OHIO ALL-BIRD CONSERVATION PLAN
OCTOBER 2010

OHIO BIRD

CONSERVATION INITIATIVE

This Ohio Bird Conservation Initiative All-Bird Conservation Plan is based on several regional conservation plans developed by the Upper Mississippi River and Great Lakes Region Joint Venture (UMRGLRJV). These include conservation plans for shorebirds (Potter et al. 2007a), landbirds (Potter et al. 2007b), waterbirds (Soulliere et al. 2007a), and waterfowl (Soulliere et al. 2007b). Habitat and bird population objectives from these plans and the UMRGLRJV Implementation Plan (Soulliere et al. 2007c) have been "stepped-down" to the state of Ohio and the primary bird conservation regions that occur within Ohio. Additional maps were incorporated from Soulliere et al. (2007c) with the generous assistance from Brad Potter of the UMRGLRJV. The OBCI Plan benefitted from reviews provided by Mike Reynolds, David Scott, Mark Shieldcastle, and Nathan Stricker.

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EXECUTIVE SUMMARY

Over the last 15 years, conservation plans have been developed for waterbirds, waterfowl, shorebirds, and landbirds at both national and regional scales. This Ohio All-Bird Conservation Plan of the Ohio Bird Conservation Initiative (OBCI) has been "stepped-down" from conservation plans developed by the Upper Mississippi River and Great Lakes Region Joint Venture (UMRGLRJV). These include conservation plans for shorebirds (Potter et al. 2007a), landbirds (Potter et al. 2007b), waterbirds (Soulliere et al. 2007a), waterfowl (Soulliere et al. 2007b), and the UMRGLRJV Implementation Plan (UMRGLRJV 2007).

The Ohio All-Bird Conservation Plan is a collaborative effort among members representing numerous organizations that serve on the Ohio Bird Conservation Initiative's Conservation Planning and Research Committee. This plan has two main functions: to summarize existing national and regional plans, and to provide guidance for future bird conservation efforts in Ohio.

GOALS OF THE PLAN

1. Summarize UMRGLRJV Habitat Conservation Strategy plans for shorebirds, waterbirds, waterfowl, and landbirds, and step-down population and habitat goals to Ohio

2. Prioritize a species list that identifies Ohio species that are at risk in the state, region, and across the continent

3. Identify research and monitoring projects needed to sustain bird populations and habitats in Ohio

4. Identify funding sources to encourage development of collaborative conservation projects among OBCI partners

PLAN CHAPTERS
Chapter 1: Shorebird Plan

Focal Species

American Golden-Plover	Dunlin
Killdeer	Short-billed Dowitcher
Upland Sandpiper	Wilson's Snipe
Sanderling	American Woodcock

Killdeer, Photo: ODNR Div. of Wildlife

Habitat Objectives

Habitat objectives for Ohio are to protect 8,468 ha for breeding shorebirds and 7,153 ha for migrating shorebirds. Restoration objectives are to restore 11,950 ha for breeding shorebirds and 5,500 ha for migrating shorebirds.

Research and Monitoring Objectives

Monitoring objectives include the development of a monitoring program to validate and improve estimates of breeding and migrating shorebird populations and trends, with an emphasis on focal species. This effort will include estimates of population size, migration timing, duration of stay, and use- days for migrating species and status and trends of breeding species. Research needs for shorebirds include building and refining biological models for breeding populations, development of bioenergetics models, and tracking migratory habitat use.

Chapter 2: Waterbird Plan

Focal Species

Black-crowned night-heron	Common tern
Yellow rail	Black tern
King rail	

Common tern, Photo:ODNR Div. of Wildlife

Habitat Objectives

Protection of 1600 ha of shallow semi-permanent marsh and herbaceous wetlands and 300 ha of deep water marsh. Restoration of 300 ha each of shallow semi-permanent marsh, deep water marsh, and herbaceous wetlands.

Research and Monitoring Objectives

Monitoring goals include adopting standard methodologies for surveying waterbirds and identifying gaps in current population survey efforts. Research needs for waterbirds include understanding habitat requirements of waterbird groups, identification of critical migration staging areas, understanding the effects of invasive plant species, and updating land-cover inventories to enhance conservation planning.

Chapter 3: Waterfowl Plan

Focal Species

Mallard	Lesser Scaup
Blue-winged teal	Canvasback
Wood duck	Tundra Swan
American black duck	

Wood duck, Photo: ODNR Div. of Wildlife

Habitat Objectives

Protection of 88,246 ha and restoration of 14,400 ha of waterfowl habitat.

Research and Monitoring Objectives

Monitoring objectives for waterfowl include expanding and integrating surveys of species abundance and environmental factors. Research needs include identifying landscape-scale population limiting factors, quantify carrying capacity, improve understanding of migratory corridors, and determine optimum spatial arrangement of wetland types within a landscape.

Chapter 4: Landbird Plan

Focal Species

Whip-poor-whill	Chimney swift
Red-headed woodpecker	Cerulean warbler
Yellow-breasted chat	Henslow's sparrow
Golden-winged warbler	Dickcissel
Eastern meadowlark	

Habitat Objectives

Protection of 1,092 km^2 of deciduous forest, 4 km^2 of forested wetland, 5,100 km^2 of shrublands, 1,939 km^2 of grassland and 2,933 km^2 of mixed-wooded openland. Restoration of 890 km^2 of deciduous forest, 2 km^2 of forested wetland, 2,826 km^2 of shrublands, 1,939 km^2 of grassland and 193 km^2 of mixed-wooded openland.

