

Species Status Assessment

Class: Birds
Family: Accipitridae
Scientific Name: *Circus cyaneus*
Common Name: Northern harrier

Species synopsis:

The northern harrier occurs across the entire United States, breeding in the northernmost regions and into Canada northward to Alaska. It is listed as Threatened in New York due to declining grassland habitat and small populations. Northern harriers breed and winter in New York, occupying open grasslands, shrublands, marshes, and bogs. Breeding Bird Atlas data from 1980-85 to 2000-05 shows no change in the percent of occupied blocks in the state, but shifts in occupancy are apparent; northern harrier is a nomadic species that responds to changes in prey availability. Though Breeding Bird Survey data in New York and other northeastern states are too sparse for analysis, data for both the Eastern region and North America for 2000-2010 show a significant decline of -0.5% per year. Christmas Bird Count data show an increasing trend from 1950 to 2010 for New York's wintering population and for wintering populations in states adjacent to New York.

I. Status

a. Current and Legal Protected Status

- i. **Federal** Not Listed **Candidate?** No
- ii. **New York** Threatened; SGCN

b. Natural Heritage Program Rank

- i. **Global** G5
- ii. **New York** S3B,S3N **Tracked by NYNHP?** Yes

Other Rank:

USFWS – Migratory Nongame Bird of Conservation Concern
Species of Northeast Regional Conservation Concern (Therres 1999)

Status Discussion:

The northern harrier is a widespread but uncommon breeder. It is a fairly common to common fall migrant, very common spring migrant, and uncommon to rare in winter. Areas of concentration include the Appalachian Plateau, St. Lawrence and Champlain Valleys, as well as the Mohawk Valley. Unlike other declining grassland species, Northern harriers also nest in freshwater marshes and bogs and hence, are also present in the Adirondacks.

Northern harrier is ranked as Apparently Secure only in Ontario; in all other states and provinces adjacent to New York, is it ranked as Vulnerable (New York and Pennsylvania), Imperiled (Vermont and Massachusetts), or Critically Imperiled (New Jersey and Connecticut).

II. Abundance and Distribution Trends

a. North America

i. Abundance

 X declining ___increasing ___stable ___unknown

ii. Distribution:

 X declining ___increasing ___stable ___unknown

Time frame considered: 2000-2010

b. Regional

i. Abundance

 X declining ___increasing ___stable ___unknown

ii. Distribution:

 X declining ___increasing ___stable ___unknown

Regional Unit Considered: Eastern BBS

Time Frame Considered: 2000-2010

Recent Breeding Bird Survey (BBS) data (2000-2010) shows few regions with robust data, but populations were stable for the period in the Prairie Pothole region. No states or provinces in the Northeast show significant BBS trends for the period 2000-2010, but the Eastern BBS region shows a significant decline of -0.5% per year, as does the North American trend.

Overall, migration numbers at Hawk Mountain Sanctuary in Pennsylvania increased slightly but significantly between 1934 and 1991. However, all aspects of harrier fall migration at Hawk Mountain from 1976 to 2003 are significantly negative (Farmer et al. 2007). Spring migration numbers at Derby Hill Observatory in Oswego County have been stable over the last ten years while numbers at Braddock Bay have been erratic, ranging from a low of 375 in 2010 to a high of 1,207 in 2008.

A comparison of spring migration counts with fall counts suggests that populations are stable in the Southwest, but spring counts suggest stable populations in the Northeast and increasing populations in the Great Lakes, while fall counts in the Northeast and Great Lakes suggest decreasing populations (Farmer and Smith 2010).

Christmas Bird Count data shows an increasing trend from 1950 to 2010 for New York's wintering population and for wintering populations in states adjacent to New York. However, severity of winter weather, including snow depth and snow/ice crust can impact abundance and distribution of harriers in winter months, as these factors affect prey availability.

