Bednarz and Dinsmore 1981, Bryant 1986, Martin 2004). Partners in Flight estimates that >90% of the global population of 10,000 to 100,000 Red-shouldered Hawks occurs within the United States and Canada (Appendix). Migration counts and BBSs indicate that populations have (1) remained relatively stable in northeastern North America since 1974, (2) increased in western North America since the early 1980s, and (3) increased around the Gulf of Mexico.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant decline in counts of Red-shouldered Hawks at Hawk Mountain, Pennsylvania, from 1934 to 1986 and a nonsignificant increase from 1971 to 1986 (Bednarz et al. 1990). In a study of six migration counts in eastern North America, Titus and Fuller (1990) reported a nonsignificant annual increase of 0.9% from 1972 to 1987. Hussell and Brown (1992) reported nonsignificant annual declines of -1.2% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported a significant increase from 1936 to 1961, but no significant trend from 1936 to 1999.

RPI analysis.—Migration counts indicate that populations of Red-shouldered Hawks generally have remained stable in northeastern North America since 1974 (Chapter 5). From 1994 to 2004, a significant annual increase of 1.3% occurred at Montclair, New Jersey. Nonsignificant annual increases of 3.5% and 0.6% were recorded at Lighthouse Point, Connecticut, and Waggoner's Gap, Pennsylvania, and nonsignificant declines of -0.3%, -0.7%, and -1.8%, respectively, were recorded at Cape May, New Jersey, Hawk Mountain, and Holiday Beach, Ontario (Fig. 12). Continued change at 1994–2004 rates would lead to a 50% increase of Red-shouldered Hawk source populations in ~53 years at Montclair. The Red-shouldered Hawk is not counted at Tadoussac, Québec, and Hawk Ridge, Minnesota, records too few birds (<20 per year) to allow us to estimate trends.

Other analyses.—BBSs in northeastern North America suggested a nonsignificant annual decline of -6.0% from 1976 to 2003. Unfortunately, confidence intervals were broad, indicating an imprecise estimate, and the trend should be interpreted in this light. CBCs in northeastern and southeastern North America indicated significant annual increases from 1974 to 2004 of 2.7% and 2.9%, respectively.

Western North America

Previous watchsite analyses.—None.

RPI analysis.—Small numbers of migrating or dispersing Red-shouldered Hawks have been recorded at Bonney Butte, Oregon, Boise Ridge, Idaho, the Goshutes, Nevada, the Grand Canyon, Arizona (Lipan Point), and at a former spring monitoring site at Jordanelle Reservoir, Utah (HawkWatch International and Idaho Bird Observatory unpubl. data), but nowhere in sufficient numbers to allow trend analyses. The only watchsite in western North America that records >20 birds per year of this species is Golden Gate Raptor Observatory in the Marin Headlands north of San Francisco Bay, California.

Other analyses.—BBSs in California indicated significant annual increases of 8.2% from 1983 to 2005 and of 6.8% from 1995 to 2005.

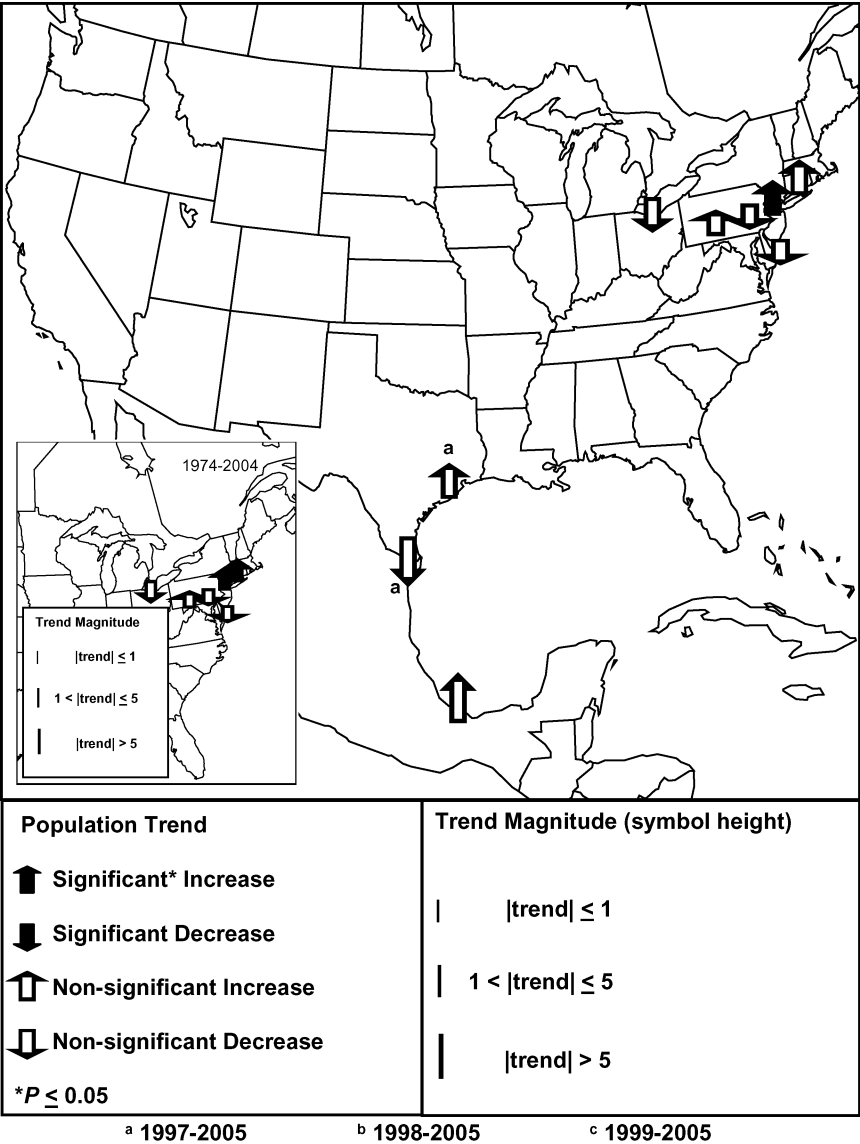


Fig. 12. Population trends for Red-shouldered Hawks (*Buteo lineatus*) at six northeastern (1994–2004) and three Gulf of Mexico raptor migration counts in North America, and long-term trends (1974–2004) for six northeastern counts (inset). Trends are expressed in percent change per year.

CBCs for California indicated significant annual increases of 2.3% from 1983 to 2005, and 2.4% from 1995 to 2005.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Small numbers of Red-shouldered Hawks were counted at watchsites in Texas and Mexico, and the resulting trend estimates were mixed in this region (Chapter 7, Fig. 12). Southern populations of this species are not highly migratory, and these trends may represent changes in the degree of local movement or changes in more northerly populations, some of which migrate $\leq 1,500$ km. Unfortunately, confidence intervals associated with the trend estimates also are wide and trend precision is low overall.

Other analyses.—BBSs recorded significant annual increases in Texas (5.1%) and Florida (4.2%) from 1995 to 2005, suggesting that migration counts were influenced more by local populations than by northern migrants.

HISTORICAL CONSERVATION CONCERNS

Red-shouldered Hawks were shot on migration in the early 20th century. The species also suffered from eggshell thinning due to pesticide use during the DDT Era of 1945–1972. Eggshell thinning was less severe than in other species, and the impact on populations is unknown (Henny et al. 1973, Wiley 1975).

CURRENT STATUS AND CONCERNS

The Red-shouldered Hawk, a species of least concern globally, is not of concern in the United States or Canada but receives special protection in Mexico (Appendix). Kirk and Hyslop (1998) rated the Red-shouldered Hawk as probably stable in Canada.

Forest fragmentation and loss, particularly in northeastern North America, may threaten some populations. Migration counts, coupled with indications of declines of populations in northeastern North American BBSs and increasing numbers on CBCs, suggest that populations of the Red-shouldered Hawk may be currently stable or declining in much of northeastern North America, with probable increases in populations near the Atlantic coast. On the other hand, increases in CBCs may indicate that the species is becoming less migratory, complicating the interpretation of count data. There is relatively high variability in counts of this species at most watchsites (annual CVs 28–133%), and this variation reduces the power of raptor migration counts to detect small changes in numbers.

Monitoring of the Red-shouldered Hawk at watchsites remains important, because BBSs have very low precision for this species. Efforts should be made to improve detection rates for this species on migration. In particular, additional spring counts around the Great Lakes may provide useful information on Canadian populations. Furthermore, studies of migration behavior may shed light on incongruities among migration count, BBS, and CBC results.

SUMMARY

Migration counts produced few significant trend estimates for this species. Although this may indicate that the monitored populations are stable, we believe that high inter-annual variability of counts and corresponding low precision of estimates may conceal trends. Considerable regional diversity is apparent in the migration trends, and this may reflect the species' short-distance migratory habits, a lower affinity to *leading lines*, or both. Efforts should be made to improve detection rates for this species on migration by adding more watchsites.

BROAD-WINGED HAWK

Scientific name:	<i>Buteo platypterus</i>
French name:	<i>Petite buse</i>
Spanish name:	<i>Busardo aliancho, Gavilán aludo</i>
Body length:	34–44 cm
Wingspan:	81–100 cm
Mass:	265–560 g
Type of migrant:	Complete
Nest type:	Small, crude stick nest in a fork of the main trunk of deciduous and coniferous trees.
Food habits:	Preys primarily on small mammals, birds, amphibians, reptiles, and invertebrates.
Migration flight:	Soaring on thermals with occasional flapping. Glides between thermals.
Estimated world population:	>1,000,000

ECOLOGY AND MIGRATION

The Broad-winged Hawk is one of the smallest and the only *complete migrant* among buteos in northeastern North America. A common breeding bird throughout deciduous forests of eastern North America, the Broad-winged Hawk is a secretive nester that is not commonly seen during breeding. The species forms large, conspicuous flocks during migration. Larger flocks or “kettles” can contain tens of thousands of birds, particularly at concentration points from south Texas through Central America. The species nests primarily in deciduous and mixed deciduous–coniferous forests in the temperate zone of North America. Nests are in large forests, often close to small forest openings and water sources.

The continental population is migratory; subspecies on islands in the Caribbean are not. Primarily a soaring migrant, the species depends on updrafts generated by thermals and mountain ridges. Because of this, they are one of the earliest migrants among North American birds of prey. This also leads to a very acute migration, with 95% of the species’ annual flight passing migration watchsites like Hawk Mountain, Pennsylvania, within two weeks.

POPULATION STATUS

The Broad-winged Hawk is a North American endemic with a population estimated to be >1,000,000 in the United States and Canada. Counts in excess of 2,000,000 individuals at Veracruz River of Raptors, Mexico,

provide the best estimate of overall population size. Migration counts and BBSs indicate that populations of Broad-winged Hawks have (1) declined generally in northeastern North America since 1974; (2) increased in western North America since the early 1980s; and (3) remained stable or increased continent-wide since 1995, as measured by raptor migration counts near the Gulf of Mexico.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a nonsignificant increase in counts of Broad-winged Hawks at Hawk Mountain, Pennsylvania, from 1934 to 1942 and a nonsignificant decline from 1971 to 1986, but no estimates were made of the rates of change. In a study of six migration counts in eastern North America, Titus and Fuller (1990) reported a nonsignificant annual decline of -2.7% from 1972 to 1987. Hussell and Brown (1992) reported that counts at Hawk Ridge, Minnesota, declined nonsignificantly from 1974 to 1989 at -3.0% annually, and those at Grimsby, Ontario (a spring count), declined significantly at -5.3% annually from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported that counts were stable from 1936 to 1999, and underwent a nonsignificant decline from 1989 to 1999. Miller et al. (2002) reported decreasing trends at Hawk Mountain and Montclair, New Jersey, from 1979 to 1998.

RPI analysis.—Migration counts indicate that the number of migrants of this species has declined in northeastern North America since 1974 (Chapter 5). From 1994 to 2004, statistically significant annual declines of -9.5% , -3.4% , and -1.1% were recorded at Montclair, New Jersey, Hawk Mountain, and Holiday Beach, Ontario, respectively, and a statistically significant annual increase of 7.8% was recorded at Waggoner's Gap, Pennsylvania. Nonsignificant annual declines of -3.6% and -1.4% were recorded at Lighthouse Point, Connecticut, and Cape May, New Jersey, respectively, and a nonsignificant increase of 1.1% was recorded at Hawk Ridge (Fig. 13). Continued change at the 1994–2004 rates would lead to a 50% increase of Broad-winged Hawk source populations in ~13 years at Waggoner's Gap, and 50% declines in 8 years at Montclair, 20 years at Hawk Mountain, and 63 years at Holiday Beach.

Other analyses.—BBSs in northeastern North America recorded a marginally significant annual increase of 2.0% from 1976 to 2003. Low detection rates make BBSs unreliable for monitoring Broad-winged Hawk populations, and the estimated trend should be interpreted in this light. The entire North American population of Broad-winged Hawks (with the exception of a few birds that winter in Florida, coastal Texas, and the Mississippi River delta) migrates to Central and South America; hence, there are no useful CBC data for this species.

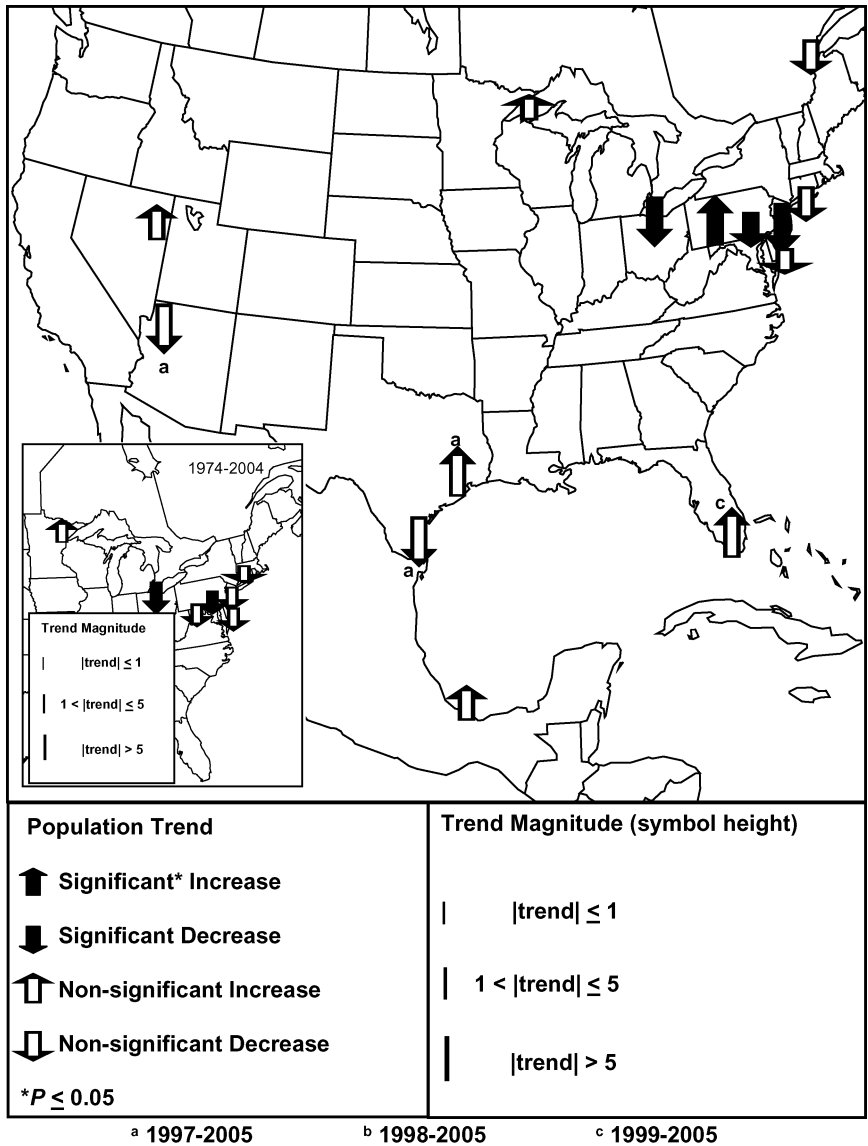


Fig. 13. Population trends for Broad-winged Hawks (*Buteo platypterus*) at eight northeastern (1994–2004), two western (1995–2005), and four Gulf of Mexico (1995–2005) raptor migration counts in North America, and long-term (1974–2004) trends at seven northeastern sites (inset). Trends are expressed in percent change per year.

Western North America

Previous watchsite analyses.—Smith et al. (2001) reported annual increases of 3% to 16% in counts at the Goshutes, Nevada, from 1983 to 1999; the Manzanos, New Mexico, from 1985 to 1999; the Sandias, New Mexico (a spring watchsite), from 1985 to 2001; the Bridger Mountains, from 1992 to 1999; and the Grand Canyon, Arizona (Lipan Point), from 1991 to 1999. Possible increases occurred at the Wellsvilles, Utah, in the late 1970s and from 1987 to 1999; at Bonney Butte, Oregon, from 1995 to 1999; and at Chelan Ridge, Washington, from 1997 to 1999. Hoffman and Smith (2003) reported significant increases at the Goshutes from 1983 to 2001 and at the Bridger Mountains and the Grand Canyon (Lipan Point) from 1992 to 2001. No significant trends were recorded at the Wellsvilles from 1987 to 2001 or Manzanos from 1983 to 2001. Smith et al. (2001) and Hoffman and Smith (2003) suggested that increasing trends in western North America reflect a westward shift in the breeding distribution of the species.

RPI analysis.—Migration counts support the hypothesis that populations of the Broad-winged Hawk have increased in portions of western North America since the mid-1980s (Chapter 6). From 1995 to 2005, a nonsignificant annual increase of 1.1% occurred at the Goshutes, and a nonsignificant decline of -6.5% occurred at the Grand Canyon (Lipan Point and Yaki Point combined, 1997 to 2005) (Fig. 13).

Other analyses.—BBSs showed nonsignificant annual declines of -4.5% from 1983 to 2004 and -9.2% from 1995 to 2005. BBS detection rates for this species are low, yielding small samples, and these trend estimates should be interpreted in that light.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Nonsignificant annual increases occurred in counts at most watchsites in the Gulf region over the last decade (Chapter 7). A nonsignificant annual decline of -2.4%, recorded at Corpus Christi, Texas, from 1997 to 2005, may reflect the influence of recent hurricanes Katrina and Rita in 2005 (Fig. 13).

HISTORICAL CONSERVATION CONCERNS

Broad-winged Hawks were shot along migration corridors in the early 20th century. Band-recovery data suggest that such persecution continued to affect the species on its wintering grounds into the 1980s (Robbins 1986). Although many raptors declined during the DDT Era of 1945 to 1972, there is little evidence that Broad-winged Hawks were significantly affected by pesticides.

CURRENT STATUS AND CONCERNS

Collisions with vehicles are a primary cause of death for birds wintering in the Florida Keys (Tabb 1973). Increased rates of forest fragmentation and loss, particularly in the boreal forest and on Caribbean Islands, may threaten populations there. Forest loss on migration routes and in wintering areas also may pose a threat. Migrants also are vulnerable to direct exploitation during migration in Central America and northern South America.

The Broad-winged Hawk is a species of least concern globally and is not listed as a species of concern in either the United States or Canada (Appendix). Kirk and Hyslop (1998) considered the species to be declining or stable in Canada, possibly as the result of timber harvests.

Migration monitoring is particularly important for this species because it is not well monitored by BBSs and is not present in most of North America during CBCs. Additional migration counts may further clarify patterns of population change in this species.

SUMMARY

Judging from the nearly complete count of the continental population at Veracruz, the Broad-winged Hawk appears to be stable or increasing in North America. The ubiquity of decreasing long-term trend estimates in northeastern North America east of the central Great Lakes, however, suggests either (1) that regional declines are underway in eastern North America, perhaps as a consequence of logging in the boreal forest there, and that this is not happening elsewhere in the species' range; (2) that populations are stable in eastern Canada, but that changes in migration geography are causing declines in established counts in eastern North America; or (3) that both factors are operating.

RED-TAILED HAWK

Scientific name:	<i>Buteo jamaicensis</i>
French name:	<i>Buse à queue rousse</i>
Spanish name:	<i>Gavilán colirroja, Aguililla colirroja, Aguililla parda</i>
Body length:	Female: 50–65 cm Male: 45–56 cm
Wingspan:	110–141 cm
Mass:	Female: 900–1,460 g Male: 690–1,300 g
Type of migrant:	Partial
Nest type:	Large stick nest in a fork of the main trunk or crown of a large, and often super-canopy, tree. Also on utility-line poles and transmission towers, Saguaro cactus, cliff ledges, and ledges of large buildings.
Food habits:	Preys primarily on small to medium-sized mammals, birds, amphibians, reptiles, and invertebrates, as well as on carrion, including road kills.
Migration flight:	Soars on broad, flat wings; glides with wings partially flexed.
Estimated world population:	>1,000,000

ECOLOGY AND MIGRATION

This large, adaptable buteo occurs in open areas interspersed with woodlots and forest patches. Primarily a sit-and-wait predator, it often perches conspicuously near fields and along roadways. The species is one of North America's most familiar and frequently observed raptors. In addition to individual variability, there are distinctive regional variants; 14 subspecies are recognized in North America.

The species nests primarily in woodlots, forest patches, and tree rows, often in agricultural and suburban areas. Large expanses of dense forest and treeless areas generally are avoided.

In most years, most individuals from the breeding range north of the United States–Canada border migrate south. Many individuals from more southerly breeding areas also migrate south, and are replaced for the winter by migrants from the north. *Leap-frog migration* occurs. Recaptures of banded birds and satellite tracking indicate that young birds from southern California and northern Baja California disperse significant distances to the northeast (i.e., into Nevada, Montana, and Wyoming) in late summer before returning south in subsequent years to reside in their natal ranges (P. Bloom and HawkWatch International unpubl. data). Satellite tracking of adults captured in the West suggests that adults show high fidelity to migration routes, breeding ranges, and winter ranges (HawkWatch International unpubl. data).

POPULATION STATUS

Approximately 90% of the global population of >1,000,000 birds is thought to occur in the United States and Canada (Appendix). Migration counts, BBSs, and CBCs reflect the complicated pattern of migration of Red-tailed Hawks that makes population trends difficult to discern. Nevertheless, they suggest that Red-tailed Hawks have (1) increased in northeastern North America year-round, and generally declined or remained stable in migration counts, from 1974 to 2004; (2) increased in the intermountain region of western North America since the early 1980s; (3) increased in the southern and declined in the northern Rocky Mountains since 1995; (4) remained stable in the Pacific Northwest since 1995; and (5) remained stable around the Gulf of Mexico.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant decline in numbers at Hawk Mountain, Pennsylvania, from 1934 to 1986, and a significant decline from 1973 to 1986. In a study of six migration counts in eastern North America, Titus and Fuller (1990) reported a nonsignificant annual decline of -0.04% from 1972 to 1987. Hussell and Brown (1992) reported a nonsignificant annual decline of -4.8% at Hawk Ridge, Minnesota, from 1974 to 1989, and a -2.1% annual decline at Grimsby, Ontario (a spring watchsite), from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported significant increases from 1936 to 1999 and from 1951 to 1999. Overall, previous estimates of population trends indicate that populations passing western Great Lakes watchsites increased, whereas those east of the Great Lakes declined or remained stable from the 1970s to the late 1980s.

RPI analysis.—Trends in migration counts varied across the region from 1974 to 2004 (Chapter 5). Since 1994, a significant annual increase of 3.1% occurred at Lighthouse Point, Connecticut, whereas significant annual declines of -9.8% and -1.9% occurred at Cape May, New Jersey, and Hawk Mountain, respectively. Nonsignificant annual increases of 3.1% and 1.9% occurred at Waggoner's Gap, Pennsylvania, and Hawk Ridge, and nonsignificant declines of -0.4% , -1.5% , and -3.1% were recorded at Tadoussac, Québec, Montclair, New Jersey, and Holiday Beach, Ontario, respectively (Fig. 14). Continued change at the 1994–2004 rates would lead to a 50% increase in ~22 years at Lighthouse Point, and 50% declines in 7 years at Cape May and 39 years at Hawk Mountain.

Other analyses.—BBSs indicated significant annual increases in northeastern North America from 1976 to 2003 (2.8%), and a nonsignificant increase in the northeastern United States (1.8%) from 1994

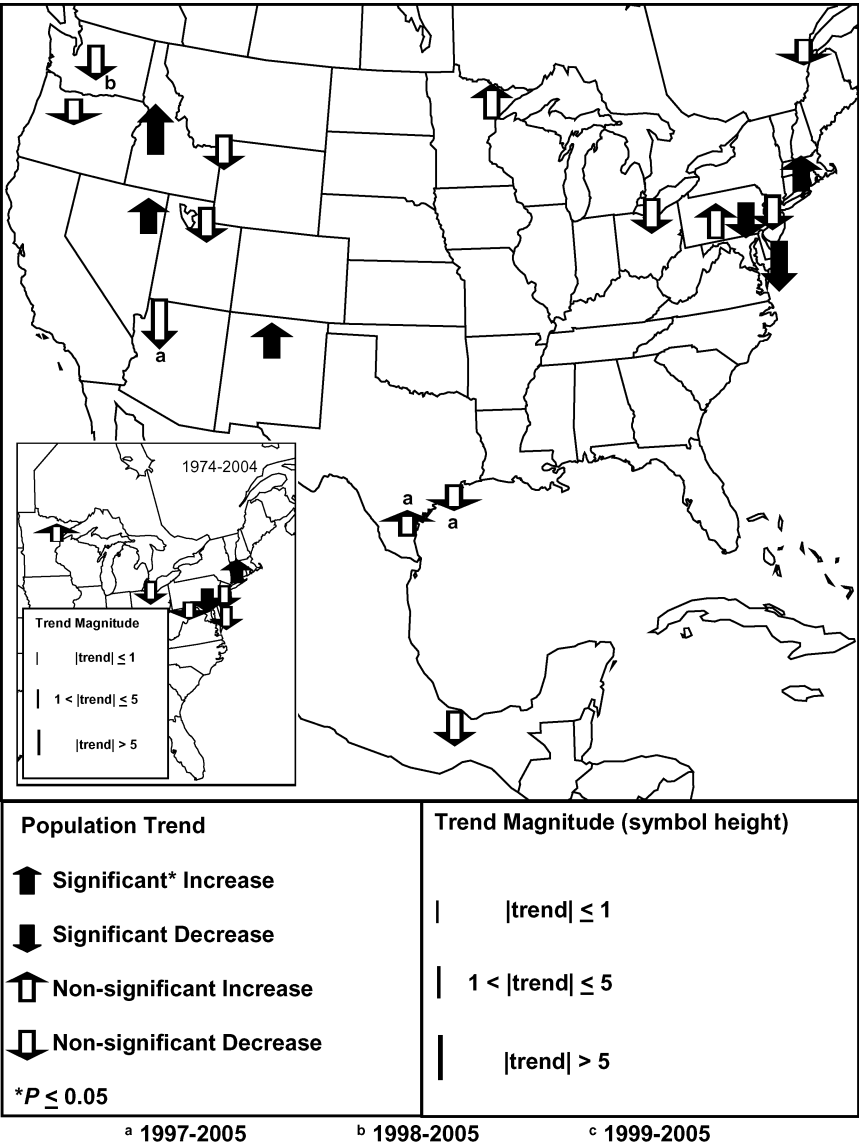


Fig. 14. Population trends for Red-tailed Hawks (*Buteo jamaicensis*) at eight northeastern (1994–2004), eight western (1995–2005), and three Gulf of Mexico (1995–2005) raptor migration counts in North America, and long-term trends (1974–2004) for seven northeastern counts (inset). Trends are expressed in percent change per year.

2004. CBCs in the northeastern and southeastern United States indicated significant annual increases of 2.7% and 3.3%, respectively, from 1974 to 2004.

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported significant increases at the Goshutes, Nevada, from 1983 to 2001; the Wellsvilles, Utah, from 1987 to 2001; the Manzanos, New Mexico, from 1985 to 2001; and the Sandias, New Mexico (a spring watchsite), from 1985 to 2001. No significant trends were recorded at the Grand Canyon, Arizona (Lipan Point), from 1991 to 2001, or the Bridger Mountains, Montana, from 1992 to 2001.

RPI analysis.—Migration counts indicate that populations mostly increased or remained stable in the western United States since the mid-1980s (Chapter 6). From 1995 to 2005, significant annual increases of 2.1%, 2.0%, and 7.3% were recorded at the Manzanos, the Goshutes, and Boise Ridge, Idaho, respectively. From 1995 to 2005, a significant annual decline of -10.7% occurred at the Grand Canyon (Lipan Point), whereas nonsignificant annual declines of -5.0%, -1.7%, -2.2%, -4.0%, and -6.2%, respectively, were recorded at Chelan Ridge, Washington (1998 to 2005), Bonney Butte, Oregon, the Bridger Mountains (1995 to 2005), the Wellsvilles (1995 to 2004), and the Grand Canyon (Lipan Point and Yaki Point combined, 1997 to 2005) (Fig. 14).

Other analyses.—BBSs indicated a significant annual increase of 1.5% from 1983 to 2005. CBCs indicated a significant annual increase of 1.3% from 1983 to 2005 and no net change (0.0%) from 1995 to 2005.

In sum, a long-term, regional increase appears to be underway in the northern intermountain region. Recent stabilization of previously increasing numbers in the Goshutes, and declines farther south at the Grand Canyon (Lipan Point and Yaki Point), may be related to possible shifts in migration geography due to the regional drought. Manzanos counts also indicate a long-term, regional increase for populations in the southern Rockies. Satellite tracking of several individuals outfitted during migration in the Manzanos showed summer ranges stretching from northern New Mexico into southwestern Montana and southern Wyoming, and demonstrated route connections among the three Rocky Mountain sites (HawkWatch International unpubl. data). Incongruities between trends at the Manzanos and the two more northerly sites may indicate that populations in the southern Rocky Mountains are more productive than those in the northern Rockies. Lastly, the short-term data sets available from the Pacific Northwest suggest that populations from northern Oregon through west-central British Columbia are relatively stable.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Watchsites in this region recorded mixed trends for the Red-tailed Hawk (Chapter 7), suggesting a relatively stable regional population (Fig. 14). Given migration geography of the species, it is likely that only relatively local movements are monitored at watchsites in coastal Texas and Veracruz.

Other analyses.—BBSs from 1995 to 2005 increased nonsignificantly in Texas (1.7%), reinforcing the idea of stable populations in the region.

HISTORICAL CONSERVATION CONCERNS

Changes in forest cover in northeastern North America and fire suppression and attendant changes in forest structure in western North America may have favored Red-tailed Hawks and led to population increases and range expansion in the 20th century (Brown 1964, Bock and Lepthein 1976, Houston and Bechard 1983).

CURRENT STATUS AND CONCERNS

Migration counts suggest that populations are stable or decreasing slightly in eastern North America, but BBSs and CBCs suggest population increases. This incongruity suggests that either some populations became less migratory in the last 30 years, or migratory populations declined in some areas whereas breeding populations of sedentary birds increased. Trends in all indexes in western North America indicate that populations increased there since the 1980s, but then stabilized or started to decline in the last decade, possibly because of a regional drought (Hoffman and Smith 2003). Migration counts of this species have limited monitoring value around the Gulf of Mexico, but they appear to have been stable over the most recent decade.

The Red-tailed Hawk is a species of least concern globally and is not of concern in the United States or Canada (Appendix). Kirk and Hyslop (1998) considered the species “not at risk” in most of Canada, with possible declines in the mixed-wood plains.

SUMMARY

The Red-tailed Hawk appears to be secure throughout most of its range in North America. Migration counts have declined in eastern North America since 1995, but coincidental increases in BBS and CBC counts suggest that these migration trends may be the result of changes in migration geography or behavior. Elsewhere in North America, population monitoring generally indicates increasing or stable populations of this common raptor.

ROUGH-LEGGED HAWK

Scientific name:	<i>Buteo lagopus</i>
French name:	<i>Buse pattue</i>
Spanish name:	<i>Ratonero calzado</i>
Body length:	46–59 cm
Wingspan:	110–143 cm
Mass:	715–1,400 g
Type of migrant:	Complete
Nest type:	Bulky stick nest on a cliff ledge, tree, or human-built structure.
Food habits:	Preys primarily on voles and lemmings in the Arctic during the breeding season and on voles and other small rodents in open shrub-steppe, grassland, and other open habitats on the wintering grounds.
Migration flight:	Soaring and gliding on broad, flat wings held in a dihedral.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

The Rough-legged Hawk is a relatively large buteo associated primarily with open habitats, including tundra in the breeding range and fields and meadows in the winter range. The species breeds throughout the Arctic and sub-Arctic in North America, Asia, and Europe. North American Rough-legged Hawks typically breed in the tundra and taiga habitats of northern and western Alaska and northern Canada. Rough-legged Hawks nest primarily in tundra associated with forested river valleys, on flat tundra, or on cliffs and steep banks of rivers. In areas of flat tundra, most nests are on steep-sided outcroppings or cliffs. The species also nests on steep hillsides, trees, and human-made structures.

In most years, most individuals migrate south as far as the northern and, sometimes, central United States, but areas of concentration vary among years.

POPULATION STATUS

Partners in Flight estimates that populations in the United States and Canada comprise approximately one-half of the global population of >1,000,000 (Appendix). Migration counts and CBCs indicate that Rough-legged Hawks have (1) declined over the last 30 years in northeastern North America and (2) declined slightly since the mid-1980s in western North America.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a significant long-term increase at Hawk Mountain, Pennsylvania, from 1934 to 1986 and a nonsignificant decline from 1971 to 1986. In a study of six migration counts in eastern North America, Titus and Fuller (1990) reported a nonsignificant annual increase of 1.1% per year from 1972 to 1987. Hussell and Brown (1992) reported a significant annual decline of -9.5% at Hawk Ridge, Minnesota, from 1974 to 1989, and a nonsignificant decline of -3.0% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported a significant increase from 1936 to 1999, and a nonsignificant increase from 1951 to 1999.

In sum, previous estimates of population trend for Rough-legged Hawks suggest that populations may have increased in the first half of the 20th century and subsequently stabilized or declined.

RPI analysis.—Migration counts indicate that Rough-legged Hawk populations have declined over the last 30 years (Chapter 5). The irruptive nature of this species' migration into areas covered by these monitoring programs suggests that migration trends should be interpreted with caution, as they may result from decreased migratory activity independent of changes in population size. From 1994 to 2004, nonsignificant annual declines of -1.2%, -3.0%, and -1.7% occurred at Tadoussac, Québec, Holiday Beach, Ontario, and Hawk Ridge, respectively (Fig. 15). Counts at other watchsites averaged <20 birds per year during this period (Chapter 5).

Other analyses.—CBCs indicated declines during the past 30 years, with a nonsignificant annual decline of -0.3% in northeastern North America and a significant annual decline of -5.7% in southeastern North America from 1974 to 2004.

These results suggest that the migration geography of Rough-legged Hawks has changed over time, with fewer individuals migrating into the southeastern United States, and relatively constant numbers wintering in the northeastern part of the continent. Analyses of spring raptor migration counts around the Great Lakes may provide additional useful information.

Western North America

Previous watchsite analyses.—None.

RPI analysis.—Migration counts showed no statistically significant trends in the western United States since the mid-1980s, but did reveal slight declining trajectories (Chapter 6). In general, the value of western counts for this species is limited because monitoring seasons are limited by snowfall and cover only the first half of the species' migration period,

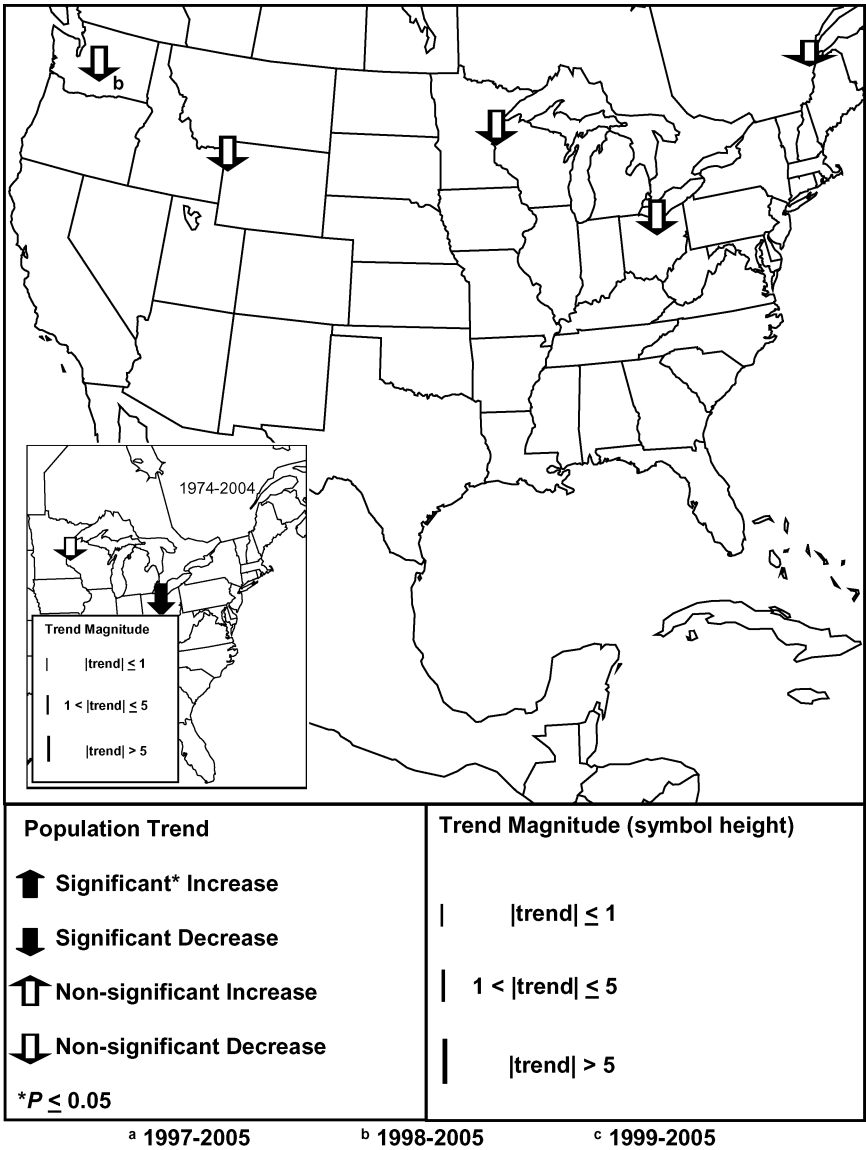


Fig. 15. Population trends for Rough-legged Hawks (*Buteo lagopus*) at three northeastern (1994–2004) and two western (1995–2005) raptor migration counts in North America, and long-term trends (1974–2004) for two northeastern counts (inset). Trends are expressed in percent change per year.

which typically extends well into November. Migration counts suggested nonsignificant declines of -2.2% and -1.1% at Chelan Ridge, Washington (1998 to 2005), and the Bridger Mountains, Montana (1992 to 2005) (Fig. 15). Counts at other watchsites averaged <20 birds per year during this period (Chapter 6).

Other analyses.—CBCs indicated that winter Rough-legged Hawk populations declined nonsignificantly at rates of -0.8% and -0.7% annually from 1983 to 2005 and 1995 to 2005, respectively.

HISTORICAL CONSERVATION CONCERNS

Over-wintering Rough-legged Hawks were once perceived by farmers and ranchers to be a threat to livestock, and consequently were shot in the early part of the 20th century. They also were shot on migration. Although the species' eggs were found to contain DDT in 1971 (Cade et al. 1971), the degree to which pesticide use affected populations is unknown.

CURRENT STATUS AND CONCERNS

Pesticides, persecution, and collisions with vehicles may threaten the species on its wintering grounds (Keran 1981, Olson 2002). The species winters in agricultural areas, and evidence suggests that land-use change may displace wintering hawks and their prey (Garrison and Bloom 1993, Brouse 1999).

The Rough-legged Hawk is a species of least concern globally and is not of concern in the United States or Canada. Kirk and Hyslop (1998) considered the species stable in Canada but noted that it is difficult to monitor because of broad fluctuations in numbers and locations of breeding adults. Newly instituted winter surveys of raptors (see www.hmana.org) may offer a monitoring tool for over-wintering individuals.

SUMMARY

Because of its northern distribution, the species is not well monitored by any of the surveys reviewed in this report. Available trends from migration counts, BBSs, and CBCs suggest a long-term decline in wintering populations in the United States. A combination of winter surveys and analysis of raptor migration counts around the Great Lakes and in Canada is needed to clarify its conservation status.

SWAINSON'S HAWK

Scientific name:	<i>Buteo swainsoni</i>
French name:	<i>Buse de Swainson</i>
Spanish name:	<i>Cavilán longostero, Aguililla de swainson, Aguilucho longostero</i>
Body length:	Female: 51–56 cm Male: 48–51 cm
Wingspan:	120–137 cm
Mass:	Female: 937–1,367 g Male: 693–936 g
Type of migrant:	Complete
Nest type:	Bulky, disorganized stick nest in a solitary tree, bush, small grove, line of trees along a water course, or utility pole or transmission tower.
Food habits:	Preys primarily on small mammals, birds, and reptiles while breeding. Feeds almost exclusively on insects—primarily orthopterans—and other invertebrates while over-wintering.
Migration flight:	Gliding and soaring with wings flexed in a dihedral, often in large groups, or “kettles.”
Estimated world population:	>1,000,000

ECOLOGY AND MIGRATION

This large buteo is associated with open grasslands, shrublands, and woodlands. It typically nests in scattered trees within open landscapes. Almost all individuals vacate the breeding range in North America to over-winter in South America, primarily Argentina, traveling distances of $\leq 12,000$ km between their breeding and winter ranges. Recent evidence suggests central California breeders may only move to the west coast of Mexico.

POPULATION STATUS

The Swainson's Hawk is a North American endemic with a population estimated to be $>1,000,000$ (Appendix). Migration counts and BBSs indicate that populations of the Swainson's Hawk increased in western North America since the mid-1980s, significantly so at least since 1995.

Eastern North America

Swainson's Hawks are seen only rarely at watchsites in eastern North America, and, consequently, no population trends were calculated for this region.

Annual counts of this species average 0.4 at Lighthouse Point, Connecticut; 2.5 at Cape May, New Jersey; 0.7 at Montclair, New Jersey; 0.2 at Hawk Mountain, Pennsylvania; 0.4 at Waggoner's Gap, Pennsylvania; and 0.4 at Holiday Beach, Ontario. The median count is 0 at all sites except Cape May, where it is 2.0.

Western North America

Historical analyses.—Hoffman and Smith (2003) reported significant increases at the Wellsvilles, Utah, from 1987 to 2001 and the Manzanos, New Mexico, from 1983 to 2001; and marginally significant increases at the Goshutes, Nevada, from 1983 to 2001 and the Sandias, New Mexico (a spring watchsite), from 1985 to 2001. They reported increases until 1996–1997, followed by declines at the Grand Canyon, Arizona (Lipan Point) (1991 to 2001), and a marginally significant decline at the Bridger Mountains, Montana, from 1992 to 2001.

RPI analysis.—Our analyses confirmed long-term significant annual increases in the West (Chapter 6). A significant annual increase of 5.4% occurred at the Goshutes from 1995 to 2005, and a nonsignificant increase of 7.4% occurred at the Grand Canyon (Lipan Point and Yaki Point combined) from 1997 to 2005. Nonsignificant annual declines of -9.0%, -2.3%, -3.5%, respectively, occurred at the Wellsvilles (1995 to 2004), Boise Ridge, Idaho (1995 to 2005), and the Manzanos (1995 to 2005) (Fig. 16). The remaining watchsites in this region counted too few individuals to allow trend estimation.

Other analyses.—BBSs indicated a nonsignificant annual decline of -0.9% from 1983 to 2005 and a nonsignificant increase of 0.2% from 1995 to 2005. CBCs are not available for this species because it is a complete migrant, and most individuals leave North America during winter.

In sum, data for Swainson's Hawks indicate that increases generally occurred within both the Rocky Mountain and Intermountain Flyways between the mid- to late 1980s and mid- to late 1990s, with possibly drought-related downturns after that, except at the Grand Canyon. Unlike the trends for many other species, the strongest long-term increases were in the intermountain region and at the Grand Canyon, which suggests that the regional drought did not deter the species from migrating through the Great Basin. Indexes in the Rocky Mountains were comparatively stable from 2000 to 2005, but overall, the species appears to have increased in the interior West during the past 15 years. Estimated annual rates of increase of 5% in the Intermountain Flyway, if sustained, would result in a doubling of the current population in ~14 years.

Part of the increase may be attributable to a population rebound from pesticide kills of the early 1990s, in which $\geq 30,000$ individuals are believed to have been killed within a two- to three-year period on the over-wintering

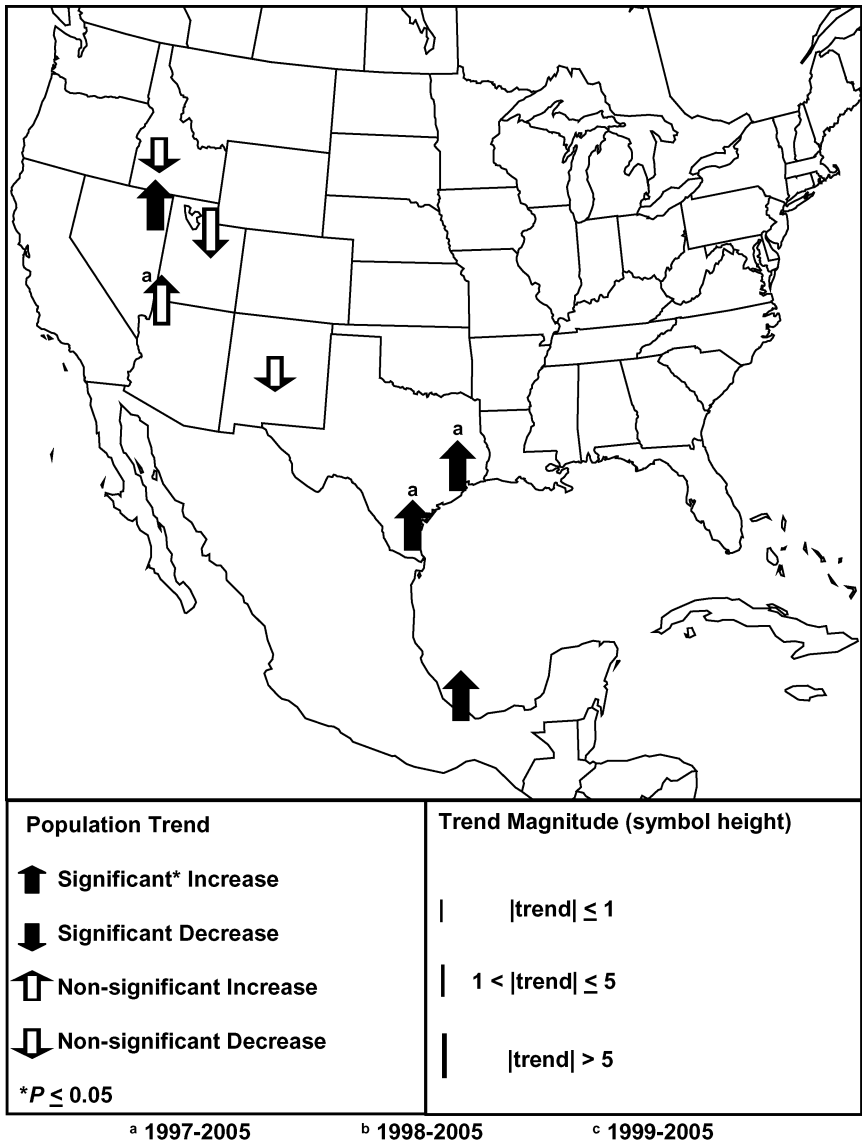


Fig. 16. Population trends (1995–2005) for Swainson’s Hawks (*Buteo swainsoni*) at five western and three Gulf Coast raptor migration counts in North America. Trends are expressed in percent change per year.

grounds in Argentina (Woodbridge et al. 1995). Because the pesticide had been used since the mid-1980s, many birds may have been killed before the problem came to light. Alternatively, there are some indications that the species already was increasing in the 1990s.

Gulf of Mexico

RPI analysis.—Significant annual increases occurred at watchsites in this region in the last decade (Chapter 7, Fig. 16). Migration counts at these three watchsites monitor nearly the entire North American population (Chapters 2 and 7), and the increases recorded there may reflect recovery from earlier population declines (see Bloom 1980, Littlefield et al. 1984, Harlow and Bloom 1989, Woodbridge et al. 1995). Counts of this species at the Florida Keys watchsite were too small to analyze.

HISTORICAL CONSERVATION CONCERNS

Although common in western North America at the beginning of the 20th century, Swainson's Hawks declined as native grasslands were converted to agriculture or developed (Bloom 1980, Littlefield et al. 1984, Harlow and Bloom 1989, Woodbridge et al. 1995). Direct persecution in the form of shooting was a significant source of mortality in the first half of the 20th century, but has since declined in North America (Houston and Schmutz 1995a). Swainson's Hawks wintering in Argentina were killed in large numbers by organophosphate pesticides in the 1990s (Woodbridge et al. 1995) but do not appear to have been harmed by pesticide use in North America during the DDT Era.

CURRENT STATUS AND CONCERNS

The species is susceptible to electrocution because of its habit of perching on utility poles. Direct persecution in the form of shooting may still be a threat during passage through Mesoamerica, given that the species roosts in large groups in agricultural habitats. Declines in reproductive output have been associated with declines in prey populations (Bechard 1983, Houston and Schmutz 1995b) and the lack of suitable nesting habitat because of land-use change (Olendorff and Stoddart 1974). Loss or conversion of grassland habitats to row-crop agriculture in both North and South America may be the largest threat to Swainson's Hawk populations, although the degree of habitat conversion has not been quantified (Ferguson-Lees and Christie 2001). On the other hand, some populations in the intermountain West and California have adapted well to hayfield agriculture, taking advantage of associated rodent populations. Additional research is needed to understand factors limiting Swainson's Hawk populations.

The Swainson's Hawk is a species of least concern globally, is a species of concern in the United States, is not at risk in Canada, and receives special protection in Mexico (Appendix). California Swainson's Hawks have reportedly declined by 90% since the mid-20th century (Ferguson-Lees and Christie 2001). Kirk and Hyslop (1998) considered the Swainson's Hawk to be declining or stable in Canada, with its status unknown in British Columbia.

SUMMARY

Overall, the data suggest substantial increases in populations of Swainson's Hawks in the last two decades across much of North America. Monitoring of this species will be greatly enhanced with additional watch-sites in the Great Plains, the foothills of the eastern Rocky Mountains, and southern California.

GOLDEN EAGLE

Scientific name:	<i>Aquila chrysaetos</i>
French name:	<i>Aigle royal</i>
Spanish name:	<i>Águila real</i>
Body length:	70–84 cm
Wingspan:	185–220 cm
Mass:	Female: 3,400–6,100 g Male: 2,500–4,200 g
Type of migrant:	Partial
Nest type:	Large stick nest usually on a cliff, dominant tree, or manmade structure.
Food habits:	Opportunistic feeder. In western North America, primarily rabbits, hares, and squirrels, 500–2,000 g. In eastern United States, waterfowl and other birds.
Migration flight:	Soaring with wings in a slight dihedral, and flapping with slow, powerful wingbeats.
Estimated world population:	100,000–1,000,000

ECOLOGY AND MIGRATION

Found in the Northern Hemisphere in both the New and Old World, the species is a “booted eagle,” with legs feathered to the toes. Golden Eagles breed in open shrubland, grassland, farmland, tundra, and broken forest, and avoid heavily forested areas. Because of the distribution of such habitats, the species is much more common in western than in eastern North America.

Northern breeding populations usually are migratory and move farther from their breeding grounds than do southern populations. Most nesting south of 55°N in western North America are permanent residents. Satellite tracking in the intermountain West indicates that individuals wander extensively during their first few years of life (HawkWatch International unpubl. data).

POPULATION STATUS

Partners in Flight estimates that Golden Eagles in the United States and Canada comprise approximately one-half of the global population of 100,000 to 1,000,000 (Appendix). A recent aerial survey estimated the Golden Eagle population of the continental northwestern United States at ~27,400 birds (Good et al. 2004). Migration counts and CBCs indicate that populations of Golden Eagles have (1) increased in eastern North America since 1974; and (2) declined in western North America since the early 1980s, with accelerating declines since 1998.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant decline at Hawk Mountain, Pennsylvania, from 1934 to 1942, a significant decline from 1946 to 1972, a significant increase from 1973 to 1986, and a significant, long-term decline from 1934 to 1986. This paralleled a decline seen in eastern Bald Eagles and was thought to be related to exposure to organochlorines. In a study of six raptor migration counts in eastern North America, Titus and Fuller (1990) reported a nonsignificant annual increase of 3.0% from 1972 to 1987. Hussell and Brown (1992) reported a nonsignificant annual decline of -1.3% in counts at Hawk Ridge, Minnesota, from 1974 to 1989, and a significant annual increase of 8.1% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990.

RPI analysis.—Migration counts indicate that populations have increased steadily in northeastern North America since 1974 (Chapter 5). More recently, significant annual increases of 2.1%, 3.9%, and 5.7% occurred at Hawk Mountain, Waggoner's Gap, Pennsylvania, and Hawk Ridge, respectively, from 1994 to 2004. Nonsignificant annual declines of -3.8% and -0.2% occurred at Tadoussac, Québec, and Holiday Beach, Ontario, respectively, during the same period (Fig. 17). We do not report trends at Lighthouse Point, Connecticut, Cape May, New Jersey, and Montclair, New Jersey, because of low numbers there.

Continued change at the 1994–2004 rates would result in a 50% increase of Golden Eagle source populations in ~33 years at Hawk Mountain, 18 years at Waggoner's Gap, and 12 years at Hawk Ridge.

Other analyses.—In northeastern North America, CBCs indicated a statistically significant annual increase of 4.1% from 1974 to 2004 and a nonsignificant annual increase of 6.9% from 1994 to 2004. In southeastern North America, CBCs recorded a significant annual increase of 2.1% from 1974 to 2004, and a nonsignificant annual increase of 5.2% from 1994 to 2004. These trends suggest steady increases in numbers of Golden Eagles wintering in eastern North America over the last 30 years. CBCs may have limited value for estimating trends in the species (see Kochert et al. 2002), and these estimates should be viewed in that light.

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported a significant increase in immature Golden Eagles at the Goshutes, Nevada, from 1983 to 2001; and significant declines in immatures at the Wellsvilles, Utah, from 1987 to 2001 and at the Grand Canyon, Arizona (Lipan Point), from 1992 to 2001. No significant trends were recorded at the Bridger Mountains, Montana, from 1992 to 2001; the Manzanos, New Mexico, from 1983 to 2001; or the Sandias, New Mexico (a spring watchsite), from 1985 to 2001. Population trajectories at all sites except Bridger Mountains were

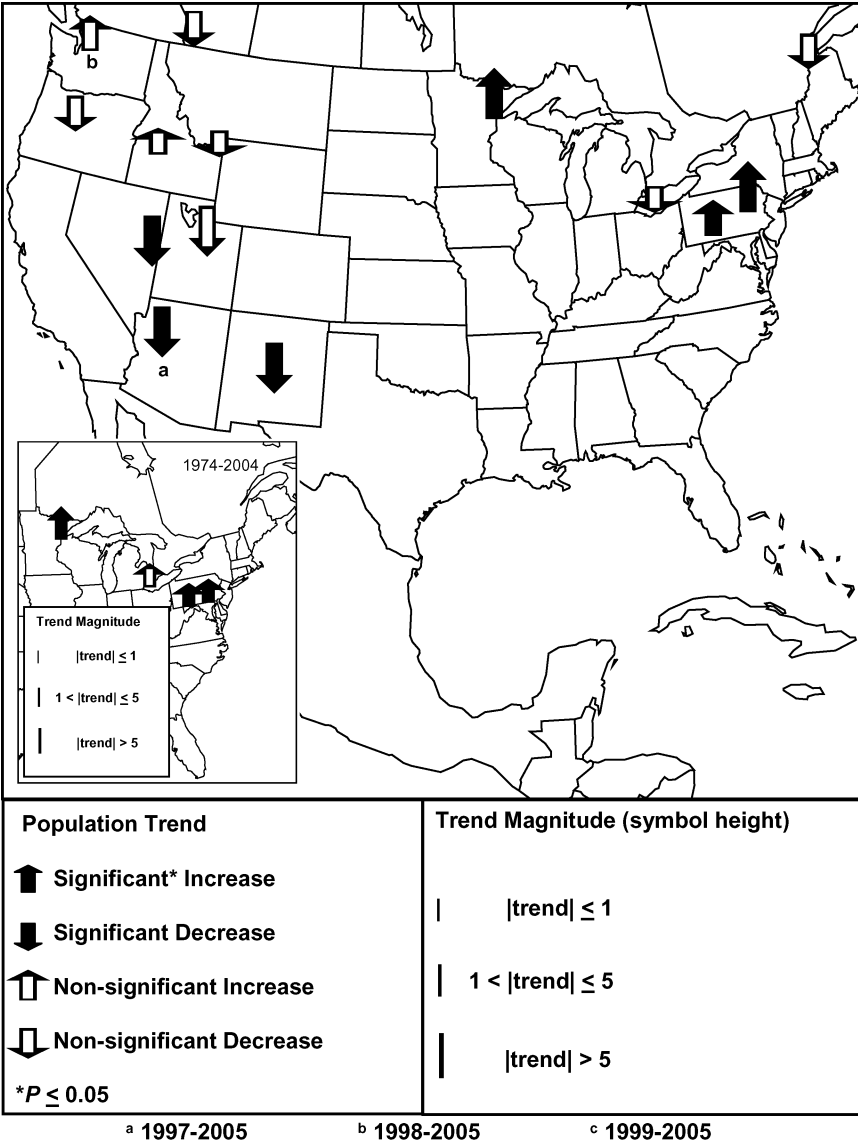


Fig. 17. Population trends for Golden Eagles (*Aquila chrysaetos*) at five north-eastern (1994–2004) and nine western (1995–2005) raptor migration counts in North America, and long-term trends (1974–2004) at four northeastern raptor migration counts (inset). Trends are expressed in percent change per year.

quadratic, with declines in the early 1990s followed by increases in the mid-1990s (Hoffman and Smith 2003).

RPI analysis.—Migration counts indicated that populations have declined in much of the western United States since the mid-1980s (Chapter 6). From 1995 to 2005, the magnitude of significant annual declines increased to -8.6% and -5.3% , respectively, in the Goshutes and Manzanos; and a marginally significant decline of -6.0% occurred in the Wellsvilles from 1995 to 2004. A significant annual decline of -13.6% occurred at the Grand Canyon (Lipan Point and Yaki Point) from 1997 to 2005, a marginally significant decline of -2.2% occurred at Mount Lorette, Alberta, from 1995 to 2005, and a nonsignificant annual decline of -3.8% occurred at Bonney Butte from 1995 to 2005. Nonsignificant annual increases of 4.5% and 1.2% were recorded at Chelan Ridge, Washington, from 1998 to 2005 and at Boise Ridge, Idaho, from 1995 to 2005 (Fig. 17).

Other analyses.—CBCs indicated a nonsignificant annual decline of -0.4% from 1983 to 2005, and a significant decline of -3.4% from 1995 to 2005. The species is not monitored by BBSs in North America, making migration counts particularly important (e.g., Kochert and Steenhof 2002).

In sum, trends in migration counts and CBCs indicate that Golden Eagle populations are decreasing in our areas of coverage in western North America. The longest-active migration watchsites tracked regional drought patterns fairly well, with declining counts in both the mid-1980s and late 1990s through early 2000s coinciding with droughts in the interior West (see Chapter 6). Other factors possibly contributing to the observed patterns are responses to cyclical prey fluctuations or loss of shrub habitat to fire (Kochert et al. 1999).

HISTORICAL CONSERVATION CONCERNS

Direct persecution, including shooting, trapping, and nest destruction, was the greatest threat historically. Unlike the Bald Eagle, which underwent population declines in the mid-20th century because of exposure to DDT and other organochlorine pesticides, Golden Eagles in the western United States and Canada were not severely affected. This may be due to the species' diet in the region, which consists largely of upland mammals and includes few birds or fish. In contrast, eastern Golden Eagles, which feed heavily on waterfowl and wading birds in both summer and winter, were negatively affected by the widespread use of organochlorine pesticides, resulting in declining trends during the DDT Era (Bednarz et al. 1990).

CURRENT STATUS AND CONCERNS

Although protected in the United States under the Bald and Golden Eagle Protection Act, the species still suffers from direct persecution, as well as from power-line electrocutions, collisions with human structures including wind turbines, and poisoning at contaminated carcasses. Land-use changes, including urbanization, agricultural development, mining and energy development, and reforestation, along with increased fires in the American West, may reduce the availability of suitable nesting and foraging habitat. Human activities account for ~70% of all direct mortality of Golden Eagles continent-wide, with accidental trauma (27%), electrocution (25%), gunshot (15%), and poisoning (6%) causing most of these deaths (Franson et al. 1995).

The Golden Eagle is a species of least concern globally, is not of concern in the United States or Canada, and is threatened in Mexico (Appendix). It is considered a species of regional concern in the west-central United States, including Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming (Appendix). Kirk and Hyslop (1998) rated it as stable or possibly declining in Canada but determined that populations there were not at risk. Kochert and Steenhof (2002) considered the species to be stable in Canada.

SUMMARY

Migration count data indicate that Golden Eagles have increased over the last 30 years in parts of northeastern North America (e.g., northern Québec). These increases have continued into the most recent decade. Data for western North America suggest long-term increases for this species, tempered by more recent declines presumably associated with regional drought, changes in prey abundance, changes in land cover, or a combination of these factors. Monitoring can be enhanced by the use of annual aerial surveys (Good et al. 2004).

AMERICAN KESTREL

Scientific name:	<i>Falco sparverius</i>
French name:	<i>Crécerelle d'Amérique</i>
Spanish name:	<i>Cernícalo Americano</i>
Body length:	Female: 23–31 cm Male: 22–27 cm
Wingspan:	Female: 57–61 cm Male: 51–56 cm
Mass:	Female: 86–165 g Male: 80–143 g
Type of migrant:	Partial
Nest type:	Cavity (secondary) in a tree, cliff, nestbox, or abandoned building.
Food habits:	Insects, small rodents, and, less frequently, small birds.
Migration flight:	Flapping interspersed with gliding; some soaring on migration; quick, erratic wingbeats; buoyant flight.
Estimated world population:	>1,000,000

ECOLOGY AND MIGRATION

North America's smallest falcon is commonly seen hunting over or perched near open fields in rural and suburban areas. Kestrels are common in farmlands and low-density suburban areas, as well as in open and semi-open natural habitats ranging from deserts to woodlands. They sometimes nest in urban areas. The species is an obligate secondary cavity-nester that does not excavate its own nest cavity.

Timing of migration coincides with that of potential prey, including green darners (*Anax junius*) (Nicoletti 1996). American Kestrels breeding in northern portions of their range are more migratory than those breeding farther south, and birds in northern areas migrate farther than those in southern areas. Many southern populations are sedentary, and this combination of factors produces a *leap-frog migration* pattern. Most kestrels breeding in North America over-winter in the United States and Mexico. A small proportion, however, migrate as far south as northern South America. Males winter farther north than females, and in more wooded habitats, possibly because females generally arrive on the winter range before males (Smallwood 1987), or because females competitively exclude males from optimal habitats (Ardia and Bildstein 1997).

Larger numbers are recorded at coastal migration counts in eastern North America, either because they themselves are pushed there by prevailing winds or because wind-drifted prey is more abundant there. As a result, annual population indexes at Cape May in coastal New Jersey are 10–20 times higher than those at Hawk Mountain in the central Appalachian

Mountains of Pennsylvania. In western North America, migrating kestrels are at least as common inland as along the coast.

POPULATION STATUS

Partners in Flight estimates that approximately three-fourths of the global population of >1,000,000 breeds in the United States and Canada (Appendix). Migration counts, BBSs, and CBCs indicate that populations of the American Kestrel have (1) declined in much of northeastern North America since 1974; (2) increased or remained stable around the western Great Lakes; (3) declined in western North America since the early 1980s, with an acceleration of declines coinciding with the onset of a regional drought in the late 1990s; and (3) declined around the eastern part of the Gulf of Mexico, but increased or remained stable elsewhere in the region.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant increase at Hawk Mountain, Pennsylvania, from 1934 to 1942. A significant increase in counts of kestrels occurred from 1942 to 1972, and a significant decline was reported for the period 1973 to 1986, but no estimates were made of the rates of change. In a study of six migration counts in eastern North America, Titus and Fuller (1990) reported a non-significant annual increase of 0.4% from 1972 to 1987. Hussell and Brown (1992) reported that counts at Hawk Ridge, Minnesota, were stable from 1974 to 1989, whereas those at Grimsby, Ontario (a spring watchsite), increased nonsignificantly at 1.0% annually from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported a significant increase from 1936 to 1999, but no significant trend from 1951 to 1999. Generally, previous estimates of population trend for kestrels indicated that populations passing western Great Lakes watchsites increased prior to 1990, whereas those east of the Great Lakes declined since the mid-1970s.

RPI analysis.—Migration counts indicate that populations of the American Kestrel have declined substantially in northeastern North America since the mid-1970s (Chapter 5). From 1994 to 2004, significant annual declines of -9.2%, -4.5%, -3.3%, -4.8%, and -4.1% occurred at Lighthouse Point, Connecticut, Cape May, New Jersey, Montclair, New Jersey, Hawk Mountain, and Holiday Beach, Ontario, respectively. At the same time, Tadoussac, Québec, and Hawk Ridge recorded nonsignificant annual declines of -1.8% and -0.7%, respectively, and Waggoner's Gap, Pennsylvania, recorded a nonsignificant increase of 0.9% (Fig.18).

Population indexes for American Kestrels at these watchsites (Chapter 5) suggest that declines for this species have accelerated since 2000 at Lighthouse Point, Hawk Mountain, and Waggoner's Gap, and remained

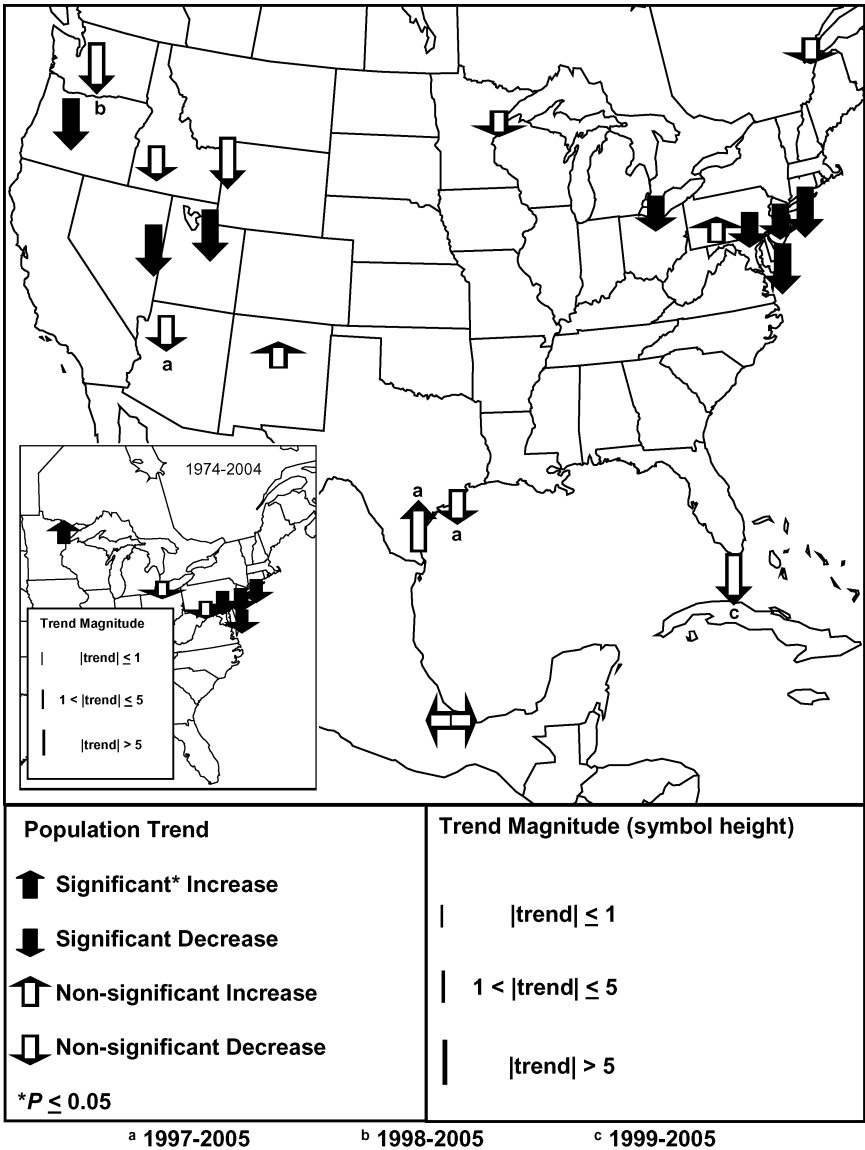


Fig. 18. Population trends for American Kestrels (*Falco sparverius*) at eight northeastern (1994–2004), eight western (1995–2005), and four Gulf of Mexico (1995–2005) raptor migration counts in North America, and long-term trends (1974–2004) for seven northeastern counts (inset). Trends are expressed in percent change per year. A bi-directional arrow indicates that the estimated trend is 0.0% per year.

relatively constant for the past 30 years at Cape May and Montclair. Continued population change at 1994–2004 rates would lead to a 50% decline of American Kestrel source populations in ~8 years at Lighthouse Point, 15 years at Cape May, 21 years at Montclair, 14 years at Hawk Mountain, and 17 years at Holiday Beach.

Other analyses.—BBSs indicated a significant annual decline of –1.4% from 1976 to 2003 in northeastern North America and a nonsignificant decline of –1.7% from 1994 to 2004 in the northeastern United States. CBCs for northeastern North America showed a significant annual decline of –4.6% from 1976 to 2003. CBCs in southeastern North America declined a significant –1.4% annually from 1974 to 2004.

In sum, migration counts, BBSs, and CBCs indicate that kestrel populations are declining in eastern North America, but that the rate of decline decreases west of the Appalachian Mountains. Results from Hawk Ridge and Holiday Beach suggest that breeding populations of the American Kestrel north of the Great Lakes were increasing or stable until recently, when they, too, began to decline.

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported a significant increase at the Goshutes, Nevada, from 1983 to 2001 and a significant decline at the Wellsvilles, Utah, from 1987 to 2001. No significant trends were recorded at the Grand Canyon, Arizona (Lipan Point), from 1991 to 2001; Bridger Mountains, Montana, from 1992 to 2001; the Manzanos, New Mexico, from 1985 to 2001; or the Sandias, New Mexico (a spring watchsite), from 1985 to 2001.

RPI analysis.—Migration counts indicate that populations of American Kestrels have declined in western North America since the early 1980s, particularly during the last decade (Chapter 6). From 1995 to 2005, significant annual declines of –7.9%, –5.9%, –4.1%, and –8.6% were recorded at Bonney Butte, Oregon, the Goshutes, the Grand Canyon (Lipan Point), and the Wellsvilles (1995 to 2004), respectively. Nonsignificant declines of –11.7%, –9.0%, –1.9%, and –4.0%, respectively, were recorded at Chelan Ridge, Washington, from 1998 to 2005; the Bridger Mountains from 1995 to 2005; Boise Ridge, Idaho, from 1995 to 2005; and the Grand Canyon (Lipan Point and Yaki Point), from 1997 to 2005. The notable exception in the interior West was the Manzanos, where a nonsignificant trend (0.1%) was recorded and no distinct pattern was evident from 1995 to 2005 (Fig. 18).

Other analyses.—BBSs detected significant annual declines of –1.7% from 1983 to 2005 and –2.7% from 1995 to 2005. CBCs indicate significant declines of –1.5% annually from 1983 to 2005 and –2.3% annually from 1995 to 2005.

In sum, kestrel counts declined during the past decade at all watchsites except the Manzano Mountains, suggesting that populations in the central and southern Rocky Mountains may be more secure than those in other regions of western North America. Whether the widespread declines are due to recent regional drought or to a combination of other factors is unknown, but further investigation is warranted. Average rates of change currently range from roughly -4 to -12% per year where declines are occurring. A 5% annual rate of decline would result in a 50% reduction of the population in ~ 14 years, and a 10% rate of decline would reduce the population 50% in ~ 7 years, and would drop the population to $<15\%$ of its original size in ~ 20 years.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Watchsites in this region recorded mixed trends for the American Kestrel, most notably a high-magnitude, marginally significant decline at the Florida Keys (Chapter 7, Fig. 18). The trend in the Florida Keys coincides with significant declines reported for this species in northeastern North America, and the lack of significance may be due to the shorter time series analyzed (Chapter 7).

Other analyses.—BBSs recorded a nonsignificant annual decline of -0.2% in the southeastern United States from 1995 to 2005. See Eastern North America section for other BBS and CBC trends.

HISTORICAL CONSERVATION CONCERNS

Historically, shooting, trapping, window strikes, and road kills were significant threats. The species also was affected by DDT, although the extent to which this occurred is unknown. Deforestation in the 19th and early 20th centuries probably benefited kestrels.

CURRENT STATUS AND CONCERNS

The American Kestrel is a species of least concern globally and is not listed as a species of concern in the United States (Appendix). Several Bird Conservation Regions in the southeastern United States list it as a species of concern (Appendix). Kirk and Hyslop (1998) ranked the American Kestrel as stable or increasing in Canada, with possible declines in the East.

Declines in migration counts may be attributable to several factors. Kestrels continued to be exposed to high levels of DDT well into the late 1970s, even after the pesticide was banned in the United States in 1972. Laboratory experiments show that DDT interferes with successful reproduction in the American Kestrel (Porter and Wiemeyer 1969, Lincer

1975). Populations of the Cooper's Hawk increased throughout northeastern North America from 1974 to 2004, and studies at Hawk Mountain Sanctuary and elsewhere indicate that the species preys upon American Kestrels (Farmer et al. 2006). Much of the region has been re-forested or developed, or is in more intensive agriculture, and grassland habitats have decreased. Since the late-1990s, *West Nile virus* has also affected numerous bird populations throughout the East. Although the impact of the virus on kestrel populations is unknown, researchers working with Hawk Mountain Sanctuary in 2004 found that 95% of the adults in a declining population using nest boxes in southeastern Pennsylvania in the vicinity of the sanctuary had been exposed to the virus.

SUMMARY

Substantial declines in populations of American Kestrels are apparent across much of North America, and there is strong cause for conservation concern. A gradient from east to west is apparent in trend estimates for northeastern North America, with stronger declines occurring at coastal watchsites. This pattern may indicate that factors exerting negative influences on populations are strongest in source populations that migrate along the coast. Recent declines in western North America appear to coincide with a regional drought. The widespread, significant declines of the American Kestrel in North America clearly warrant further investigation to further clarify the causes.

MERLIN

Scientific name:	<i>Falco columbarius</i>
French name:	<i>Faucon émerillon</i>
Spanish name:	<i>Esmerejón</i>
Body length:	24–30 cm
Wingspan:	53–68 cm
Mass:	Female: 180–310 g Male: 145–200 g
Type of migrant:	Partial
Nest type:	Primarily old stick-nests of other birds; rarely in cavities, on cliffs, or on the ground.
Food habits:	Preys primarily on small to medium-sized passerines <50 g and insects, at least on migration.
Migration flight:	Powerful, moderately deep-flapping with a rapid cadence; rarely soars.
Estimated world population:	>1,000,000

ECOLOGY AND MIGRATION

This small falcon is a fast, powerful flier that appears pigeon-like in flight. Three subspecies breed in North America: the Black Merlin (*F. c. suckleyi*) of the Pacific Northwest, the Taiga Merlin (*F. c. columbarius*) of the boreal forest, and the Prairie Merlin (*F. c. richardsonii*) of the northern plains. Females in all subspecies are 20–30% larger than males. Merlins most often are seen in rapid, direct, flapping flight, and are seldom seen soaring or gliding.

Preferred breeding habitat consists of open or semi-open areas near forest openings, woodlots, and small groves, often near bodies of water. Urban populations breed in conifers in residential areas, parks, and cemeteries. Winter habitat includes open forests and grasslands, and Merlins also frequently hunt on tidal flats and near grain elevators and other features that attract passerines.

The Black Merlin is largely sedentary, with seasonal, relatively short-distance migrations limited to individuals breeding in the northern and inland portions of the subspecies' range; some move into California in winter. The Taiga Merlin is largely migratory, and some individuals make short-distance movements and winter throughout much of the western United States, along the eastern seaboard south of Massachusetts, and in the Gulf states. Others make long-distance migratory movements, ending up throughout Mexico, the Caribbean, Central America, and as far south as northern Peru in South America. The Prairie Merlin winters throughout much of the western United States and northern Mexico, although some individuals remain in

and around urban centers throughout the breeding range. Recently, more Merlins (probably of the Taiga subspecies) have been wintering in the eastern mid-Atlantic states, which suggests migratory short-stopping, particularly on the part of urban breeders. Like Peregrine Falcons, Merlins often cross large bodies of water and may be seen along coastlines, not so much to avoid water, but rather because they are prime hunting areas during migration. In both eastern and western North America, coastal watchsites report many more Merlins than inland watchsites.

POPULATION STATUS

Partners in Flight estimates that approximately one-half of the global population of >1,000,000 breeds in the United States and Canada (Appendix). Migration counts, BBSs, and CBCs indicate that Merlins have (1) increased throughout eastern North America since 1974; (2) increased in western North America since the early 1980s; and (3) declined in counts in the Florida Keys, but increased or remained stable elsewhere in the Gulf of Mexico.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported nonsignificant declines at Hawk Mountain, Pennsylvania, from 1934 to 1942, 1946 to 1972, and 1973 to 1986. In a study of counts at six raptor migration watchsites in eastern North America, Titus and Fuller (1990) reported a significant annual increase of 14.2% from 1972 to 1987. Similarly, Hussell and Brown (1992) reported that counts at Hawk Ridge, Minnesota, increased a significant 14.3% annually from 1974 to 1989, whereas counts at Grimsby, Ontario (a spring watchsite), increased 9.4% annually from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported significant increases in counts of Merlins from 1936 to 1999 and from 1951 to 1999, but noted a nonsignificant decline from 1991 to 2001.

Overall, previous estimates of population trends indicate that populations passing northern watchsites in eastern North America have increased steadily from the early 1970s to late 1980s.

RPI analysis.—Migration counts indicate that populations of Merlins have increased in northeastern North America since 1974 (Chapter 5). More recent trends indicate that population growth of this species is slowing in northeastern North America (Fig. 19). From 1994 to 2004, a significant annual increase of 10.2% occurred at Waggoner's Gap, Pennsylvania, whereas nonsignificant increases of 3.0% and 4.6% were recorded at Lighthouse Point, Connecticut, and Montclair Hawkwatch, New Jersey, respectively, along with nonsignificant declines of -0.8%, -2.1%, -0.4%, -1.2%, and -1.9% at Tadoussac, Québec, Cape May,

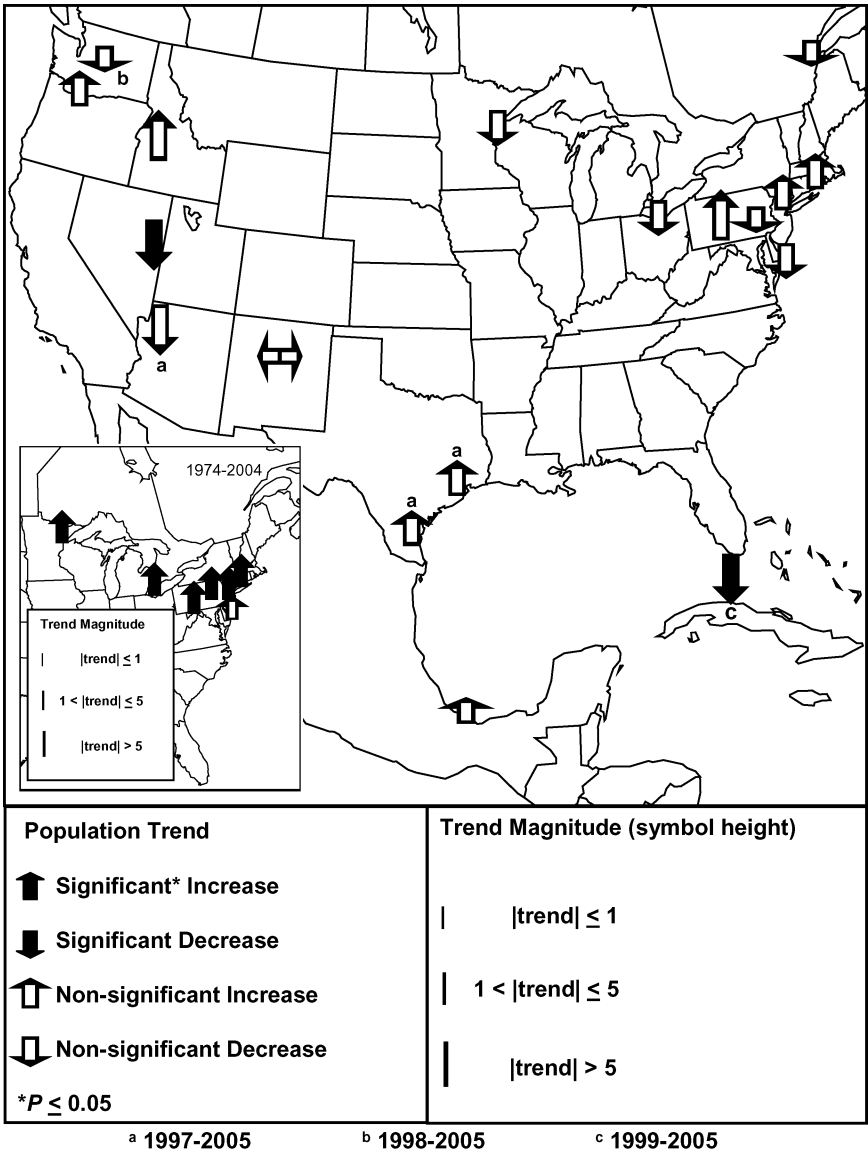


Fig. 19. Population trends for Merlins (*Falco columbarius*) at eight northeastern (1994–2004), six western (1995–2005), and four Gulf of Mexico (1995–2005) raptor migration counts in North America, and long-term trends (1974–2004) for seven northeastern counts (inset). Trends are expressed in percent change per year. Lateral, bi-directional arrows indicate that the estimated trend is 0.0% per year.

New Jersey, Hawk Mountain, Holiday Beach, Ontario, and Hawk Ridge, respectively. Continued population change at the 1994–2004 rates would lead to a 50% increase in Merlin source populations in ~7 years at Waggoner's Gap.

Other analyses.—BBSs indicated a significant annual increase of 13.6% in Merlin populations in northeastern North America from 1976 to 2003, but the precision of this estimate was low, and it should be considered in that light. CBCs in northeastern and southeastern North America indicated significant annual increases of 3.0% and 2.0%, respectively, from 1974 to 2004.

In sum, the data suggest long-term increases by this species in northeastern North America changing to recent stable or declining trends.

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported significant increases at the Goshutes, Nevada, from 1983 to 2001; the Wellsvilles, Utah, from 1987 to 2001; the Manzanos, New Mexico, from 1983 to 2001; and the Sandias, New Mexico (a spring watchsite), from 1985 to 2001. No significant trends were recorded at the Grand Canyon, Arizona (Lipan Point), from 1991 to 2001, or at the Bridger Mountains, Montana, from 1992 to 2001.

RPI analysis.—Migration counts indicated that Merlin populations have increased in the western United States since the mid-1980s (Chapter 6). A significant annual decline of –11.6% occurred in the Goshutes from 1998 to 2005. A marginally significant annual increase of 6.3% occurred at Boise Ridge, Idaho, from 1995 to 2005, and a nonsignificant increase of 2.1% occurred at Bonney Butte, Oregon, from 1995 to 2005. Nonsignificant declines of –0.4% and –6.8%, respectively, occurred at Chelan Ridge, Washington, from 1998 to 2005, and the Grand Canyon (Lipan Point and Yaki Point, combined) from 1997 to 2005 (Fig. 19). At other sites, counts were too low to calculate trends (Chapter 6).

Other analyses.—BBSs indicated a nonsignificant annual increase of 2.5% from 1983 to 2005, and a nonsignificant decline of –2.3% from 1995 to 2005. CBCs indicated a significant annual increase of 2.9% from 1983 to 2005, and a nonsignificant annual increase of 2.0% from 1995 to 2005.

In sum, the significant downturn in counts at the Goshutes, but not at Boise Ridge, coupled with the fact that Merlins do not breed in the Great Basin, suggests that the recent regional drought shifted migration routes away from the Great Basin (Chapter 6). More generally, migration counts and other population indexes suggest that western populations increased substantially between the early 1980s and mid-1990s and have since stabilized or continued to increase.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Migration counts detected a significant annual decline of -13.4% at the Florida Keys, Florida, from 1999 to 2005 (Fig. 19). The remaining watchsites in the region recorded nonsignificant increases (Chapter 7). Confidence intervals for trend estimates at all four watchsites were fairly wide, indicating limited precision of the trend estimates.

Other analyses.—BBSs and CBCs indicated long-term and recent increases in most regions from which Gulf Coast watchsites receive migrants (see above).

HISTORICAL CONSERVATION CONCERNS

Merlins were shot along with other hawks at well-known migration spots in the early 20th century. Merlin eggshells thinned during the DDT Era of 1945–1972, and reproductive success declined (Fox 1971). Although the widespread use of DDT was banned in Canada and the United States in 1971 and 1972, respectively, as recently as 1988, eggshells of Merlins breeding in Canada were found to contain sufficient concentrations of DDE to reduce reproductive success (Noble and Elliot 1988).

CURRENT STATUS AND CONCERNS

Studies indicate that shooting still contributed to mortality in parts of Canada as late as the mid-1980s (James et al. 1989). Counts of migrating Merlins at traditional watchsites began to increase in the late 1970s and have continued to increase in most areas since. Monitoring of migrants at watchsites is particularly important for this species because of the low precision of BBSs on the breeding grounds.

The Merlin is a species of least concern globally and is not of concern in the United States or Canada (Appendix). Kirk and Hyslop (1998) rated the Merlin “not at risk” in Canada, because populations were increasing and the species was beginning to nest and feed in urban areas.

SUMMARY

Data collected from raptor migration counts indicate that Merlin populations increased dramatically in eastern and western North America in the last 20–30 years; however, increases have slowed at most sites in the last decade. BBS and CBC trends generally agree with this pattern, although the species is not well monitored by BBSs. The significant decline in raptor migration counts in the Florida Keys since 1999 most likely indicates a decrease in the distance migrated by individuals from the Northeast. Even so, additional study is needed to determine whether this decline represents migratory short-stopping or a decline in the source population.

PEREGRINE FALCON

Scientific name:	<i>Falco peregrinus</i>
French name:	<i>Faucon pèlerin</i>
Spanish name:	<i>Halcón peregrino</i>
Body length:	Female: 45–58 cm Male: 36–49 cm
Wingspan:	Female: 102–117 cm Male: 94–100 cm
Mass:	Female: 800–1,600 g Male: 450–1,060 g
Type of migrant:	Partial
Nest type:	Small “scrape” or depression on a cliff ledge, crease, or cavity; also within large tree cavities, on the ground, and on ledges of urban buildings; sometimes in old stick-nests of other birds.
Food habits:	Preys primarily on birds of between 50 and 500 g, including pigeons and doves, passerines, waterfowl and shorebirds, and gallinaceous birds, as well as smaller raptors. Also takes mammals (primarily bats), amphibians, fish, and insects.
Migration flight:	Powerful, deep flapping flight; less frequent gliding and soaring.
Estimated world population:	10,000–100,000

ECOLOGY AND MIGRATION

Three subspecies occur in North America: one subspecies (*F. p. anatum*) of North America south of the tundra, one subspecies (*F. p. tundrius*) of the Arctic tundra of North America and Greenland, and one subspecies (*F. p. pealei*) of the coastal Pacific Northwest. Females are 15–20% larger and 40–60% heavier than males in all subspecies.

The species is sparsely distributed in all but a few locations and, as such, is vulnerable to local extirpation (see Rabinowitz et al. 1986).

Migration begins across a broad front, but clearly defined routes become evident as the species concentrates along *leading* and *diversion lines*. Peregrine Falcons often cross large bodies of water and are seen along coastlines, not so much to avoid water, but rather because coastlines are prime hunting areas. The species regularly crosses the Gulf of Mexico and Caribbean Sea. In eastern North America, coastal watchsites report more migrants than inland watchsites, with the largest known migratory concentration of the species in North America occurring each autumn in the Florida Keys (Lott 2006).

Peregrines exhibit a *leap-frog migration* pattern in which breeders from northern areas over-winter south of the more southerly breeders.

Some individuals migrate distances of 13,000 km or more each way. Northern breeders in Greenland and Canada, over-winter as far south as central Argentina and Chile.

POPULATION STATUS

Partners in Flight estimates that approximately one-fourth of the global population of 10,000 to 100,000 breeds in the United States and Canada (Appendix). Population estimates summarized in White et al. (2002) placed the continental population at 52,000–62,000 individuals at the end of the 20th century, which seems realistic given that the pre-DDT-Era population of North America has been estimated at 10,600–12,000 breeding pairs (Cade 2003). Migration counts and CBCs indicate that populations have (1) increased in eastern North America since 1974, and apparently began to stabilize around 1995; (2) increased in western North America since the early 1980s; and (3) increased in areas of North America monitored by migration counts in the Gulf of Mexico.

Eastern North America

Previous watchsite analyses.—Bednarz et al. (1990) reported a non-significant increase at Hawk Mountain, Pennsylvania, from 1934 to 1942. They reported a nonsignificant increasing trend from 1973 to 1986 and a significant decline from 1942 to 1972 (Bednarz et al. 1990). In a study of counts at six migration counts in eastern North America, Titus and Fuller (1990) reported a significant annual increase of 15.3% from 1972 to 1987. Hussell and Brown (1992) reported a significant annual increase of 6.1% at Hawk Ridge, Minnesota, from 1974 to 1989 and a significant annual increase of 27.8% at Grimsby, Ontario (a spring watchsite), from 1975 to 1990. At Cedar Grove, Wisconsin, Mueller et al. (2001) reported significant increases from 1936 to 1999 and from 1951 to 1999.

Overall, previous estimates of population trends for falcons indicate that populations passing northern watchsites increased steadily between the early 1970s and late 1990s.

RPI analysis.—Migration counts indicate that populations of Peregrine Falcons have increased in northeastern North America since 1974, coincidental with the start of reintroduction efforts (Chapter 5). From 1994 to 2004, significant annual increases of 7.2% and 7.8% occurred at Tadoussac, Québec, and Hawk Ridge, respectively. Nonsignificant annual increases of 3.2%, 7.1%, 1.6%, and 1.0% occurred at Lighthouse Point, Connecticut, Montclair, New Jersey, Hawk Mountain, and Waggoner's Gap, Pennsylvania, respectively, and nonsignificant declines of -1.3% and -2.7% recorded at Cape May, New Jersey, and Holiday Beach, Ontario (Fig. 20), indicate that the rates of increase are slowing or reversing. Continued

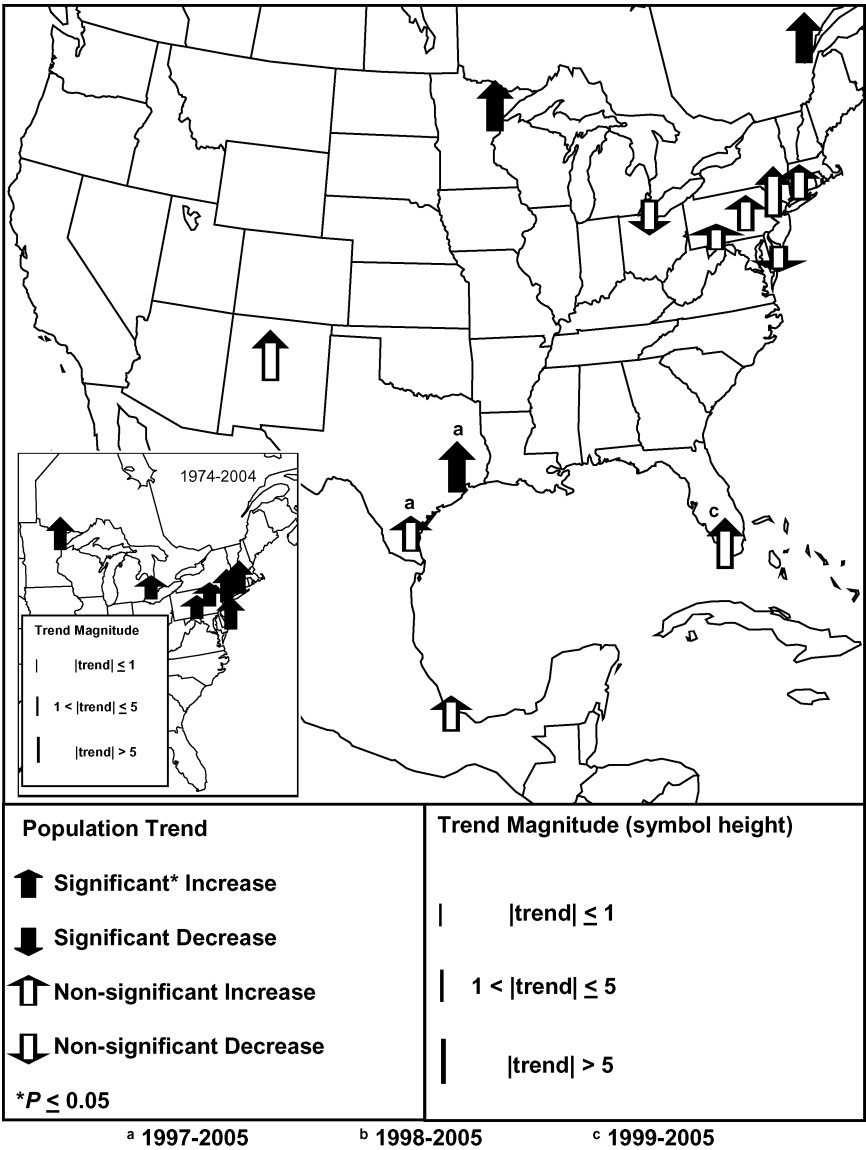


Fig. 20. Population trends for Peregrine Falcons (*Falco peregrinus*) at eight northeastern (1994–2004), one western (1995–2005), and four Gulf of Mexico (1995–2005) raptor migration counts in North America, and long-term trends (1974–2004) for seven northeastern counts (inset). Trends are expressed in percent change per year.

population change at 1994–2004 rates would lead to a 50% increase of Peregrine Falcon source populations in ~10 years at Tadoussac, and 22 years at Lighthouse Point.

Other analyses.—CBCs indicated significant annual increases in northeastern North America of 5.5% from 1976 to 2003 and 9.5% from 1994 to 2004. Significant annual increases of 16.4% and 9.6% occurred in CBCs for southeastern North America from 1976 to 2003 and from 1994 to 2004, respectively. BBSs do not include Peregrine Falcons, and no population trends are available from this source.

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported significant increases at the Goshutes, Nevada, from 1983 to 2001; the Wellsvilles, Utah, between the late 1970s and late 1980s and from 1987 to 2001; the Manzanos, New Mexico, from 1985 to 2001; and in the Sandias, New Mexico (a spring watchsite), from 1985 to 2001. In contrast, no significant trends were reported at the Grand Canyon, Arizona (Lipan Point), from 1991 to 2001 or at the Bridger Mountains, Montana, from 1992 to 2001.

RPI analysis.—Migration counts and CBCs suggest that populations have increased in parts of the western United States since the mid-1980s (Chapter 6). We were able to analyze migration counts only from the Manzanos because counts at all other western sites were too low (<20 per year). A nonsignificant annual increase of 5.0% occurred at the Manzanos from 1995 to 2005 (Fig. 20).

Other analyses.—CBCs for western North America indicated significant annual increases of 4.2% from both 1983 to 2005 and 1995 to 2005.

Gulf of Mexico

Previous watchsite analyses.—None.

RPI analysis.—Watchsites in the Gulf region recorded increases in counts of this species over the last decade (Chapter 7, Fig. 20).

HISTORICAL CONSERVATION CONCERNS

Historically, Peregrine Falcons were subject to direct persecution, including shooting, trapping, egg collecting, and capture for use in falconry. During the DDT Era of 1945–1972, their numbers declined significantly, and the species was *extirpated* in the eastern United States by 1965, by which time reproductive failure was well documented throughout the continent (Hickey 1969). Research identified eggshell thinning as the cause of reproductive failure, and DDT residues (primarily the contaminant, DDE) as the cause of eggshell thinning.

The species was listed as endangered in the United States in 1970. Regional recovery plans for the species were established under the Endangered Species Act, all of which sought to reduce the environmental contamination caused by pesticides, and most of which also called for extensive captive propagation and release programs. The release and reintroduction of Peregrine Falcons propagated in captivity began in 1974 (see Cade et al. 1988). By 1998, almost 7,000 individuals had been released, and breeding pairs had reclaimed more than 700 territories vacated during the DDT Era. The combined effects of strict legal protection, restoration efforts, and the ban on the widespread use of DDT enabled Peregrine Falcon numbers to begin increasing in the late 1970s. Populations continued to increase in the 1980s and 1990s, and by the late 1990s most populations had almost fully recovered.

CURRENT STATUS AND CONCERNS

Migration counts at Cape May have declined a nonsignificant -9.0% annually since 1998, suggesting that the source population is stabilized or declining. Monitoring migrants at watchsites is particularly important for this species, because it is not monitored by BBSs on the breeding grounds and recent delisting may limit special breeding surveys.

The Peregrine Falcon is a species of least concern globally, but it is a species of concern in the United States and a species of special concern in Canada, and it receives special protection in Mexico (Appendix). Most of the U.S. Fish and Wildlife Service regions and Bird Conservation Regions still consider it a species of concern (Appendix). Kirk and Hyslop (1998) ranked the species as stable or increasing in Canada but noted that those in coastal British Columbia had not returned to historical levels as of 1998.

SUMMARY

In the last 30 years, Peregrine Falcons largely have recovered from earlier population crashes. Dramatic increases in migration counts have occurred throughout northeastern North America, accompanied by more moderate increases in western North America. Migration counts along the Gulf of Mexico reinforce the conclusion that North American populations of the species are increasing. Recent trends in northeastern North America further suggest that populations are stabilizing after a long period of growth. Peregrine Falcons are not well monitored by BBSs and CBCs, and migration counts remain an important tool for monitoring populations of this raptor.

PRAIRIE FALCON

Scientific name:	<i>Falco mexicanus</i>
French name:	<i>Faucon des prairies</i>
Spanish name:	<i>Halcón de las praderas, Halcón mexicano, Halcón pradeño, Halcon café, Halcón palido</i>
Body length:	Female: 42–47 cm Male: 37–40 cm
Wingspan:	Female: 105–113 cm Male: 91–97 cm
Mass:	Female: 675–975 g Male: 420–635 g
Type of migrant:	Partial
Nest type:	Small “scrape” or depression on a cliff ledge or in a rocky pothole, usually with overhead cover. Sometimes in stick-nests of other species in trees, on power poles and buildings, and in caves.
Food habits:	Preys primarily on ground squirrels, other small to medium-sized mammals, and birds; also on insects and reptiles.
Migration flight:	Powerful but shallow flapping, with infrequent gliding and soaring.
Estimated world population:	10,000–100,000

ECOLOGY AND MIGRATION

The species is closely associated with arid, drought-prone areas of western North America. Individuals from the northern portion of the breeding range in Canada winter to the south. Breeding populations generally move seasonally in response to changes in food availability, migrating, for example, from dry breeding areas where ground squirrels aestivate in late summer to moister areas where squirrels remain available. Farther south, few individuals move directly southward to wintering areas in the autumn; instead, most migrate eastward or even northward in autumn before turning south later. Overall, the loop migrations of this species involve three distinct seasonal-use areas: breeding, late summer, and winter (Enderson 1964, Steenhof et al. 1984, Steenhof et al. 2005, Chapter 2).

POPULATION STATUS

Partners in Flight estimates that >90% of the global population of 10,000 to 100,000 birds breeds in the United States and Canada (Appendix). Migration counts, BBSs, and CBCs suggest that Prairie Falcon populations have declined since 1995 in western North America; however, the complex migration pattern of the species and low rates of detection in

BBSs make data from all three surveys difficult to interpret. Conversely, CBCs on the Great Plains suggest that the species has increased in this portion of the West since the early 1980s.

Eastern North America

Prairie Falcons do not breed in eastern North America and are rarely observed at migration watchsites. As a result, no population trends are available for this region.

Western North America

Previous watchsite analyses.—Hoffman and Smith (2003) reported significant annual increases at the Goshutes, Nevada, from 1983 to 2001, and the Manzanos, New Mexico, from 1985 to 2001. Migration counts at the Grand Canyon, Arizona (Lipan Point), the Bridger Mountains, Montana, the Wellsvilles, Utah, and the Sandias, New Mexico (a spring watchsite), were relatively low throughout the period, suggesting that populations were stable in much of the region. In a 1994 review, White (1994) concluded that populations of the Prairie Falcon were stable through the 1980s, with possibly local declines in some areas. Nesting density in the Snake River Birds of Prey National Conservation Area, Idaho, declined from 1976 to 1997, coincidental with land-use changes that affected the distribution and abundance of ground squirrels (Steenhof et al. 1999).

RPI analysis.—We were able to analyze migration counts only from the Goshutes and Manzanos because of low counts (<20 per year) elsewhere (Chapter 6). From 1995 to 2005, the Goshutes recorded a significant annual decline of -12.3%, and a nonsignificant annual decline of -4.1% occurred at the Manzanos (Fig. 21). A common pattern of change at both watchsites, consisting of significant increases from the late 1980s until 1997–1998, followed by significant declines, coincides with the start of a regional drought in 1998 (Chapter 6). Even so, counts at both sites were higher in 2005 than in the early 1980s.

Other analyses.—BBSs suggested a nonsignificant annual decline of -1.0% from 1983 to 2005, and a recent, nonsignificant decline of -1.9%. The value of BBS trends for this species is limited, because of the low number of individuals counted, and the trends should be considered in this light. CBCs indicate a significant annual decline of -1.4% from 1983 to 2005 and a nonsignificant decline of -0.3% from 1995 to 2005. East of this region, CBCs for the Great Plains (i.e., Colorado, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas) indicated that significant annual increases of 1.2% and 3.8% occurred from 1983 to 2005 and from 1995 to 2005, respectively. CBC trends may be unreliable because they are based on low numbers of individuals and should be considered in this light.

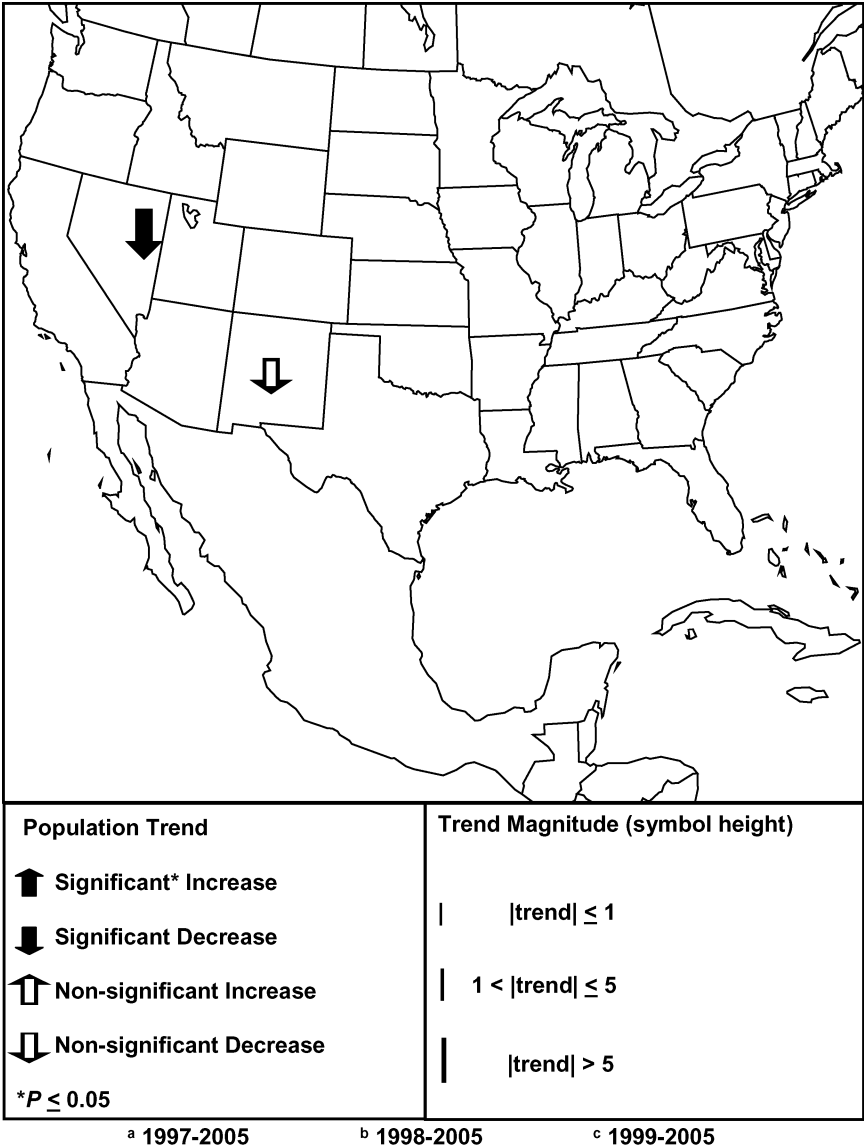


Fig. 21. Population trends (1995–2005) for Prairie Falcons (*Falco mexicanus*) at two western raptor migration counts in North America. Trends are expressed in percent change per year.

In sum, although recent declining patterns in both the Goshutes and Manzanos may be of concern, increasing counts of wintering birds on the Great Plains suggest that changes in distribution, possibly in response to a regional drought, may account for the decreased migration counts.

Gulf of Mexico

Prairie Falcons were not detected in sufficient numbers at raptor migration counts in this region to permit the calculation of trends.

HISTORICAL CONSERVATION CONCERNS

Historically, the species was subject to several types of direct persecution, including shooting, trapping, and egg collecting. During the DDT Era of 1945–1972, numbers of Peregrine Falcons in North America declined significantly. Although the species appears to be physiologically more sensitive to the effects of DDT than Peregrine Falcons (Fyfe et al. 1988), its populations did not experience the same degree of declines as those of the latter, most likely because of the predominance of mammalian prey in the diet of Prairie Falcons.

CURRENT STATUS AND CONCERNS

Shooting continues to be a significant source of mortality for Prairie Falcons, especially juveniles. The species also is captured and used in falconry (Conway et al. 1995). Other threats include pesticides, mercury, and lead shot, all of which are ingested when eating contaminated prey. Another common source of mortality is collision with fences (Beauvais et al. 1992). The breeding distribution of the species is closely tied to the availability of cliffs, and the species, therefore, is susceptible to human activities that disturb nests or destroy or degrade this important nesting substrate. Large-scale agriculture that disturbs or destroys habitat for ground squirrels can reduce the prey base for Prairie Falcons (e.g., Garrett and Mitchell 1973, U.S. Department of the Interior 1979).

The Prairie Falcon is a species of least concern globally, is a species of concern in the United States, is not at risk in Canada, and is threatened in Mexico (Appendix). Kirk and Hyslop (1998) rated populations breeding in Canada as possibly stable, but noted that local declines had occurred in association with increased cultivation near nests.

SUMMARY

Migration counts suggest that recent declines may have occurred in association with a regional drought in western North America. CBCs conducted

in the Great Plains, however, contradict this finding, and suggest increases in wintering populations of the species. Taken together, these surveys may indicate that the migration geography or the breeding distribution of this species has changed in response to the drought or other conditions. Because neither raptor migration counts, BBSs, nor CBCs adequately monitor the Prairie Falcon, increased efforts to conduct regular nest surveys or winter road surveys will be needed to adequately monitor this species' status in the long term.

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APPENDIX

Tables 1 and 2 can be found on the following pages.

Table 1. Summary of conservation status designations of North American raptors at global and national levels.

Species	Scientific name	Estimated world population ^a	Proportion in U.S. & Canada ^b	Global status ^c	U.S. status ^d	Canada status ^e	Mexico status ^f
Species with RPI trend estimates							
Black Vulture	<i>Coragyps atratus</i>	>10 ⁶	<10%	LC	NR	—	—
Turkey Vulture	<i>Cathartes aura</i>	>10 ⁶	25%	LC	NR	NR	—
Osprey	<i>Pandion haliaetus</i>	10 ⁴ –10 ⁵	50%	LC	NR	ND	—
Hook-billed Kite	<i>Chondrohierax uncinatus</i>	10 ⁴ –10 ⁵	<10%	LC	T	—	—
Swallow-tailed Kite	<i>Elanoides forficatus</i>	10 ⁵ –10 ⁶	<10%	LC	CC	—	SP
Mississippi Kite	<i>Ictinia mississippiensis</i>	10 ⁴ –10 ⁵	>90%	LC	NR	—	—
Bald Eagle	<i>Haliaeetus leucocephalus</i>	10 ⁵ –10 ⁶	>90%	LC	NR	NR	E
Northern Harrier	<i>Circus cyaneus</i>	10 ⁵ –10 ⁶	25–50%	LC	CC	NR	—
Sharp-shinned Hawk	<i>Accipiter striatus</i>	10 ⁵ –10 ⁶	≥50%	LC	NR	NR	SP
Cooper's Hawk	<i>Accipiter cooperii</i>	10 ⁵ –10 ⁶	>90%	LC	NR	NR	SP
Northern Goshawk	<i>Accipiter gentilis</i>	10 ⁵ –10 ⁶	50%	LC	NR	NR, T ^g	T
Red-shouldered Hawk	<i>Buteo lineatus</i>	10 ⁴ –10 ⁵	>90%	LC	NR	NR	SP
Broad-winged Hawk	<i>Buteo platypterus</i>	>10 ⁶	>90%	LC	NR	ND	SP
Swainson's Hawk	<i>Buteo swainsoni</i>	>10 ⁶	>90%	LC	CC	NR	SP
Zone-tailed Hawk	<i>Buteo albonotatus</i>	10 ³ –10 ⁴	<10%	LC	NR	—	SP
Red-tailed Hawk	<i>Buteo jamaicensis</i>	>10 ⁶	90%	LC	NR	NR	—
Rough-legged Hawk	<i>Buteo lagopus</i>	10 ⁵ –10 ⁶	50%	LC	NR	NR	—
Golden Eagle	<i>Aquila chrysaetos</i>	10 ⁵ –10 ⁶	50%	LC	NR	NR	T
American Kestrel	<i>Falco sparverius</i>	>10 ⁶	75%	LC	NR	ND	—
Merlin	<i>Falco columbarius</i>	>10 ⁶	50%	LC	NR	NR	—
Peregrine Falcon	<i>Falco peregrinus</i>	10 ⁴ –10 ⁵	25%	LC	CC	SC	SP
Prairie Falcon	<i>Falco mexicanus</i>	10 ⁴ –10 ⁵	>90%	LC	CC	NR	T
Species without RPI trend estimates							
California Condor	<i>Gymnogyps californianus</i>	10 ¹ –10 ²	>90%	CE	E	—	—
White-tailed Kite	<i>Elanus leucurus</i>	10 ⁵ –10 ⁶	25%	LC	NR	—	—

Table 1. Continued.

Species	Scientific name	Estimated world population ^a	Proportion in U.S. & Canada ^b	Global status ^c	U.S. status ^d	Canada status ^e	Mexico status ^f
Snail Kite	<i>Rostrhamus sociabilis</i>	10 ⁵ –10 ⁶	<10%	LC	E	–	SP
Common Black Hawk	<i>Buteogallus anthracinus</i>	10 ⁴ –10 ⁵	<10%	LC	NR	–	SP
Harris’ Hawk	<i>Parabuteo unicinctus</i>	10 ⁴ –10 ⁵	10%	LC	NR	–	SP
Gray Hawk	<i>Buteo nitidus</i>	10 ⁵ –10 ⁶	<10%	LC	E	–	–
Short-tailed Hawk	<i>Buteo brachyurus</i>	10 ⁴ –10 ⁵	<10%	LC	NR	–	–
White-tailed Hawk	<i>Buteo albicaudatus</i>	10 ⁴ –10 ⁵	<10%	LC	NR	–	SP
Ferruginous Hawk	<i>Buteo regalis</i>	10 ³ –10 ⁴	>90%	NT	CC	SC	SP
Crested Caracara	<i>Caracara cheriway</i>	10 ⁵ –10 ⁶	<10%	LC	NR	–	–
Aplomado Falcon	<i>Falco femoralis</i>	10 ⁴ –10 ⁶	<10%	LC	E	–	SP
Gyr Falcon	<i>Falco rusticolus</i>	10 ⁴ –10 ⁵	50%	LC	NR	NR	–

^aWorld population according to Ferguson-Lees and Christie (2001).
^bPercentage of population in United States and Canada according to Partners in Flight North American Landbird Conservation Plan: Appendix A.
^cGlobal ranks according to International Union for Conservation of Nature and Natural Resources (IUCN) Red List (www.iucnredlist.org/): CE indicates “critically endangered,” LC indicates “least concern,” NT indicates “near threatened.”
^dUnited States status according to U.S. Fish and Wildlife Service (USFWS) Species of Conservation Concern 2002, <http://migratorybirds.fws.gov/reports>; CC indicates “species of concern,” NR indicates that species does not appear in Species of Conservation Concern 2002. If federally listed in United States: E = endangered, T = threatened.
^eCanada status according to Canadian Wildlife Service (www.speciesatrisk.gc.ca/): ND indicates no data available, NR indicates “not at risk,” SC indicates “special concern,” T indicates “threatened.” A dash indicates that the species is not present in Canada.
^fMexico ranks equivalent to IUCN defined categories (Special Protection [SP] = “Subject to special protection, could become threatened in short or mid-term or status is uncertain”) according to SEMARNAT 2002 (www.inc.gob.mx/). A dash indicates no special status or the species does not occur in Mexico.
^gThreatened status applies only to *laingi* subspecies of British Columbia

Table 2. Summary of conservation status designations of North American raptors at regional levels. North American Partners in Flight (PIF) columns indicate continent-wide PIF scores and monitoring need ranks.

Species	Scientific name	Species of concern in USFWS region ^a	Species of concern in Bird Conservation Region ^a	Partners in Flight (PIF) score ^{b,c}	PIF monitoring need ^{b,d}
Species with RPI trend estimates					
Black Vulture	<i>Coragyps atratus</i>	—	—	5	—
Turkey Vulture	<i>Cathartes aura</i>	—	—	6	—
Osprey	<i>Pandion haliaetus</i>	—	—	8	2,3
Hook-billed Kite	<i>Chondrohierax uncinatus</i>	—	—	9	1
Swallow-tailed Kite	<i>Elanoides forficatus</i>	2,4,N	25,26,27,31,37	16	2
Mississippi Kite	<i>Ictinia mississippiensis</i>	—	19,26	13	2
Bald Eagle	<i>Haliaeetus leucocephalus</i>	—	—	10	3
Northern Harrier	<i>Circus cyaneus</i>	2,6,N	11,16,18, 9,21, 35–37	11	3
Sharp-shinned Hawk	<i>Accipiter striatus</i>	—	—	8	3
Cooper's Hawk	<i>Accipiter cooperii</i>	—	—	8	2
Northern Goshawk	<i>Accipiter gentilis</i>	—	5, 34	11	2,3
Red-shouldered Hawk	<i>Buteo lineatus</i>	—	—	8	—
Broad-winged Hawk	<i>Buteo platypterus</i>	—	—	9	—
Swainson's Hawk	<i>Buteo swainsoni</i>	1,3,6,N	9–11,16, 19,32,36	14	—
Zone-tailed Hawk	<i>Buteo albonotatus</i>	—	—	10	1
Red-tailed Hawk	<i>Buteo jamaicensis</i>	—	—	6	—
Rough-legged Hawk	<i>Buteo lagopus</i>	—	—	8	2,3
Golden Eagle	<i>Aquila chrysaetos</i>	6	9,10,16,17	11	3
American Kestrel	<i>Falco sparverius</i>	—	25,27,31	7	—
Merlin	<i>Falco columbarius</i>	—	—	7	2,3
Peregrine Falcon	<i>Falco peregrinus</i>	1–7,N	1–37,69	8	2,3
Prairie Falcon	<i>Falco mexicanus</i>	1,6,N	9,10, 16–18,32	12	2

Table 2. Continued.

Species	Scientific name	Species of concern in USFWS region ^a	Species of concern in Bird Conservation Region ^a	Partners in Flight (PIF) score ^{b,d}	PIF monitoring need ^{b, c}
		Species without RPI trend estimates			
California Condor	<i>Gymnogyps californianus</i>	—	—	20	—
White-tailed Kite	<i>Elanus leucurus</i>	—	—	8	—
Snail Kite	<i>Rostrhamus sociabilis</i>	—	—	11	1
Common Black Hawk	<i>Buteogallus anthracinus</i>	2	34, 35	11	1
Harris' Hawk	<i>Parabuteo unicinctus</i>	—	36	12	—
Gray Hawk	<i>Buteo nitidus</i>	2	34	7	1
Short-tailed Hawk	<i>Buteo brachyurus</i>	4	27, 31	10	1
White-tailed Hawk	<i>Buteo albicaudatus</i>	2	37	10	1
Ferruginous Hawk	<i>Buteo regalis</i>	2, 6, N	9–11, 16–18, 34, 35	13	—
Crested Caracara	<i>Caracara cheriway</i>	—	—	8	2
Aplomado Falcon	<i>Falco femoralis</i>	—	—	12	1
Gyr Falcon	<i>Falco rusticolus</i>	—	—	8	2, 3

^a Ranking from the U.S. Fish and Wildlife Service (USFWS) Species of Conservation Concern 2002, <http://migratorybirds.fws.gov/reports>, (N = national species of concern). USFWS Regions: 1 = Pacific, 2 = Southwest, 3 = Great Lakes–Big Rivers, 4 = Southeast, 5 = Northeast, 6 = Mountain–Prairie, 7 = Alaska. For BCR Regions, see map at www.partnersinflight.org. A dash indicates that the species did not meet criteria for inclusion on the list for any BCR or USFWS region.

^b Data from Partners in Flight North American Landbird Conservation Plan: Appendix A.

^c PIF score >14 = PIF Watchlist species; score with bold type indicates “watchlist” species.

^d Monitoring need: 1 = little or no information on population status; 2 = trend information available from an existing survey, but trend precision is low; 3 = one-third or more of the Canadian–United States breeding range is not covered by a breeding-season survey (i.e., much of range north of BBS coverage); from Rich et al. (2004). A dash indicates that the BBS or a species-specific survey provides possibly acceptable data at the continental level.