Research Objectives

Research objectives include identifying landscape and habitat characteristics associated with high productivity, identifying migratory stopover sites, and improving the understanding of landscape- and fine-scale habitat attributes important to focal species.

Eastern Meadowlark
Photo: ODNR Div. of Wildlife

BACKGROUND AND INTRODUCTION

Yellow-breasted chat, Photo: TK Tolford

Over the last 15 years, conservation plans have been developed for waterbirds, waterfowl, shorebirds, and landbirds at both national and regional scales, the latter including both Bird Conservation Regions (BCRs) and Joint Venture regions. In 2007, conservation plans developed by the Upper Mississippi River and Great Lakes Region Joint Venture (UMRGLRJV) were stepped-down to state level and can be used for bird conservation planning in Ohio (e.g., UMRGLRJV Shorebird Habitat Conservation Strategy; Potter et al. 2007a). Stepping down, or the process of making national and regional goals applicable to a lower level (e.g., state), is an important part of bird conservation planning, and allows Ohio to contribute to bird conservation needs of species at regional and continental scales. Partners in Flight refer to this step as "stepping forward", the idea that to move forward goals must be broken into smaller pieces to achieve a conservation outcome (Will et al. 2005).

The Ohio All-Bird Conservation Plan of the Ohio Bird Conservation Initiative (OBCI) has two main functions: to summarize existing national and regional plans, and to provide guidance for future bird conservation efforts in Ohio. Similar to the UMRGLRJV, the strategy goal for the Plan is to *"Establish efficient habitat conservation to maintain or increase carrying capacity for populations of priority species in Ohio, consistent with continental, Joint Venture, and BCR goals."* This OBCI Plan has been "stepped-down" from conservation plans developed by the Upper Mississippi River and Great Lakes Region Joint Venture (UMRGLRJV). These include conservation plans for shorebirds (Potter et al. 2007a), landbirds (Potter et al. 2007b), waterbirds (Soulliere et al. 2007a), waterfowl (Soulliere et al. 2007b), and the UMRGLRJV Implementation Plan (UMRGLRJV 2007). This plan is a collaborative effort among members representing numerous organizations that serve on the Ohio Bird Conservation Initiative's Conservation Planning and Research Committee. *It should be emphasized that this plan for OBCI contains extensive work done by the Upper Mississippi River and Great Lakes Region Joint Venture, national bird conservation groups, and the Appalachian Mountains Joint Venture. Further, this plan is a "living document" that will require updating as knowledge of bird conservation improves and new spatial data become available.*

The main goals for the Ohio All-bird Conservation Plan are to:

1. Summarize UMRGLRJV Habitat Conservation Strategy plans for shorebirds, waterbirds, waterfowl, and landbirds, and step-down population and habitat goals to Ohio
2. Prioritize a species list that identifies Ohio species that are at risk in the state, region, and across the continent
3. Identify research and monitoring projects needed to sustain bird populations and habitats in Ohio
4. Identify funding sources to encourage development of collaborative conservation projects among OBCI partners

This document contains four chapters, each summarizing UMRGLRJV Conservation Strategy plans for shorebirds, waterbirds, waterfowl, and landbirds, respectively. The OBCI Implementation plan is a separate document which describes Ohio, the history of OBCI, regional and continental bird conservation plans, and summarizes habitat objectives from the four bird groups covered in chapters 1-4.

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Chapter 1

SHOREBIRD PLAN

BACKGROUND

This chapter is based on the Upper Mississippi River and Great Lakes Joint Venture (UMRGLRJV) Shorebird Habitat Conservation Strategy (Potter et al. 2007):
http://www.uppermissgreatlakesjv.org/docs/UMRGLR_JV_ShorebirdHCS.pdf
and describes ways that Ohio can contribute to shorebird conservation in the UMRGLRJV through a combination of habitat protection, restoration and management, population monitoring, and research. These actions are needed to help reverse wetland losses, and to preserve and

enhance existing shorebird habitats. While the ultimate goal for Ohio will be to contribute to the maintenance or increase of continental shorebird populations, many other wetland-dependent wildlife species in Ohio will benefit.

We have included information from the JV plan that is most applicable to Ohio, but also suggest reviewing Potter et al. 2007 for

Sanderlings, Photo: ODNR Division of Wildlife

detailed information on their biological models and methodologies, and species accounts for UMRGLRJV focal species. We have summarized UMRGLRJV efforts to "step-down" continental shorebird conservation priorities to the JV. This will ultimately provide conservationists guidance in effectively increasing landscape carrying capacity through the protection, restoration, and enhancement of shorebird habitats. We have summarized where, what, when and how much habitat is needed to increase and sustain populations of priority shorebird species at target levels.

Conservation planning for shorebirds is difficult given the unpredictable nature of their migration routes and stopover duration, but the UMRGLRJV has established a scientific process for habitat objective-setting that includes identification of assumptions. To link population and habitat objectives for a diverse group like shorebirds, breeding and non-breeding focal species were selected for habitat planning. Each breeding focal species represents a specific habitat type. Likewise, foraging guilds that correspond to different cover types were selected for migration habitat planning and monitoring. Migration habitat objectives for Ohio were generated from continental estimates of spring population size. This assumed that the habitat carrying capacity

established to accommodate spring populations will suffice during autumn migration. Using information from the UMRGLRJV Shorebird Habitat Conservation Strategy, we have presented goals for shorebird habitat conservation in Ohio.

History and Goals

The U.S. Shorebird Conservation Plan (USSCP) (Brown et al. 2001) was developed as a strategic guide to stabilize declining populations of shorebird species. As one component of the North American Bird Conservation Initiative (NABCI), the USSCP seeks to promote partnerships at a landscape level that emphasize integrated management for multiple bird species. With few modifications, the population assessments and conservation priorities expressed in the USSCP and the UMVGL Shorebird Conservation Plan (de Szalay et al. 2000) were strongly used in the development of the Upper Mississippi and Great Lakes Joint Venture (UMRGLRJV) Shorebird Habitat Conservation Strategy (Potter et al. 2007).

Shorebird Biology and Migration

Shorebirds (Order Charadriiformes) include diverse groups such as plovers, avocets, stilts, and sandpipers; however, for the purposes of this plan do not include other groups in the Charadriiformes (e.g., gulls and terns). Nearly all shorebirds are wetland dependent, with the exceptions being Killdeer and two UMRGLRJV and OBCI focal species, Upland Sandpiper and American Woodcock. Because these focal species use more terrestrial habitats, they are also covered in the landbird chapter of this plan.

The Atlantic and Pacific coasts are important migration corridors for shorebirds in North America, but the importance of interior regions of the continent is gaining recognition. Ohio has only one migration staging area identified as regionally significant by the Western Hemisphere Shorebird Reserve Network: the Lake Erie Marshes of Ohio and Michigan (Potter et al. 2007). The JV region also encompasses the entire Lake Erie shoreline within Ohio, plus portions of the Ohio River floodplain which also serve as an important migration corridor for shorebirds.

Ohio is primarily used by shorebirds during spring and fall migration with approximate peaks of shorebird abundance occurring from late April-June and July-October. Ohio is much less used by nesting shorebirds. For example, all 34 species covered by the UMRGLRJV shorebird plan (Potter et al. 2007) are migratory in Ohio (Table 1), and only 6 species have nested in Ohio in recent years. BCRs 13 and 22 are considered highly important for Killdeer in Ohio, which also have common or locally common breeding populations of American Woodcock. Piping Plover has been extirpated as an Ohio breeder (Peterjohn 2001), but is included here since the U.S. Fish and Wildlife Service has designated critical habitat along a portion of the Lake Erie shoreline in Ohio, and Piping Plover do very rarely occur in migration. Killdeer and Wilson's Snipe occur during winter months, but only in very small numbers (Table 1); other shorebirds are typically even more rare in winter. Ohio and the larger UMRGLRJV are considered very important for 7 migrant species: Greater and Lesser Yellowlegs, Least Sandpiper, Pectoral Sandpiper, Dunlin, and Short-billed and Long-billed Dowitchers.

Table 1. Breeding, migration, and wintering status[a] of shorebirds in the Bird Conservation Regions (BCRs) within Ohio. Adapted from de Szalay et al. (2000). Several rare and vagrant species are not included and were not covered in deSzalay et al. (2000) or Potter et al. (2007).

Species[b]	UMRGLRJV migration/ breeding status	Ohio BCR 13 (Lower Great Lakes and St. Lawrence Plain)	Ohio BCR 22 (Eastern Tall Grass Prairie)	Ohio BCR 24 (Central Hardwoods)	Ohio BCR 28 (Appalachian Mountains)
Black-bellied Plover	M	M	M	M	M
American Golden-Plover	M	M	**M**	m	m
Semipalmated Plover	M	M	M	m	m
Piping Plover (Great Lakes)	M, **B**	m	m	-	-
Killdeer	M, **B**, w	M, **B**, w	M, **B,** w	M, B, w	M, B, w
Black-necked Stilt	m, b	m	m	-	-
American Avocet	m	m	m	-	-
Greater Yellowlegs	**M**	M	**M**	m	m
Lesser Yellowlegs	**M**	M	**M**	m	m
Solitary Sandpiper	M, b	M	M	m	m
Willet	m	m	m	m	m
Spotted Sandpiper	M, B	M, B	M, B	m, b	m, b
Upland Sandpiper	m, b	m, b	m, b	m	m
Whimbrel	m	m	m	m	M
Hudsonian Godwit	M	m	m	m	M
Marbled Godwit	M	m	m	-	-
Ruddy Turnstone	M	M	M	m	m
Red Knot	m	m	m	m	m
Sanderling	M	M	M	m	m
Semipalmated Sandpiper	M	M	M	m	m
Western Sandpiper	m	m	m	m	m
Least Sandpiper	**M**	**M**	**M**	m	m
White-rumped Sandpiper	M	m	M	m	M
Baird's Sandpiper	M	m	m	m	M
Pectoral Sandpiper	**M**	**M**	**M**	m	m
Dunlin	**M**	**M**	**M**	m	m
Stilt Sandpiper	M	M	M	m	M
Buff-breasted Sandpiper	M	M	M	m	m
Short-billed Dowitcher	**M**	**M**	M	m	m
Long-billed Dowitcher	**M**	M	M	m	M
Wilson's Snipe	M, B	M, b	M, b, w	m, w	m, w
American Woodcock	M, B	M, B	M, B	M, B	M, B
Wilson's Phalarope	M, b	m, b	m	m	m
Red-necked Phalarope	m	m	m	-	-

[a] Codes: B = breeding, M = migration, W = wintering. **B**, **M**, **W** = high concentrations; region extremely important to species relative to majority of other regions. B, M, W = common or locally abundant; region important to species relative to other regions. b, m, w = uncommon to fairly common; region within species' range but occurs in low abundance relative to other regions (Brown et al. 2001).

[b] Bold names are focal species selected for habitat planning and monitoring emphasis; Piping Plover and Wilson's Phalarope were considered focal species in the UMRGLRJV (Potter et al. 2007), but not for OBCI.

Shorebird Habitat Requirements

Habitat types important to breeding and migrating shorebirds in Ohio include natural and managed wetlands, flooded agricultural fields, floodplains, sand, and gravel bars of rivers, and shorelines and mudflats of lakes and reservoirs. In addition, open shrubland / shrub/sapling-stage forest are important habitats for breeding and foraging American Woodcock, whereas extensive grassland habitats are required by breeding Upland Sandpipers. Because Ohio has lost approximately 90% of its original wetlands, proper management of remaining wetland habitats at the appropriate times of year is important to meet habitat needs of migrating shorebirds.

A primary goal of this plan is to ensure that suitable foraging and resting sites are made available to shorebirds throughout the state over a range of climatic conditions. Migration and reproduction are annual events in the shorebird life cycle that demand energy and nutritional requirements above the maintenance level. Understanding the needs of these birds at these times of year will help managers to provide the necessary resources at the proper times. At many intensively managed sites, water level manipulation and other management activities (e.g., burning or disking) can be used to provide habitat for shorebirds and complement other wildlife management objectives.

Most shorebirds using Ohio are long-distance migrants that require suitable wetlands where they can periodically stop to replenish their energetic reserves. These staging areas must have water less than 20 cm (<8 inches) in depth or mud flats, sparse vegetation (<25% cover), undisturbed resting areas, and abundant invertebrate food resources to meet the habitat needs and high energy demands of migratory shorebirds.

Resource availability in inland areas like Ohio is highly dependent on precipitation patterns and greatly varies in time and space. During dry years, naturally-receding wetlands may provide the only available, unmanaged shorebird habitat. In extremely wet years, such areas are generally flooded well into the wet meadow zone rendering their food resources unavailable to most shorebird species. The dynamics of climate cycles and changing availability of feeding areas often causes shorebirds migrating through Ohio to be scattered over larger areas rather than concentrated at a few major stopover sites.

In coastal areas, habitat and food resources can be fairly predictable and abundant. Lake Erie has many important shorebird habitats including coastal marshes, exposed mudflats, and sandy beaches, but these wetlands are highly influenced by changes in lake levels. Changes in long-term precipitation patterns in the Great Lakes Basin affect water levels in Lake Erie, with record high and low water levels differing by as much as 1-2 m (3-6 ft). Annual lake levels can vary 10-30 inches during a year, with levels the lowest in mid-winter and highest in mid-summer. Furthermore, wind-driven tides, called seiches, cause lake levels to fluctuate on a daily basis, sometimes as much as 6-8 feet. Southwest winds expose the bottom of shallow coastal areas and make associated invertebrate food resources available to shorebirds, while prolonged northeast winds can deeply flood these same areas for extended periods. These extremes in water levels have important consequences to habitat availability for migrating shorebirds.
Most of the remaining vegetated marshes along Lake Erie's shoreline have been diked in response to degraded environmental conditions, prolonged high lake levels, and scouring by waves and winter ice. Very few undiked vegetated marshes remain. Water levels in diked

marshes can be managed to regenerate vegetation and increase availability of food resources available at correct times, but managers need to be aware of peak migration periods. Relatively low lake levels since 1999 more frequently expose shallow coastal areas and shoreline; unfortunately, many of these areas are being invaded by non-native plants such as phragmites and purple loosestrife.

Shorebird Population Status and Trends

A technical working group of the U.S. Shorebird Conservation Plan assessed the conservation status of shorebirds that breed in North America (Brown et al. 2001). The assessment established five conservation priority categories based on expert knowledge of shorebird population trends, distribution, relative abundance, and habitat threats. These categories were: highly imperiled, high concern, moderate concern, low concern, and lowest concern. At the continental scale, only Piping Plover, Red Knot, and Buff-breasted Sandpiper were considered "highly imperiled". Species considered of "high concern" were American Golden-Plover, Solitary Sandpiper, Upland Sandpiper, Whimbrel, Hudsonian Godwit, Marbled Godwit, Ruddy Turnstone, Sanderling, Western Sandpiper, Dunlin, Short-billed Dowitcher, American Woodcock, and Wilson's Phalarope (Brown et al. 2001). At the scale of the UMRGLRJV, only Piping Plover was considered "highly imperiled"; species considered of "high concern" were Greater Yellowlegs, Solitary Sandpiper, Upland Sandpiper, Whimbrel, Hudsonian Godwit, Marbled Godwit, Buff-breasted Sandpiper, Short-billed Dowitcher, and American Woodcock (Brown et al. 2006). Species considered of "moderate" concern within UMRGLRJV included: Black-bellied Plover, American Golden-Plover, Killdeer, Ruddy Turnstone, Red Knot, Sanderling, Semipalmated Sandpiper, Western Sandpiper, Least Sandpiper, Dunlin, and Stilt Sandpiper (Brown et al. 2001).

Shorebird Area Importance

The continental assessment by Brown et al. (2000) also evaluated area priority, where "area importance" (AI) scores were applied to each BCR (Table 2). AI scores were derived from knowledge and expert opinion of shorebird distributions, frequencies of occurrence, and relative abundance within BCRs. The scores reflect perceived importance of management and protection activities relative to other regions, plus the seasons during which a BCR is important, including breeding, migration, and winter (Brown et al. 2001). The USSCP system applies scores (1-5) to individual BCRs and shorebird planning regions according to the following criteria: 5 = high concentrations are known to occur, region has high importance to the species, and is critical to supporting hemispheric populations, 4 = common or locally abundant within the region, with large numbers known or suspected to occur, and the region is known or suspected to be important to supporting hemispheric or regional species populations, 3 = uncommon to fairly common within the region, region is within the species' range and the species occurs regularly within the region, but with low abundance, 2 = occurs rarely and with low frequency within the region, but the region is within the expected range of the species, and management is generally not warranted for the species within the region, 1 = occurs only unpredictably, irregularly, or as a vagrant within the region, which is outside the expected range of the species.

Table 2. Shorebird area importance (AI) scores[a] for Bird Conservation Regions (BCR) within Ohio. Based on scoring system of Brown et al. (2000).

	BCR 13 Lower Great Lakes / St Lawrence Plain	BCR 22 Eastern Tall Grass Prairie	BCR 24 Central Hardwoods	BCR 28 (Appalachian Mountains)
Black-bellied Plover	4	4	3	3
American Golden-Plover	**4**	**4**	**3**	**3**
Semipalmated Plover	4	4	3	3
Piping Plover	1	1	-	-
Killdeer	**5**	**5**	**4**	**4**
Greater Yellowlegs	4	5	4	4
Lesser Yellowlegs	4	5	4	4
Solitary Sandpiper	4	4	4	4
Willet	3	3	2	2
Spotted Sandpiper	4	4	4	4
Upland Sandpiper	**3**	**3**	**3**	**3**
Whimbrel	3	3	3	3
Hudsonian Godwit	3	4	1	1
Marbled Godwit	3	4	1	1
Ruddy Turnstone	4	4	3	3
Red Knot	3	3	1	1
Sanderling	**3**	**4**	**3**	**3**
Semipalmated Sandpiper	4	4	4	4
Western Sandpiper	3	3	3	3
Least Sandpiper	5	5	4	4
White-rumped Sandpiper	3	4	3	3
Baird's Sandpiper	3	4	3	3
Pectoral Sandpiper	5	5	3	3
Dunlin	**5**	**4**	**3**	**3**
Stilt Sandpiper	4	4	3	3
Buff-breasted Sandpiper	4	4	3	3
Short-billed Dowitcher	**5**	**4**	**3**	**3**
Long-billed Dowitcher	5	5	3	3
Wilson's Snipe	**4**	**4**	**3**	**3**
American Woodcock	**4**	**4**	**4**	**4**
Wilson's Phalarope	3	4	1	1
Red-necked Phalarope	1	1	1	1

[a] Larger AI scores represent greater importance of the area to high concentrations and supporting hemispheric populations.
[b] Bold names and scores are Ohio focal species selected for planning and monitoring emphasis; Piping Plover and Wilson's Phalarope were considered focal species in the UMRGLRJV (Potter et al. 2007).

OHIO HABITAT CONSERVATION STRATEGIES FOR SHOREBIRDS

Habitat Inventory and Protection Goals

Wetland complexes and associated uplands in Ohio that are considered important for shorebirds and other wetland birds need to be comprehensively identified. As of February 2010, Ducks Unlimited (Michigan Office) has nearly completed an update of the statewide wetland inventory using National Wetland Inventory methodology and this will be an important step for evaluating the status of Ohio's wetland habitat. Where feasible, sites identified will need restoration and/or long-term protection by federal and state agencies and conservation organizations (e.g., ODNR, OEPA, USDA, Ducks Unlimited, The Nature Conservancy) through fee-title acquisition, conservation easement, or landowner agreement.

Although Ohio has relatively few sites that attract large numbers of shorebirds on a regular basis, several areas are important for achieving UMRGLRJV goals. These areas include National Wildlife Refuges (Ottawa, Cedar Point, West Sister Island), State Wildlife Areas (Big Island, Killdeer Plains, Magee Marsh, Metzger Marsh, Pickerel Creek), Conneaut Harbor, Hoover Reservoir, and several private hunting clubs.

The UMRGLRJV has summarized goals for habitat enhancement for Ohio by bird conservation region (Potter et al. 2007; Table 3). The JV suggests protecting over 8,468 ha of habitat for Ohio breeding species and over 7,153 ha for migrating species in Ohio. The goals set by the UMRGLRJV Shorebird Conservation Strategy are based on focal species. Breeding focal species were chosen for habitat planning and population monitoring while migrating species were chosen for habitat-limiting factors, monitoring and migration chronology. Information on focal species and their habitat requirements can be found in Potter et al. (2007).

Table 3. Ohio shorebird habitat maintenance and protection objectives (ha) by Bird Conservation Region (BCR) to meet carrying capacity for breeding (B) and migrating (M) population goals in the Upper Mississippi River and Great Lakes Joint Venture region. Distribution of protection effort based on JV focal species [a] breeding population estimates (B), migration areas importance scores (M), and habitat models; see Potter et al. (2007) for methods. Habitat objectives are given in hectares (1 ha = 2.47 acres). See Table 1 in Chapter 5 for habitat descriptions.

BCR	Dry mudflat / agriculture		Wet meadow with open water	Wet mudflat / moist soil plants	Shallow water (<5 cm)	Moderate water (5-20 cm)	Beach	
	B	M	B	M	M	M	B	M
13	230	497	832	2,216	897	239	1	69
22	7,345	55	0	236	105	28	2	8
28	57	357	0	1,673	611	97	0	63
Total	7,633	910	832	4,125	1,613	364	3	141

[a] Ohio breeding focal species included Killdeer (dry mudflat), and Wilson's Snipe (wet mudflat). Focal species representing migration guilds included American Golden Plover (dry mudflat), Dunlin (wet mudflat), Short-billed Dowitcher, and Sanderling (beach); Piping Plover (beach) and Wilson's Phalarope (moderate water) were considered focal species in the UMRGLRJV (Potter et al. 2007).

Habitat Restoration

The North American Waterfowl Management Plan (NAWMP 2004) is a continent-wide conservation plan implemented in 1986 and signed by the U.S. and Canada (and later Mexico) to restore waterfowl populations through regional partnerships called Joint Ventures. Because of its record of success, additional continental bird conservation plans, including the UMRGLRJV Shorebird Plan, have been modeled after the NAWMP and implemented through the Joint Ventures. Although the type of habitat provided for waterfowl may differ from what is optimal for shorebirds, proper planning and coordination of wetland restoration and management can benefit both waterfowl and shorebirds.

Ohio goals for habitat restoration and enhancement developed by UMRGLRJV (Potter et al. 2007; Table 4) recommend restoring 11,950 ha for breeding shorebirds and over 5,500 ha for migratory species. Areas with greater potential for wetland restoration in Ohio may be based on the presence of hydric soils (Figure 1). Restoration potential is based on the percent hydric soils (wet/previous wetland; STATSGO 1991) and the relative importance of location. Wet-soil areas >50 km from known shorebird concentration sites received a higher priority rating (yellow-red) and wet sites <50 km from current staging areas were rated moderate priority (blue); white areas on the map have lower wetland restoration potential.

Table 4. Ohio shorebird habitat restoration and enhancement objectives (ha) by Bird Conservation Region (BCR) to meet carrying capacity for breeding (B) and migrating (M) population goals in the Upper Mississippi River and Great Lakes Joint Venture region. Distribution of restoration effort is based on JV focal species breeding population deficits (B), migration population deficits (M), and habitat models. Habitat objectives are given in hectares (1 ha = 2.47 acres). See Table 1 in Chapter 5 for habitat descriptions.

BCR	Dry mudflat / agriculture		Wet meadow with open water	Wet mudflat / moist soil plants	Shallow water (<5 cm deep)	Moderate water (5-20 cm deep)	Beach
	B	M	B	M	M	M	M
13	331	303	975	2,032	276	218	170
22	10,560	32	0	215	33	25	22
28	82	184	0	1,504	198	96	168
Total	10,974	520	975	3,751	507	338	360

[a] Ohio breeding focal species included Killdeer (dry mudflat) and Wilson's Snipe (wet mudflat). Focal species representing migration guilds included American Golden Plover (dry mudflat), Dunlin (wet mudflat), Short-billed Dowitcher, and Sanderling (beach); Piping Plover (beach) and Wilson's Phalarope (moderate water) were considered UMRGLRJV focal species (Potter et al. 2007). Population deficit = population goal–current estimate.

Habitat Management Philosophy

Management of shorebird habitats requires using a wide range of techniques in diverse habitats, and achieving regional priorities requires management for different species at different seasons. Integrated management of Ohio habitats used by shorebirds and other wetland-dependent wildlife is a goal of this plan. This section summarizes the UMGLV Shorebird Plan's wetland habitat management principles (Potter et al. 2007).

Site specific management plans must be designed by local managers, but these general principles will apply to many situations where integrated wetland management for shorebirds and other wetland wildlife is the goal.

1) Wetland habitats should be managed as dynamic systems.

2) Naturally self-maintaining systems should be preserved and are generally preferable to sites requiring ongoing, intensive management.

3) Management for diverse species groups is generally preferable to management for single species, except for species at high risk.

4) Management activities should be seasonally timed to have the maximum impact on critically limiting resources.

5) Shorebird management should be a priority on publicly managed wetlands.

6) Greater efforts are needed to support improved shorebird management activities on private lands.

7) Successful management for shorebirds requires a detailed understanding of historical conditions at each site and across entire landscapes.

8) Multiple use management of habitats requires careful balancing of public access with acceptable levels of human disturbance to shorebirds.

Wetland Complex Principle: The Value of Wetland Stages

Providing a complex of wetlands is important - what resources one wetland may be lacking, another one can provide. Managers can learn to provide the necessary resources for migrating shorebirds by recognizing the importance of providing a variety (complex) of wetland habitats during the annual peaks of shorebird abundance. Shorebird abundance in Ohio peaks during April -June and July-November. Managers need to provide a variety of appropriate water depths and vegetation heights/densities at those times to ensure that the life-requirements of a variety of shorebirds are made available. Water levels in constructed impoundments can be manipulated slowly, gradually, and at varied times to mimic natural hydrology. If appropriately timed, these gradual changes provide food and foraging depths for a variety of bird species and their varying migration periods.

Importance of Disturbance

Providing basic habitat requirements is of no value if the habitat is not reasonably protected from human disturbance. Except for egg production, flight requires more energy than any other activity. If disturbance from public recreation or management activities prevents birds from utilizing habitat at crucial times of year, this disturbance can be detrimental to shorebirds. Managers need to minimize the time that shorebirds spend flying and maximize the time they spend feeding and resting. For high to moderate shorebird use areas, managers should try to prohibit access (or allow very limited access) within approximately 500 feet during peak shorebird migration, especially August to early October; user groups of concern include dog walkers, fisherman, hunters, boaters, and bird watchers.

POPULATION MONITORING

Monitoring Progress for Population Goals

Measures of abundance are crude for most shorebird species, but we assume they provide an adequate starting point for goal setting and determining monitoring needs. However, an effective monitoring strategy is required to measure progress toward meeting population and habitat objectives within Ohio.

Current surveys include species-specific monitoring of breeding populations, such as the Woodcock Singing-ground Survey, to more general monitoring programs like the International Shorebird Survey (ISS) and Breeding Bird Survey (BBS). These long term programs collectively provide information on distribution, densities, and population trends. The Woodcock Singing-ground Survey is a systematic effort producing relatively high quality data for this species, at least at regional and continental levels. Due to the low density of survey routes, however, these

American woodcock, Photo: Paul Rodewald

data are less useful at smaller scales. The ISS may be used for peak migration staging numbers, migration timing, and responses to management actions at specific sites. It cannot be used to estimate population trends because survey design is not systematic or randomized and is therefore subject to large observer bias. The BBS is more statistically rigorous but is conducted from roads which have historically avoided wetland areas and wetlands are under-represented. It is useful for inland and upland species like Killdeer and Upland Sandpiper, but detection and route locations are inadequate for other shorebirds that occur in the Great Lakes coastal zone or remote wetland sites.

Monitoring Objectives

Develop a monitoring program to validate and improve estimates of breeding and migrating shorebird populations and trends in the JV region, with emphasis on JV focal species. This effort will include estimates of population size, migration timing, duration of stay, and use- days for migrating shorebirds, plus status and trends of breeding species.

UMRGLRJV has developed specific short-term (< 5 years) survey needs for different shorebird groups to fill immediate information gaps (Potter et al. 2007).

• Coastal migrants -- Sanderling, Dunlin, Piping Plover, Ruddy Turnstone, Semipalmated Sandpiper, and Black-bellied Plover. Surveys should be conducted during autumn and spring via a stratified random sampling at the state level using a network of volunteers.

• Interior-migrating plovers -- American Golden-Plover, Black-bellied Plover, and Killdeer. Surveys should be conducted during spring migration only and focus on interior wetlands and flooded agricultural fields. Surveys should be conducted on stratified random plots or roadside transects within areas of Illinois, Indiana, and Ohio known historically to be staging areas.

• Other interior-migrating shorebirds -- Wilson's Phalarope, Pectoral Sandpipers, and Greater and Lesser Yellowlegs. Surveys should be conducted during spring migration and focus on interior wetlands, coastal marshes and estuaries using cluster sampling or a stratified random plot design.

The UMRGLRJV recommended specific long-term annual surveys of breeding populations of Upland Sandpiper and Wilson's Snipe, but these species are rare breeders in Ohio (Peterjohn 2001) making surveys unfeasible. However, the Ohio Breeding Bird Atlas II (2006-2010) will provide a unique opportunity to locate new breeding individuals or populations.

State Breeding Bird Atlases can provide state-level information on breeding distribution, rough and status, and long-term trends for and changes in distribution between atlas efforts for Killdeer, Spotted Sandpiper, and American Woodcock. However, within Ohio only very limited opportunity currently exists to obtain meaningful population trend estimates in interior habitats due to annual variation in weather and habitat conditions.

Finally, in addition to documenting area use, the UMRGLRJV recommended that JV partners strive to evaluate habitat quality as it relates to productivity and survival. Smaller scale monitoring projects that target JV focal species may be necessary to better understand the effect of local conservation efforts on the fitness of shorebirds. Baseline information on vital rates (breeders) and physical condition (migrants and breeders) must be determined and a monitoring protocol eventually established.

Most inland shorebird habitat in Ohio is dispersed and ephemeral. Thus, shorebirds using interior areas of the state tend to opportunistically exploit available habitat within the landscape, rather than consistently concentrating at a few sites as is done along Lake Erie. This makes population monitoring a challenge. The only large-scale survey for tracking numbers and distribution of migrating shorebirds that currently covers the UMRGLRJV is the International Shorebird Survey (ISS). Based at the Manomet Center for Conservation Sciences, the ISS uses a network of ~800 cooperators to census shorebirds at over 500 locations. ISS data are useful in providing information on use, peak numbers, timing of migration, and responses to management activities at individual survey sites. Ohio currently has the greatest ISS coverage (54 sites) within the UMRGLRJV, followed by Michigan (23), New York (12), and Illinois (11). Until improvements to the ISS or other migration-staging surveys are completed, migrant population

estimates for the JV region will be updated based on changes in continental breeding population estimates.

RESEARCH NEEDS FOR SHOREBIRDS

To further shorebird conservation in the UMRGLRJV, research and information needs were identified by Potter et al. (2007) with a specific emphasis on UMRGLRJV focal species.   OBCI can in the future make this list more specific to Ohio.

Research should be developed to build or refine biological models that relate breeding shorebird population responses to landscape/habitat changes. This requires identification and understanding of how habitat factors influence vital rates (e.g., survival, nesting/fledging success) plus knowledge of how vital rates affect population growth and sustainability.

Research should be developed to improve bioenergetics models used to evaluate landscape/habitat carrying capacity for migrating shorebirds including analyses of energetic carry capacity, and habitat characteristics important to shorebird abundance and population dynamics (e.g., distribution and abundance of shorebirds in relation to indices like wetland abundance and landscape composition).

A combined monitoring and research protocol should be developed to better track priority migrating shorebirds (JV focal species) in order to identify 1) primary and secondary use areas, 2) characteristics that influence habitat suitability, 3) energetic condition as related to habitat suitability, and 4) change in habitat abundance.

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Chapter 2
WATERBIRD PLAN

BACKGROUND

This chapter is based on the Upper Mississippi River and Great Lakes Region Joint Venture (UMRGLRJV) Waterbird Habitat Conservation Strategy (Soulliere et al. 2007): http://www.uppermissgreatlakesjv.org/docs/zzUMRGLR_JV_WaterbirdHCS.pdf

We have included information from the JV plan that is most applicable to Ohio and summarize Joint Venture (JV) efforts to "step-down" continental waterbird conservation priorities to the JV region and have initiated step-down to a smaller scale, the state of Ohio. This will ultimately provide conservationists guidance in effectively increasing landscape carrying capacity through the protection, restoration, and enhancement of waterbird habitats.   We have summarized where, what, when and how much habitat is needed to increase and sustain populations of priority waterbird species at target levels.

Great blue heron, Photo: ODNR Div. of Wildlife

The term "waterbird" refers to colonial nesting birds (herons, egrets, terns, gulls and cormorants), secretive marshbirds (rails, bitterns and cranes), and loons and grebes that are most often associated with wetland and open-water habitats. These species vary in their social behavior from being mostly solitary and secretive (e.g. King Rail) to semi-colonial (Green Heron), and colonial (e.g. Great Blue Heron). Marshbirds tend to be difficult to observe; they only venture out of extremely dense vegetation while foraging. Colonial waterbirds are on the opposite spectrum; these birds form large colonies while nesting or roosting and are often very conspicuous. Roosts and breeding colonies are usually placed on islands to reduce predation and competition. Colonies are frequently found near important foraging sites.

A national waterbird conservation plan, called the Waterbird Conservation Plan for the Americas (Kushlan et al. 2002), was written to summarize status and threats to North American waterbird species. The first version of this plan only covered colonial and semi-colonial waterbirds but the second version that is due out in the near future will cover species missed in the first draft - secretive marshbirds, loons, and cranes. The UMGLJV regional waterbird conservation plan (Wires et al., in review) summarizes waterbird conservation and management, habitat preferences, population trends, and population estimates.

Ohio provides habitat for many species of waterbirds (see Table 1). The most productive area for waterbirds in Ohio is within the marshes of the Western Lake Erie basin, an area that was once the Great Black Swamp. The islands in Lake Erie shelter nesting colonies of wading birds, gulls and cormorants. Also, many species spend the non-breeding season along the shores of Lake

Erie while some species are here only during migration. Although many of Ohio's wetlands have been drained and converted to agriculture, some of the areas that remain are home to secretive marshbirds and other waterbirds.

Table 1. Seasonal occurrence, relative abundance, and nesting strategy of waterbirds within Ohio listed by Bird Conservation Region (BCR). Data largely taken from the Upper Mississippi Valley / Great Lakes Regional Waterbird Plan (Wires et al., in review) and Soulliere et al. (2007).[a]

Species[b]	Lower Great Lakes / St. Lawrence Plain (BCR 13)	Eastern Tall Grass Prairie (BCR 22)	Central Hardwoods (BCR 24)	Nesting Strategy[c]
Red-throated Loon	w, m	m	m	N
Common Loon	w, M	M	w, m	N
Pied-billed Grebe	B, w	B, w	b, w	N
Horned Grebe	w, M	w, M	w, m	N/C
Red-necked Grebe	w, m	w, m	-	N/C
Eared Grebe	m	m	-	C/N
American White Pelican	m	m	m	C
Double-crested Cormorant	**B**	B, w, **M**	w, m	C
American Bittern	*b, m*	*b, m*	*b, m*	N
Least Bittern	*b, m*	*b, m*	*b, m*	N/C
Great Blue Heron	B, w, m	B, w, m	b, w, m	C
Great Egret	b, m	B, m	m	C
Snowy Egret	m	b, m	m	C
Little Blue Heron	m	b, m	m	C
Cattle Egret	m	b, m	m	C
Green Heron	*B*	*b*	*b*	N/C
Black-crowned Night-Heron	*b, w*	*b, w*	*b, w*	C
Yellow-crowned Night-Heron	*b, w*	*b, m*	*b, m*	C
Yellow Rail	*m*	*m*	*m*	N
Black Rail	*m*	*b, m*	*m*	N
King Rail	*b, m*	*b, m*	*m*	N
Virginia Rail	**b**, *w*	**b**, *m, w*	*w*, m	N
Sora	**b**	**b**, m	b, m	N
Common Moorhen	b, *m*	b, *m*	b, *m*	N
American Coot	b, w, m	b, w, m	b, w, m	N
Sandhill Crane	b, m	b, m	m	N
Whooping Crane	*m*	*m*	-	N
Parasitic Jaeger	*m*	*m*	-	C/N
Franklin's Gull	*m*	*m*	m	C
Bonaparte's Gull	*w, m*	*w, m*	*w, m*	C
Ring-billed Gull	b, *w, m*	b, *w, m*	*w, m*	C
Herring Gull	b, *w, m*	b, *w, m*	*w, m*	C
Great Black-backed Gull	m, w	m, w	-	C
Sabine's Gull	*m*	*m*	*m*	C

Table 1. Continued.

Species[b]	Lower Great Lakes / St. Lawrence Plain (BCR 13)	Eastern Tall Grass Prairie (BCR 22)	Central Hardwoods (BCR 24)	Nesting Strategy[c]
Thayer's Gull	w	w	-	C
Iceland Gull	w	w	-	C
Lesser Black-backed Gull	w	W	-	C
Glaucous Gull	w	w	-	C
Little Gull	w	w	-	C
Caspian Tern	*m*	m	*m*	C
Common Tern	b	b, *m*	*m*	C
Forster's Tern	m	*m*	*m*	C
Least Tern	M	m	m	C/N
Black Tern	b	b, *m*	*m*	C

[a]Seasonal occurrence and relative abundance categories: B = Breeding, M = Migration, W = Wintering.
B, M, W = high concentrations, Ohio is very important to the species relative to most other regions; B, M, W = common or locally abundant, Ohio is important to the species; b, m, w = uncommon to fairly common, Ohio is within species range but species occurs in low abundance relative to other states; *b, m, w* = status as a breeder, migrant, or wintering birds is known, but abundance relative to other states is not known for the BCR.
[b] Bold names are focal species selected for habitat planning and monitoring emphasis (Soulliere et al. 2007); