

Status of Ohio's Breeding Birds: Identifying Species of Management Concern¹

DAVID A. SWANSON AND RANDY P. DETTMERS, Ohio Department of Natural Resources, New Marshfield, OH 45766 and US Fish and Wildlife, Hadley, MA 01035

ABSTRACT. We ranked Ohio's breeding birds by decreasing management concern based on the mean score of 7 criteria. Three criteria were global in nature and included the species' global abundance, breeding distribution, and wintering distribution. The other 4 criteria (threats to breeding habitat, threats to non-breeding habitat, state population trend, and importance of the state) pertained specifically to Ohio. We ranked 187 avian species known to breed in Ohio. Mean scores ranged from 3.7 to 1.0 (scores of 5.0 to 1.0 were possible). Several of the highest ranked species were previously listed as endangered, threatened, or of special interest at the state level by the Ohio Department of Natural Resources, Division of Wildlife. We assigned each species to a habitat type and a residency status. Mean values were then calculated for all the species within the same habitat or residency group. The closeness of the mean ranks of the habitat groups suggests that habitat destruction and degradation are limiting factors of all breeding birds in Ohio. In each habitat category, the highest ranked species used a variety of habitat types and vegetation structure. By residency status, permanent residents had the lowest mean score (1.8, $n = 21$) and long-distance neotropical migrants had the highest (2.6, $n = 74$). Because of the diverse habitat associations of the highest ranked species and common limiting factors, our results suggest that landscape-level habitat acquisition and management programs are needed to prevent additional listing of breeding birds as endangered, threatened, or of special interest in Ohio.

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INTRODUCTION

The Partners in Flight – Aves de las Americas neotropical migratory bird conservation program (PIF) was initiated in 1990 by the National Fish and Wildlife Foundation to promote pro-active international migratory bird conservation programs (Stangel 1993). The purpose of PIF is to identify declining populations of birds and address the conservation and management needs of these species before they become threatened or endangered.

The Ohio working group of PIF was formed in 1993 as part of the regional Midwest working group. The Ohio working group fosters communication, cooperation, and coordination among federal and state natural resource agencies, private conservation organizations, academic institutions, and others interested in avian conservation. Committees within the working group address issues related to research, population and habitat monitoring, habitat management, and education.

Of the 193 avian species recorded during the Ohio breeding bird atlas project, 187 were confirmed as breeding (Peterjohn and Rice 1991). The abundance, distribution, population trends, and limiting factors vary considerably among these species. Some species occur at the center of their breeding range in Ohio, whereas other species make only minor or occasional use of the state during the breeding period.

Regional PIF working groups developed a standardized procedure to determine the status of neotropical migratory birds within each region and identify those species most in need of management attention (Hunter and others 1993). The Ohio working group expanded

this prioritization scheme to all breeding birds in the state (neotropical migrants, short-distance migrants, and permanent residents). In this paper we present a list of Ohio's breeding birds prioritized by degree of management concern.

MATERIALS AND METHODS

We identified all birds that breed in Ohio and ranked species by decreasing management concern based on the mean score of 7 criteria (Table 1). Species were assigned scores within each category ranging from 1 (low concern) to 5 (high concern).

The first 3 criteria (global abundance, global breeding distribution, and global wintering distribution) were adapted from The Nature Conservancy's National Heritage Program (Master 1991) and represent crude measures of a species' vulnerability to catastrophic stochastic environmental events (Hunter and others 1993). In general, species that have the greatest population bases are most capable of absorbing adverse environmental or other density independent effects. Ranks for these 3 criteria were assigned based on the assumption that abundant or widely distributed species were less vulnerable to these stochastic events than uncommon or locally distributed species. The other 4 criteria (threats to breeding habitat, threats to non-breeding habitat, state population trend, and importance of the state) pertained specifically to Ohio. We based threats to breeding and non-breeding habitat scores on published information regarding habitat loss or degradation, brown-headed cowbird (*Molothrus ater*) parasitism, predation, contaminants, and/or persecution. We used range maps (Peterson 1980; Rappole and others 1983; DeGraaf and Rappole 1995) to determine the importance

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TABLE 1

Criteria used to rank the level of management concern for breeding birds in Ohio. Each species was assigned a score for each of the 7 criteria listed below and ranked based on the mean of the 7 scores.

Score	Criteria
<i>Global Abundance</i>	
1	Abundant or demonstrably secure
2	Common or apparently secure
3	Uncommon to fairly common
4	Rare to uncommon
5	Very rare to rare
<i>Global Breeding Distribution</i>	
1	>76% of temperate North America
2	51-75% of temperate North America
3	26-50% of temperate North America
4	11-25% of temperate North America
5	<10% of temperate North America
<i>Global Wintering Distribution</i>	
1	Southern latitudes of the US through Central America into South America, or all South America
2	Southern US through Central America or Central America through South America
3	Mexico and Caribbean and Central America or Middle American highlands or Amazon Basin
4	Caribbean Basin or Caribbean Slope of Middle America or Pacific Slope of Middle America or Mexican Highlands or Andean Ridge of South America
5	Bahamas or Guatemala, Honduras, and Nicaragua highlands or Mexican States of Jalisco, Michoacan, and Guerrero or southern Sinoloa and southern Baja California in Mexico
<i>Breeding Grounds Threats</i>	
1	No known threats – habitat increasing or stable; species has high reproductive potential; ecological generalist.
2	Minor threats – habitat loss between 1.0 and 10%; moderate ecological generalist.
3	Moderate threats – habitat loss between 11 and 25%; species has moderate reproductive potential; species possesses some ecological specialization.
4	Severe threats – habitat loss between 26 and 50%; ecological specialist.
5	Extirpation likely – habitat loss >50%; species has low reproductive potential; ecological specialist.
<i>Wintering Grounds and Migration Routes Threats</i>	
1	No known threats – habitat increasing or stable; ecological generalist during both migration and winter.
2	Minor threats – habitat loss between 1 and 10%; moderate generalist during both migration and winter.
3	Moderate threats – habitat loss between 11 and 25%; moderate ecological specialization during migration and/or winter.

TABLE 1 (Cont.)

Criteria used to rank the level of management concern for breeding birds in Ohio. Each species was assigned a score for each of the 7 criteria listed below and ranked based on the mean of the 7 scores.

Score	Criteria
4	Severe threats – habitat loss between 26 and 50%; ecological specialist during both migration and winter.
5	Extirpation likely – habitat loss >50%; ecological specialist during both migration and winter.
<i>Importance of Ohio to Species</i>	
1	<1.0% of species' total distribution
2	1.0-10% of species' total distribution
3	11-25% of species' total distribution
4	26-50% of species' total distribution
5	51-100% of species' total distribution
<i>Population Trend¹</i>	
	Long-term trend (1966-98)
	+* + - -*
Short-term trend (1980-98)	+* 1 1 3 3
	+ 1 2 3 4
	- 3 3 4 5
	-* 4 4 5 5

¹ +* = significant positive trend; + = non-significant positive trend; - = non-significant negative trend; -* = significant negative trend.

The score at the intersection of the long-term and short-term trend was assigned to each species.

of Ohio to each species. The state population trend score was based on Breeding Bird Survey (BBS) data if the degrees of freedom of the analysis were >14 or when the average number of detections per route was >1.0 (Thompson and others 1993). Long-term BBS trends were calculated for the period 1966-1998 and short-term trends for the period 1980-1998 by the route regression method (Geissler and Sauer 1990). Trend estimates were presented as a percent change per year and statistical significance (the test of the null hypothesis of no trend) was assessed using z-tests at $\alpha = 0.10$. We based the population trend score for each species on the direction and significance of the long-term and short-term trends (Thompson and others 1993). For example, if a species had experienced a significant positive population trend during 1966-1998 and a significant negative trend during 1980-1998, we assigned that species a population trend score of 4 (see Table 1). The population trend score for species for which BBS trend data were unreliable or unavailable were based on opinions of Ohio working group members. Species were then ranked in order of decreasing management concern based on the mean of the 7 scores.

We identified the general habitat type associated with each species based on a literature review (DeGraaf

and others 1991; Peterjohn and Rice 1991; DeGraaf and Rappole 1995). Habitats were classified as wetland (swamp, meadow, marsh, bog, Lake Erie island), grassland (hayfield, pasture, Cropland Reserve Program land, prairie), forest (upland and bottomland deciduous forest >20 years old), brush (upland and bottomland deciduous forest <20 years old, old field), and urban/suburban. We also assigned each species to a residency

type based upon its migratory characteristics: long-distance neotropical migrant (Type A), short-distance neotropical migrant (Type B), short-distance temperate migrant (Type E), or non-migratory permanent resident (Type F) (Table 2). We then calculated a mean rank for all species assigned to the same habitat type and residency status to determine which were of highest management concern.

TABLE 2

Criteria scores used to rank management concern of Ohio's breeding birds.

Common Name	Scientific Name	Habitat ¹	GA ²	GBD ³	GWD ⁴	TB ⁵	TW ⁶	POP ⁷	IA ⁸	Mean ⁹	Type ¹⁰
Blue-winged warbler	<i>Vermivora pinus</i>	S	3	4	4	4	4	4	3	3.7	A
Golden-winged warbler	<i>Vermivora chrysoptera</i>	S	4	4	4	4	4	5	1	3.7	A
Black tern	<i>Chlidonias niger</i>	W	3	2	3	5	3	5	4	3.6	A
Cerulean warbler	<i>Dendroica cerulea</i>	F	4	4	4	3	4	4	2	3.6	A
Common tern	<i>Sterna hirundo</i>	W	3	1	3	5	3	5	4	3.4	E
Henslow's sparrow	<i>Ammodramus benslowii</i>	G	3	3	4	4	4	3	3	3.4	E
Prothonotary warbler	<i>Protonotaria citrea</i>	W	3	3	4	4	4	4	2	3.4	A
Sedge wren	<i>Cistothorus platensis</i>	W	4	3	4	4	3	4	1	3.3	B
Bewick's wren	<i>Thryomanes bewickii</i>	S	2	2	3	5	3	5	2	3.1	E
Dickcissel	<i>Spiza americana</i>	G	2	3	4	4	4	4	1	3.1	A
King rail	<i>Rallus elegans</i>	W	3	2	2	5	3	5	2	3.1	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	F	3	2	3	4	4	4	2	3.1	A
American bittern	<i>Botaurus lentiginosus</i>	W	3	1	3	5	3	5	1	3.0	B
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	F	3	3	4	3	3	3	2	3.0	A
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>	S	3	3	5	3	3	3	1	3.0	A
Great-crested flycatcher	<i>Myiarchus crinitus</i>	F	2	3	4	3	4	3	2	3.0	A
Loggerhead shrike	<i>Lanius ludovicianus</i>	S	3	2	3	4	4	4	1	3.0	B
Louisiana waterthrush	<i>Seiurus motacilla</i>	F	4	3	3	3	3	3	2	3.0	A
Sandhill crane	<i>Grus canadensis</i>	W	3	3	4	4	3	3	1	3.0	E
Upland sandpiper	<i>Bartramia longicauda</i>	G	3	3	3	4	3	4	1	3.0	A
Virginia rail	<i>Rallus limicola</i>	W	4	1	4	4	4	3	1	3.0	B
Wood thrush	<i>Hylocichla mustelina</i>	F	2	3	4	3	4	3	2	3.0	A
Worm-eating warbler	<i>Helmitheros vermivorus</i>	F	3	3	4	3	3	3	2	3.0	A
Acadian flycatcher	<i>Empidonax virescens</i>	F	2	3	4	3	3	3	2	2.9	A
Blackburnian warbler	<i>Dendroica fusca</i>	F	3	3	4	3	3	3	1	2.9	A
Black duck	<i>Anas rubripes</i>	W	3	1	3	4	2	4	3	2.9	E
Bobolink	<i>Dolichonyx oryzivorus</i>	G	2	3	3	4	3	4	1	2.9	A
Common moorhen	<i>Gallinula chloropus</i>	W	2	2	3	4	3	4	2	2.9	B
Eastern wood-peewee	<i>Contopus virens</i>	F	2	3	4	3	3	3	2	2.9	A
Kentucky warbler	<i>Oporornis formosus</i>	F	2	3	4	3	3	3	2	2.9	A
Scarlet tanager	<i>Piranga olivacea</i>	F	2	3	4	3	3	3	2	2.9	A
Yellow-throated vireo	<i>Vireo flavifrons</i>	F	3	3	3	3	3	3	2	2.9	A
Whip-poor-will	<i>Caprimulgus vociferus</i>	F	2	3	3	4	4	3	1	2.9	A
American woodcock	<i>Scolopax minor</i>	S	2	2	3	3	4	3	1	2.7	E
Black-throated green warbler	<i>Dendroica virens</i>	F	3	3	3	3	3	3	1	2.7	A
Grasshopper sparrow	<i>Ammodramus savannarum</i>	G	2	2	3	4	3	4	1	2.7	A
Hooded warbler	<i>Wilsonia citrina</i>	F	3	3	4	2	2	3	2	2.7	A
Lark sparrow	<i>Chondestes grammacus</i>	G	3	2	3	4	3	3	1	2.7	A
Least bittern	<i>Ixobrychus exilis</i>	W	3	1	3	4	3	4	1	2.7	B
Magnolia warbler	<i>Dendroica magnolia</i>	F	3	3	3	3	3	3	1	2.7	A
Northern pintail	<i>Anas acuta</i>	W	3	1	1	4	3	4	3	2.7	B
Prairie warbler	<i>Dendroica discolor</i>	S	2	3	4	3	3	3	1	2.7	A
Purple martin	<i>Progne subis</i>	U	2	2	3	3	4	3	2	2.7	A
Ring-necked pheasant	<i>Phasianus colchicus</i>	G	2	2	2	3	4	4	2	2.7	F
Yellow-throated warbler	<i>Dendroica dominica</i>	F	3	3	3	3	3	3	1	2.7	A

TABLE 2 (Cont.)

Criteria scores used to rank management concern of Ohio's breeding birds.

Common Name	Scientific Name	Habitat ¹	GA ²	GBD ³	GWD ⁴	TB ⁵	TW ⁶	POP ⁷	IA ⁸	Mean ⁹	Type ¹⁰
American coot	<i>Fulica americana</i>	W	2	1	3	4	3	4	1	2.6	B
Bank swallow	<i>Riparia riparia</i>	W	3	1	3	3	4	3	1	2.6	A
Bell's vireo	<i>Vireo bellii</i>	S	3	3	4	2	2	3	1	2.6	A
Canada warbler	<i>Wilsonia canadensis</i>	S	2	3	4	3	2	3	1	2.6	A
Carolina chickadee	<i>Parus carolinensis</i>	F	2	3	3	2	3	2	3	2.6	F
Indigo bunting	<i>Passerina cyanea</i>	S	1	3	3	3	3	3	2	2.6	A
Northern oriole	<i>Icterus galbula</i>	F	2	3	3	3	3	3	1	2.6	A
Northern parula	<i>Parula americana</i>	F	2	3	3	3	3	3	1	2.6	A
Orchard oriole	<i>Icterus spurius</i>	S	3	3	3	3	3	2	1	2.6	A
Ovenbird	<i>Seiurus aurocapillus</i>	F	2	3	3	3	3	3	1	2.6	A
Red-shouldered hawk	<i>Buteo lineatus</i>	F	3	3	3	3	2	3	1	2.6	B
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	S	2	3	3	3	3	3	1	2.6	A
Sora	<i>Porzana carolina</i>	W	3	1	3	4	3	3	1	2.6	B
Summer tanager	<i>Piranga rubra</i>	S	2	3	3	3	3	3	1	2.6	A
Veery	<i>Catbarus fuscescens</i>	F	3	3	1	3	2	3	3	2.6	A
Vesper sparrow	<i>Poocetes gramineus</i>	G	3	2	2	4	2	4	1	2.6	B
White-eyed vireo	<i>Vireo griseus</i>	S	2	3	3	3	3	3	1	2.6	A
Willow flycatcher	<i>Empidonax traillii</i>	S	3	2	3	3	3	3	1	2.6	A
Wilson phalarope	<i>Phalaropus tricolor</i>	W	3	3	3	3	2	3	1	2.6	E
Yellow-breasted chat	<i>Icteria virens</i>	S	2	2	3	3	3	4	1	2.6	A
American redstart	<i>Septopbaga ruticilla</i>	F	2	2	2	3	4	3	1	2.4	A
Barn owl	<i>Tyto alba</i>	G	2	1	1	4	4	4	1	2.4	E
Black-throated blue warbler	<i>Dendroica caerulescens</i>	F	3	3	4	2	2	2	1	2.4	A
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	F	2	2	3	3	3	3	1	2.4	A
Blue-winged teal	<i>Anas discors</i>	W	3	1	2	3	3	3	2	2.4	B
Broad-winged hawk	<i>Buteo platypterus</i>	F	3	2	2	3	3	3	1	2.4	A
Eastern kingbird	<i>Tyrannus tyrannus</i>	S	2	2	3	3	3	3	1	2.4	A
Green-winged teal	<i>Anas crecca</i>	W	3	1	3	3	2	3	2	2.4	B
Hermit thrush	<i>Catbarus guttatus</i>	F	3	2	2	3	3	3	1	2.4	B
Least flycatcher	<i>Empidonax minimus</i>	S	3	2	3	3	2	3	1	2.4	A
Mourning warbler	<i>Oporornis philadelphia</i>	S	3	3	4	2	2	2	1	2.4	A
Northern bobwhite	<i>Colinus virginianus</i>	G	2	2	2	3	3	3	2	2.4	F
Redhead	<i>Aythya americana</i>	W	3	1	2	3	2	3	3	2.4	B
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	F	2	1	1	4	4	4	1	2.4	E
Ruddy duck	<i>Oxyura jamaicensis</i>	W	3	1	1	3	3	3	3	2.4	B
Short-eared owl	<i>Asio flammeus</i>	G	4	1	1	4	3	3	1	2.4	B
Snowy egret	<i>Egretta thula</i>	W	3	1	3	3	3	3	1	2.4	A
Swamp sparrow	<i>Melospiza georgiana</i>	W	3	3	3	2	2	3	1	2.4	B
Warbling vireo	<i>Vireo gilvus</i>	F	2	1	3	3	4	3	1	2.4	A
Alder flycatcher	<i>Empidonax alnorum</i>	S	3	2	4	2	2	2	1	2.3	A
American wigeon	<i>Anas americana</i>	W	2	1	2	3	2	3	3	2.3	B
Black-and-white warbler	<i>Mniotilta varia</i>	F	3	3	1	3	2	2	2	2.3	A
Cliff swallow	<i>Hirundo pyrrhonota</i>	G	2	1	3	3	3	3	1	2.3	A
Common nighthawk	<i>Chordeiles minor</i>	U	2	1	2	3	4	3	1	2.3	A
Green heron	<i>Butorides virescens</i>	W	2	1	2	3	4	3	1	2.3	B
Northern harrier	<i>Circus cyaneus</i>	G	3	1	1	4	3	3	1	2.3	B
Pied-billed grebe	<i>Podilymbus podiceps</i>	W	2	1	1	4	4	3	1	2.3	B
Pileated woodpecker	<i>Dryocopus pileatus</i>	F	2	2	2	3	3	2	2	2.3	F
Pine warbler	<i>Dendroica pinus</i>	F	2	3	3	2	2	3	1	2.3	E
Purple finch	<i>Carpodacus purpureus</i>	U	3	3	3	2	2	2	1	2.3	B
Ruffed grouse	<i>Bonasa umbellus</i>	S	2	2	2	2	4	2	2	2.3	F
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>	S	1	2	2	3	4	3	1	2.3	B
Solitary vireo	<i>Vireo solitarius</i>	F	3	3	3	2	2	2	1	2.3	A
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	F	2	3	2	3	3	2	1	2.3	B
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	W	2	1	2	3	3	3	1	2.1	B

TABLE 2 (Cont.)

Criteria scores used to rank management concern of Ohio's breeding birds.

Common Name	Scientific Name	Habitat ¹	GA ²	GBD ³	GWD ⁴	TB ⁵	TW ⁶	POP ⁷	IA ⁸	Mean ⁹	Type ¹⁰
Black vulture	<i>Coragyps atratus</i>	F	3	2	2	2	2	2	2	2.1	E
Blue grosbeak	<i>Guiraca caerulea</i>	S	3	2	3	2	2	2	1	2.1	A
Chimney swift	<i>Chaetura pelagica</i>	U	1	2	3	2	3	2	2	2.1	A
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	F	2	3	3	2	2	2	1	2.1	A
Eastern screech owl	<i>Otus asio</i>	F	2	2	2	2	3	2	2	2.1	F
Golden-crowned kinglet	<i>Regulus satrapa</i>	F	3	3	2	2	2	2	1	2.1	E
Gray catbird	<i>Dumetella carolinensis</i>	S	2	2	3	2	3	2	1	2.1	A
Little blue heron	<i>Egretta caerulea</i>	W	3	1	1	4	2	3	1	2.1	A
Marsh wren	<i>Cistothorus palustris</i>	W	2	2	2	3	2	3	1	2.1	B
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	W	3	1	3	2	3	2	1	2.1	A
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	F	2	2	2	2	3	2	2	2.1	F
Ruby-crowned kinglet	<i>Regulus calendula</i>	F	3	3	2	2	2	2	1	2.1	E
Ruby-throated hummingbird	<i>Archilochus colubris</i>	All	2	2	3	2	2	2	2	2.1	A
Savannah sparrow	<i>Passerculus sandwichensis</i>	G	2	1	2	3	3	3	1	2.1	B
Winter wren	<i>Troglodytes troglodytes</i>	F	2	1	1	3	3	3	2	2.1	E
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	W	2	3	3	2	2	2	1	2.1	A
American goldfinch	<i>Carduelis tristis</i>	S	1	2	2	2	3	2	2	2.0	B
Bald eagle	<i>Haliaeetus leucocephalus</i>	W	3	1	1	3	2	3	1	2.0	E
Belted kingfisher	<i>Ceryle alcyon</i>	W	2	1	1	3	3	3	1	2.0	B
Brown creeper	<i>Certhia americana</i>	F	2	1	1	3	3	3	1	2.0	B
Brown thrasher	<i>Toxostoma rufum</i>	S	1	1	1	3	4	3	1	2.0	E
Cedar waxwing	<i>Bombycilla cedrorum</i>	S	2	2	2	2	3	2	1	2.0	B
Common yellowthroat	<i>Geothlypis trichas</i>	S	1	1	2	3	3	3	1	2.0	A
Cooper's hawk	<i>Accipiter cooperii</i>	F	3	1	2	2	2	2	2	2.0	B
Eastern meadowlark	<i>Sturnella magna</i>	G	1	1	1	4	2	4	1	2.0	B
Eastern phoebe	<i>Sayornis phoebe</i>	F	2	2	2	2	3	2	1	2.0	B
Gadwall	<i>Anas strepera</i>	W	2	3	1	3	3	1	1	2.0	B
Great egret	<i>Casmerodius albus</i>	W	3	1	1	3	2	3	1	2.0	B
Hooded merganser	<i>Lophodytes cucullatus</i>	W	3	1	1	3	2	3	1	2.0	E
Northern mockingbird	<i>Mimus polyglottos</i>	S	2	2	2	2	3	2	1	2.0	B
Northern saw-whet owl	<i>Aegolius acadicus</i>	F	2	1	1	3	3	3	1	2.0	E
Northern shoveler	<i>Anas clypeata</i>	W	2	1	2	3	2	3	1	2.0	B
Red-eyed vireo	<i>Vireo olivaceus</i>	F	1	2	3	2	3	2	1	2.0	A
Spotted sandpiper	<i>Actitis macularia</i>	W	1	1	2	3	3	3	1	2.0	B
Western meadowlark	<i>Sturnella neglecta</i>	G	2	3	1	3	1	2	2	2.0	B
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>	W	3	1	1	3	3	2	1	2.0	B
Yellow warbler	<i>Dendroica petechia</i>	W	1	1	1	3	3	3	2	2.0	A
Barred owl	<i>Strix varia</i>	F	2	1	1	3	3	2	1	1.9	F
Cattle egret	<i>Bubulcus ibis</i>	G	1	1	1	3	3	3	1	1.9	B
Dark-eyed junco	<i>Junco hyemalis</i>	G	2	2	1	3	2	2	1	1.9	B
Eastern bluebird	<i>Sialia sialis</i>	G	2	2	2	2	2	2	1	1.9	B
Field sparrow	<i>Spizella pusilla</i>	G	1	1	1	3	3	3	1	1.9	E
Northern flicker	<i>Colaptes auratus</i>	F	2	1	1	3	3	2	1	1.9	B
Northern waterthrush	<i>Seiurus noveboracensis</i>	W	2	2	2	2	2	2	1	1.9	A
Peregrine falcon	<i>Falco peregrinus</i>	U	4	1	1	2	2	2	1	1.9	A
Red-breasted nuthatch	<i>Sitta canadensis</i>	F	2	1	1	3	3	2	1	1.9	E
Red-winged blackbird	<i>Agelaius phoeniceus</i>	W	3	3	1	3	1	1	1	1.9	B
Sharp-shinned hawk	<i>Accipiter striatus</i>	F	3	1	1	3	2	2	1	1.9	B
Tree swallow	<i>Tachycineta bicolor</i>	W	2	1	2	2	3	2	1	1.9	B
Wood duck	<i>Aix sponsa</i>	W	2	1	3	2	2	2	1	1.9	E
Black-capped chickadee	<i>Parus atricapillus</i>	F	2	1	1	2	3	2	1	1.7	F
Common snipe	<i>Gallinago gallinago</i>	W	2	1	1	2	2	3	1	1.7	B
Great blue heron	<i>Ardea herodias</i>	W	2	1	1	2	3	2	1	1.7	B
Great-horned owl	<i>Bubo virginianus</i>	F	2	1	1	2	3	2	1	1.7	F
Long-eared owl	<i>Asio otus</i>	F	3	1	1	2	2	2	1	1.7	B

TABLE 2 (Cont.)

Criteria scores used to rank management concern of Ohio's breeding birds.

Common Name	Scientific Name	Habitat ¹	GA ²	GBD ³	GWD ⁴	TB ⁵	TW ⁶	POP ⁷	IA ⁸	Mean ⁹	Type ¹⁰
Song sparrow	<i>Melospiza melodia</i>	S	1	1	1	2	3	2	2	1.7	B
Brown-headed cowbird	<i>Molothrus ater</i>	All	1	1	2	2	2	2	1	1.6	B
Chipping sparrow	<i>Spizella passerina</i>	U	1	1	2	2	2	2	1	1.6	A
Common grackle	<i>Quiscalus quiscula</i>	U	1	1	1	2	3	2	1	1.6	E
Double-crested cormorant	<i>Phalacrocorax auritus</i>	W	1	1	1	1	1	2	4	1.6	B
Downy woodpecker	<i>Picoides pubescens</i>	F	1	1	1	2	3	2	1	1.6	F
Hairy woodpecker	<i>Picoides villosus</i>	F	1	1	1	2	3	2	1	1.6	F
Herring gull	<i>Larus argentatus</i>	W	1	1	2	2	2	2	1	1.6	B
Horned lark	<i>Eremophila alpestris</i>	G	1	1	1	2	3	2	1	1.6	B
House sparrow	<i>Passer domesticus</i>	U	1	1	1	2	3	2	1	1.6	F
Northern cardinal	<i>Cardinalis cardinalis</i>	F	1	1	1	2	3	2	1	1.6	F
Pine siskin	<i>Carduelis pinus</i>	U	1	2	1	2	2	2	1	1.6	B
Tufted titmouse	<i>Parus bicolor</i>	F	1	1	1	2	3	2	1	1.6	F
White-breasted nuthatch	<i>Sitta carolinensis</i>	F	1	1	1	2	3	2	1	1.6	F
American crow	<i>Corvus brachyrhynchos</i>	F	1	1	1	2	2	2	1	1.4	F
American kestrel	<i>Falco sparverius</i>	G	1	1	1	2	2	2	1	1.4	B
American robin	<i>Turdus migratorius</i>	U	1	1	1	2	2	2	1	1.4	B
Barn swallow	<i>Hirundo rustica</i>	G	1	1	1	2	2	2	1	1.4	A
Blue jay	<i>Cyanocitta cristata</i>	F	1	1	1	2	2	2	1	1.4	F
Canada goose	<i>Branta canadensis</i>	W	1	1	1	1	1	2	3	1.4	E
Carolina wren	<i>Thryothorus ludovicianus</i>	S	1	1	1	2	2	2	1	1.4	F
European starling	<i>Sturnus vulgaris</i>	U	1	1	1	2	2	1	1	1.4	E
House wren	<i>Troglodytes aedon</i>	U	1	1	1	2	2	2	1	1.4	A
Killdeer	<i>Charadrius vociferus</i>	G	1	1	1	2	2	2	1	1.4	B
Mallard	<i>Anas platyrhynchos</i>	W	1	1	1	2	2	2	1	1.4	B
Red-tailed hawk	<i>Buteo jamaicensis</i>	F	1	1	1	2	2	2	1	1.4	B
Rock dove	<i>Columba livia</i>	U	1	1	1	2	2	1	1	1.4	F
Turkey vulture	<i>Cathartes aura</i>	F	1	1	1	2	2	2	1	1.4	B
Wild turkey	<i>Meleagris gallopavo</i>	F	3	1	1	1	1	2	1	1.4	F
Ring-billed gull	<i>Larus delawarensis</i>	W	1	2	1	1	1	2	1	1.3	B
Mourning dove	<i>Zenaida macroura</i>	S	1	1	1	1	2	1	1	1.1	B
House finch	<i>Carpodacus mexicanus</i>	U	1	1	1	1	1	1	1	1.0	E

¹F = forest, G = grassland, S = shrub, U = urban/suburban, W = wetland.²Global abundance.³Global breeding distribution.⁴Global wintering distribution.⁵Threats to breeding habitat.⁶Threats to wintering habitat.⁷Population trend.⁸Importance of area.⁹Mean of all 7 scores.¹⁰A = breeds in North America, winters primarily south of U.S.; B = breeds and winters primarily in North America, some winter south of U.S.; E = breeds and winters entirely in North America; F = permanent resident, does not migrate.

RESULTS

We ranked 187 avian species that breed in Ohio by decreasing management concern (Table 2). Mean species scores ranged from 3.7 to 1.0 (scores of 5 to 1 were possible). Twelve (6%) species scored ranks >3.0 and 50 (27%) scored <2.0.

Five of the 12 species (42%) with scores >3.0 were associated with wetland habitat, three (25%) with early successional shrub land, two (16%) with mature forest, and two (16%) with grasslands. Mean scores for all birds by habitat type were similar: shrub land = 2.4 ($n = 32$), forest = 2.3 ($n = 65$), wetland = 2.3 ($n = 50$), and grassland = 2.1 ($n = 24$). Birds categorized as urban/suburban and "all" ($n = 16$) had a mean score of 1.8.

By residency status, permanent residents (Type F) had the lowest mean score (1.8, $n = 21$) and long-distance neotropical migrants (Type A) had the highest (2.6, $n = 74$). The mean score of short-distance temperate migrants (Type E) was 2.3 ($n = 26$), higher than that of short-distance neotropical migrants (Type B) (2.1, $n = 66$).

DISCUSSION

Several of the highest ranked species on our list were previously listed as endangered—golden-winged warbler (*Vermivora chrysoptera*), black tern (*Chlidonias niger*), common tern (*Sterna hirundo*), sedge wren (*Cistothorus platensis*), Bewick's wren (*Thryomanes bewickii*), king rail (*Rallus elegans*), American bittern

(*Botaurus lentiginosus*), loggerhead shrike (*Lanius ludovicianus*), and sandhill crane (*Grus canadensis*); threatened—upland sandpiper (*Bartramia longicauda*); or of special interest—cerulean warbler (*Dendroica cerulea*) and Henslow's sparrow (*Ammodramus henslowii*) at the state level by the Ohio Department of Natural Resources, Division of Wildlife (1995), giving credence to our ranking system. The highest ranked forest nesting species was the cerulean warbler, a species of high management concern throughout the Midwest (Thompson and others 1996). The Henslow's sparrow was the top-ranked grassland nesting bird in Ohio. This species is listed as endangered in Illinois, threatened in Iowa and Indiana, and of special management concern in Minnesota and Wisconsin (Herkert and others 1996).

The ranking process indicated that in each habitat category, the highest ranked species used a variety of habitat types and vegetation structures. For example, the grassland nesting birds of highest management concern based on our ranks were the Henslow's sparrow, dickcissel (*Spiza americana*), and upland sandpiper (Table 2). Henslow's sparrows prefer undisturbed grasslands that have tall, dense cover (Wiens 1969; Skinner and others 1984; Herkert 1994). Dickcissels prefer old fields, hayfields, and other idle grasslands with moderately tall herbaceous vegetation (Tabor 1947; Emlen and Wiens 1965; Zimmerman 1971). Upland sandpipers typically prefer areas of short, sparse cover (Ailes 1980; Buhnerkempe and Westemeier 1988).

Similarly, among forest nesting birds, Blackburnian warblers (*Dendroica fusca*) and northern parulas (*Parula americana*) occupy mature coniferous forests (Graber and Graber 1951; Peterjohn 1989), whereas cerulean warblers and scarlet tanagers (*Piranga olivacea*) require extensive tracts of mature hardwood forest with tall trees for nesting (Robbins and others 1992; DeGraaf and Rappole 1995). Both the Acadian and great-crested flycatcher (*Empidonax virescens* and *Myiarchus crinitus*) require extensive mature hardwood forest, with the former preferring a well-developed understory and the latter a fairly open canopy with scattered large cavity trees (Mousley 1934; Peterjohn 1989).

The three top-ranked wetland nesting birds also differ in their habitat requirements. Common terns prefer nesting on islands that are free of mammalian predators and human disturbance (Shields and Townsend 1985). Nesting black terns are occupants of large undisturbed marshes where permanent open water is interspersed with patches of tall emergent vegetation (Novak 1992). Prothonotary warblers (*Protonotaria citrea*) nest in natural cavities or old woodpecker holes in wooded swamps where standing water remains throughout the nesting period (Walkinshaw 1953).

The closeness of the mean ranks of habitat groups (Range: 2.1–2.4) suggests that habitat destruction and degradation are common limiting factors of all breeding birds in Ohio. Less than 15% of Ohio's original 5 million acres of wetland habitat remains today, over half of which is concentrated in 10 northern counties (Bennett and McElfish 1998). Less than 0.5% of Ohio's native tallgrass prairie remains (Troutman and others 1979;

Hands and others 1989) and acreage of secondary grassland habitat (pastures and hayfields) has declined >50% since 1950 in glaciated Ohio (US Department of Commerce 1984; Ohio Agricultural Statistics Service 1989).

Forest inventory data show that between 1968 and 1991, acreage in the seedling-sapling, or shrub, stage of forest succession (trees <5.0 inches d.b.h. [diameter breast height]) decreased >50% from 3.7 to 1.8 million acres, whereas acreage in the mature sawtimber size class (trees >11 inches d.b.h.) more than doubled from 1.9 to 4.0 million acres (Griffith and others 1993). That several forest nesting species associated with mature forest habitats received high ranks (for example, cerulean warbler, black and yellow-billed cuckoos (*Coccyzus erythrophthalmus* and *C. americanus*), and Louisiana waterthrush (*Seiurus motacilla*)) implies additional research is needed to identify limiting factors (for example, predation, parasitism, and contaminants).

Thompson and others (1993) cautioned against using priority ranking systems to focus management efforts on a small number of top-ranked species, and recommended landscape-level management that addressed the habitat needs of suites of highly ranked species. The large number of highly ranked species in wetland, grassland, forest, and shrub habitats suggests that landscape-level habitat management programs must be implemented across the state to prevent additional listings of Ohio's breeding birds as endangered, threatened, or special interest. Mosaics of different habitat types and vegetation structures within each habitat category (for example, forested and open-water wetlands, mowed and unmowed grasslands, and mature and brushy forest stands) must be provided throughout Ohio's landscape to ensure that all avian species are provided the requisites needed for survival and reproduction.

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