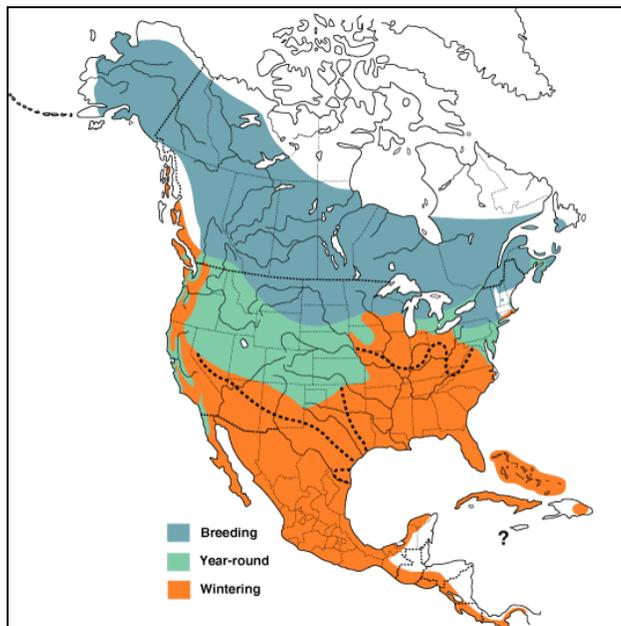


Figure 1. Range of the northern harrier in North America (Birds of North America Online 2013).

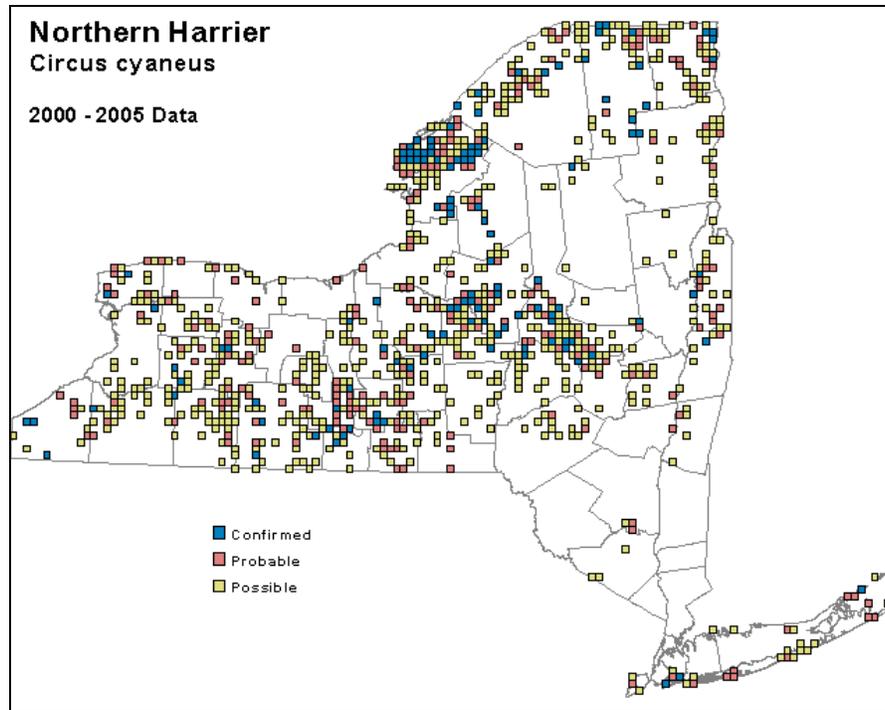


Figure 2. Northern harrier occurrence in New York State during the second Breeding Bird Atlas (McGowan and Corwin 2008).

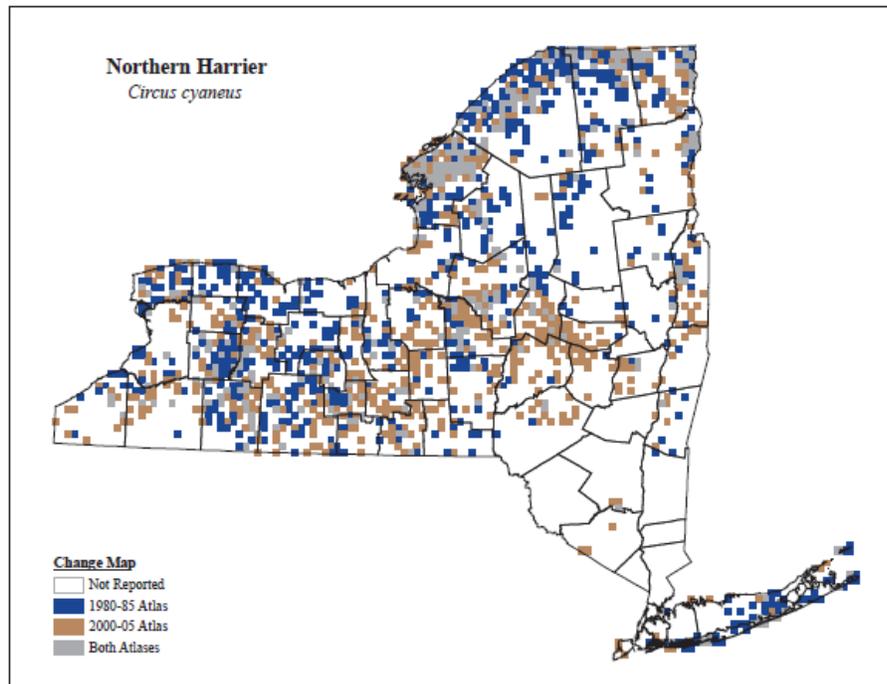


Figure 3. Change in northern harrier occurrence in New York State between the first Breeding Bird Atlas and the second Breeding Bird Atlas (McGowan and Corwin 2008).

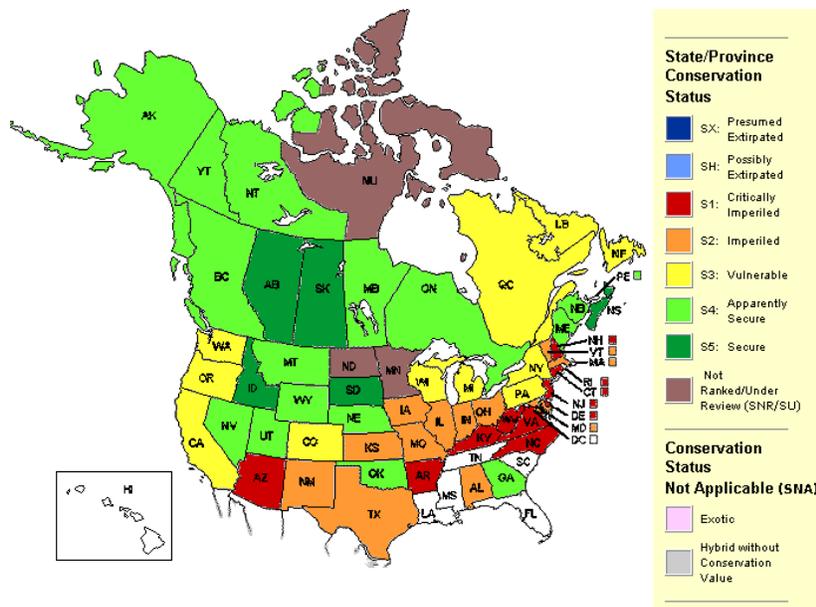


Figure 4. Conservation status of the northern harrier in North America (NatureServe 2012).

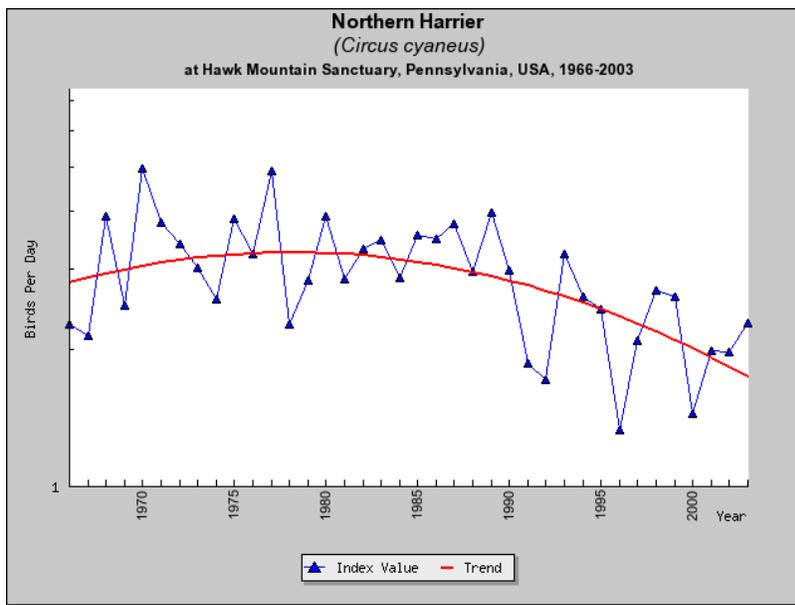


Figure 5. Northern harrier migration trend at Hawk Mountain Sanctuary in Pennsylvania, 1966-2003 (www.hawkmountain.org).

III. New York Rarity, if known:

Historic	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
prior to 1970	_____	_____	_____
prior to 1980	_____	_____	_____
prior to 1990	_____	_____	<u>17</u>

Details of historic occurrence:

The first Breeding Bird Atlas (1980-85) documented occupancy in a total of 937 survey blocks statewide, about 17% of the state.

Current	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
	_____	_____	<u>17</u>

Details of current occurrence:

The second Breeding Bird Atlas (2000-05) documented occupancy in a total of 917 survey blocks statewide, about 17% of the state. The change in occupancy between Atlas surveys was -1%. A patchy pattern of increases and decreases is notable. Increases are apparent across the Appalachian Plateau and Mohawk Valley while decreases are apparent on Long Island, the Adirondacks, the St. Lawrence Plains, and the western portion of the Erie-Ontario Plain.

New York's Contribution to Species North American Range:

Distribution (percent of NY where species occurs)

- ___ 0-5%
- ___ 6-10%
- X 11-25%
- ___ 26-50%
- ___ >50%

Abundance (within NY distribution)

- ___ abundant
- ___ common
- ___ fairly common
- X uncommon
- ___ rare

NY's Contribution to North American range

- 0-5%
- 6-10%
- 11-25%
- 26-50%
- >50%

Classification of New York Range

- Core
- Peripheral
- Disjunct

Distance to core population:

IV. Primary Habitat or Community Type:

1. Pasture/Hay
2. Old Field Managed Grasslands
3. Freshwater Marsh
4. Great Lakes Freshwater Estuary Marsh
5. Wet Meadow/Shrub Swamp
6. Open Acidic Peatlands
7. Native Barrens and Savanna
8. Maritime Dunes
9. Great Lakes Dune and Swale
10. Estuarine, Brackish Intertidal, Tidal Wetland, High Marsh

Habitat or Community Type Trend in New York:

Declining Stable Increasing Unknown

Time frame of decline/increase: _____

Habitat Specialist? Yes No

Indicator Species? Yes No

Habitat Discussion:

In New York, the Northern harrier breeds and winters in open wetlands, marshy meadows, wet, lightly grazed pastures, old fields, freshwater and brackish marshes, upland prairies, mesic grasslands, drained marshlands, croplands, cold desert shrub-steppe, and riparian woodland. Wet grasslands and marshes appear to support the highest breeding densities. Harriers generally avoid urban areas, but foraging does occur along roadsides (Hager 2009).

V. New York Species Demographics and Life History

- Breeder in New York
 - Summer Resident
 - Winter Resident
 - Anadromous
- Non-breeder in New York
 - Summer Resident
 - Winter Resident
 - Catadromous
- Migratory only
- Unknown

Species Demographics and Life History Discussion:

Northern harriers will breed in their first year, but most apparently breed in their second year. Males are more likely to breed during their first year if voles are abundant. Breeding is presumed to occur annually. Annual reproductive success (mean number of offspring fledged/pair) of all nests and of successful nests averaged 1.8 and 3.1, respectively. In New Brunswick, reproductive success was most strongly predicted by male food-provisioning rate and laying date, and to a lesser extent by clutch size (Simmons et al. 1986, Barnard et al. 1987). Reproductive success was moderately, but not significantly, correlated with vole abundance in August (Simmons et al. 1986, see also Burke 1979, Hamerstrom et al. 1985).

Among 114 banded birds, the mean age at death was 16.6 months (Keran 1981). The longest lifespan reported was 16 years, 5 months (Bildstein 1988), and the greatest reported known age of a (female) breeding bird in North America is 8 years. Pre-1950s mortality rates were estimated at 59% in first year and 30% among adults (Bildstein 1988). There are few data on causes of mortality. The mortality rate is <5% among fledglings (Sutherland 1987, MacWhirter 1994).

VI. Threats:

Habitat loss resulting from hayfield abandonment, succession, wetland drainage, and urban/suburban development are the primary threats to Northern harrier populations. Other major problems are early mowing of hayfields and heavy grazing rotations in pastures—especially wet pastures—and increases in ground predators (harriers are ground-nesters).

Continued widespread destruction of freshwater and estuarine wetlands in U.S. poses a threat to breeding and wintering populations. Conversion of native grassland prairies for monotypic farming has contributed to local population declines, and remains a major threat to populations (e.g., Duebbert and Lokemoen 1977, Toland 1985). In upland areas, mechanized agriculture and early mowing have increased the threat of nest destruction. Overgrazing of pastures, and the advent of larger crop fields and fewer fencerows, together with the widespread use of insecticides and rodenticides, have reduced prey availability and thus the amount of appropriate habitat for the species (Duebbert and Lokemoen 1977, Hamerstrom 1986).

Northern harriers are sensitive to human disturbance. Construction of a wind farm in Wisconsin significantly reduced sightings of harriers in summer (Garvin et al. 2011). Typically avoids wind turbines and at low risk for collision (Garvin et al. 2011); flies through areas around rotor blades rather than feeding around wind turbines, decreasing the likelihood of collision with blades (Smallwood et al. 2009).

Due to the habitat of salvaging dead or dying birds and mammals, harriers are susceptible to secondary poisoning and death from a variety of herbicides, pesticides, and avicides (Mineau et al. 1999, Kostecke et al. 2007).

A study led by a Canadian toxicologist identified acutely toxic pesticides as the most likely leading cause of the widespread decline in grassland bird numbers in the United States. The 23-year assessment, which looked at five other causes of grassland bird decline besides lethal pesticide risk, including change in cropped pasture such as hay or alfalfa production, farming intensity or the proportion of agricultural land that is actively cropped, herbicide use, overall insecticide use, and change in permanent pasture and rangeland, concluded that lethal pesticides were nearly four times more likely to be associated with population declines than the next most likely contributor, changes in cropped pasture (Mineau and Whiteside 2013).

Are there regulatory mechanisms that protect the species or its habitat in New York?

No Unknown

Yes

The northern harrier is listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

Northern harrier is protected under the Migratory Bird Treaty Act of 1918. The Freshwater Wetlands Act provides protection for wetlands greater than 12.4 acres in size under Article 24 of the NYS Conservation Law. There is no legal protection for their grassland habitats.

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

The NYSDEC's Best Management Practices (BMPs) for grassland birds should be used to guide habitat management on grassland habitat or habitat to be converted into grassland. The management goal of these BMPs is to maintain the open, grassy conditions necessary for successful breeding by grassland birds and to avoid disturbance to nesting birds. Techniques may include seeding, mowing, and removal of trees and shrubs including invasive species. Typically, land should be managed for a minimum of 5 years to begin showing benefits for grassland birds. These BMPs form the basis for specific 5-year Site Management Plans for landowners selected to receive technical and financial assistance through LIP (NYSDEC 2013).

The publication, *A Plan for Conserving Grassland Birds in New York* (Morgan and Burger 2008), identifies focus areas for coordinating grassland bird conservation efforts. Because grassland birds are sensitive to landscape-level factors and funding for conservation activities is limited, the best opportunity for achieving success is to concentrate efforts within regions of the state that support key residual populations of grassland birds. Suitable landcover classification datasets are needed to incorporate habitat availability into the delineation process.

Because the vast majority of remaining grassland habitat is privately owned, private lands incentive programs and educational programs should be a major component of the conservation effort. Protection of existing habitat for threatened and endangered species through enforcement of regulations pertaining to the taking of habitat is also a critical component of the conservation effort for these species (Morgan and Burger 2008).

Morgan and Burger (2008) recommend that further research is needed:

1. Methods and data for modeling distributions and abundance of grassland landcover across the landscape.

2. Impacts of management on productivity of grassland birds, to amplify existing information on grassland bird abundances associated with management.

3. Potential benefits of native grass species as grassland habitat in contrast with demonstrated benefit of non-native cool season grasses.

Conservation actions following IUCN taxonomy are categorized in the table below.

Conservation Actions	
Action Category	Action
Land/Water Protection	Site/Area Protection
Land/Water Protection	Resource/Habitat Protection
Land/Water Management	Site/Area Management
Land/Water Management	Invasive/Problematic Species Control
Land/Water Management	Habitat and Natural Process Restoration
Education and Awareness	Training
Education and Awareness	Awareness & Communications
Law and Policy	Policies and Regulations

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for grassland birds, which includes northern harrier.

Easement acquisition:

___ Identify ownership of grasslands in core focus areas, and focus Landowner Incentive Program (LIP) funding for use in conserving the most important privately-owned grasslands in the state, and distribute \$400,000 per year from LIP to conserve priority grasslands.

Habitat management:

___ Develop habitat management guidelines and action plans for priority focus grassland bird species.

Habitat research:

___ Evaluate the effects of specific farming and management practices, such as: timing of mowing, intensity of grazing, frequency of mowing, mowing versus haying versus prescribed fire, and width of buffer strips on productivity of grassland birds.

Other acquisition:

___ Incorporate priority grassland focus areas into the NYS Open Space Plan.

Other action:

- Work with public land managers, including NRCS, USFWS, DEC and others, to better direct funding and other resources to the highest priority areas and projects for grassland habitat management. The ability to focus funding sources in core priority grasslands will be key. If the funding sources from National Resource Conservation Service (NRCS) cannot be adequately focused in priority areas, then this will cripple the ability to conserve the most critical grassland areas and will result in continued declines in grassland birds even within these focus areas.
- Develop an outreach program to educate the public and land managers on the need for, and wildlife benefits, of grasslands. Also provide technical guidance on what and how to benefit grassland species. Outreach to private landowners will be a key first step to educate the public about the importance of their lands to grassland birds. So much of this habitat exists on private lands that their cooperation will be the ultimate deciding factor on whether species declines can be halted. Their cooperation at the level needed for meaningful change will probably hinge on some form of subsidies.

Population monitoring:

- Develop and implement supplemental monitoring programs for grassland bird species that are not adequately sampled by BBS to determine precise population trends and evaluate effectiveness of conservation efforts. Use long term trend data to determine effectiveness of grassland conservation efforts.
- Complete inventory of potential grassland habitat for species present, distribution, and relative abundance of priority species.

Statewide management plan:

- Complete a comprehensive Grassland Bird Conservation Plan that coordinates research, management, and conservation efforts to more effectively conserve NY's grassland birds. Identify priority species and delineate priority focus areas for conservation and management.

VII. References

- Barnard, P. E., R. B. MacWhirter, R. E. Simmons, G. L. Hansen, and P. C. Smith. 1987. Timing of breeding and the seasonal importance of passerine prey to Northern Harriers. *Can. J. Zool.* 65:1942-1946.
- Bildstein, K. L. 1988. Northern Harrier, *Circus cyaneus*. Pages 251-303 in *Handbook of North American birds*. Vol. 4 (Palmer, R. S., Ed.) Yale Univ. Press, New Haven, CT.
- Burke, C. J. 1979. Effect of prey and land use on mating systems of harriers. Master's Thesis. Univ. of Wisconsin, Stevens Point.
- Dinsmore, J. J. 1988. Field reports-summer 1988. *Iowa Bird Life* 58:106-113.
- Duebbert, H. F. and J. T. Lokemoen. 1977. Upland nesting of American Bitterns, Marsh Hawks, and Short-eared Owls. *Prairie Nat.* 9:33-40.

- Farmer, C. J., D. J. T. Hussell, and D. Mizrah. 2007. Detecting population trends in migratory birds of prey. *Auk* 124(3):1047-1062.
- Farmer, C. J. and J. P. Smith. 2010. Seasonal differences in migration counts of raptors: Utility of spring counts for population monitoring. *Journal of Raptor Research* 44(2):101-112.
- Garvin, J. C., C. S. Jennelle, D. Drake, and S. M. Grodsky. 2011. Response of raptors to a windfarm. *Journal of Applied Ecology* 48(1):199-209.
- Hager, S. B. 2009. Human-related threats to urban raptors. *Journal of Raptor Research* 43(3):210-226.
- Hamerstrom, F. 1986. Harrier, hawk of the marsh: the hawk that is ruled by a mouse. Smithsonian. Inst. Press, Washington, D.C.
- Hamerstrom, F., F. N. Hamerstrom, and C. J. Burke. 1985. Effect of voles on mating systems in a central Wisconsin population of harriers. *Wilson Bull.* 97:332-346.
- Keran, D. 1981. The incidence of man-caused and natural mortalities to raptors. *Raptor Res.* 15:108-112.
- Kostecke, R. M., G. M. Linz, M. J. Kenyon, and W. J. Bleier. 2007. Relative abundance of diurnal raptors as an index of potential exposure to an avicide used to cull blackbirds. *Journal of Raptor Research* 41(1):73-74.
- Macwhirter, R. B. 1994. Offspring sex ratios, mortality, and relative provisioning of daughters and sons in the Northern Harrier (*Circus cyaneus*). Phd Thesis. Ohio State Univ. Columbus.
- McGowan, K.J. and K. Corwin, eds. 2008. *The Second Atlas of Breeding Birds in New York State*. Cornell University Press, Ithaca, NY.
- Mineau, P., M. R. Fletcher, L. C. Glaser, N. J. Thomas, C. Brassard, L. K. Wilson, J. E. Elliott, L. A. Lyon, C. J. Henny, T. Bollinger, and S. L. Porter. 1999. Poisoning of raptors with organophosphorus and carbamate pesticides with emphasis on Canada, U.S. and U.K. *Journal of Raptor Research* 33(1):1-37.
- Mineau, P. and M. Whiteside. 2013. Pesticide acute toxicity is a better correlate of U.S. grassland bird declines than agricultural intensification. *PloS ONE* 8: 1-8.
- Morgan, M. R. and M. F. Burger. 2008. A plan for conserving grassland birds in New York: Final report to the New York State Department of Environmental Conservation under contract #C005137. Audubon New York, Ithaca, NY. <<http://ny.audubon.org/PDFs/ConservationPlan-GrasslandBirds-NY.pdf>>. Accessed 7 June2013.

NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. <<http://www.natureserve.org/explorer>>. Accessed 7 June 2013.

New York State Department of Environmental Conservation (NYSDEC). 2005. New York State Comprehensive Wildlife Conservation Strategy. <<http://www.dec.ny.gov/index.html>>. Accessed 7 June 2013.

New York State Department of Environmental Conservation (NYSDEC). 2013. Best management practices for grassland birds. <<http://www.dec.ny.gov/pubs/86582.html>>. Accessed 7 June 2013.

Norment, C. J., C. D. Ardizzone, and K. Hartman. 1999. Habitat relations and breeding biology of grassland birds in New York. *Studies in Avian Biology* 19:112-121.

Simmons, R., B. MacWhirter, P. Barnard, and G. L. Hansen. 1986. The influence of microtines on polygyny, productivity, age, and provisioning of breeding Northern Harriers: a 5-year study. *Can. J. Zool.* 64:2447-2456.

Smith, K.G., S.R. Wittenberg, R.B. Macwhirter and K.L. Bildstein. 2011. Northern Harrier (*Circus cyaneus*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; <<http://bna.birds.cornell.edu/bna/species/210> doi:10.2173/bna.210>

Sutherland, J. E. 1987. The predation ecology of the Northern Harrier (*Circus cyaneus hudsonius*) on Mallard Island, North Dakota. Master's Thesis. Univ. of N. Dakota, Grand Forks.

Therres, G.D. 1999. Wildlife species of regional conservation concern in the northeastern United States. *Northeast Wildlife* 54:93-100.

Toland, B. 1985. Nest site selection, productivity, and food habits of Northern Harriers in southwest Missouri. *Nat. Areas J.* 5:22-27.

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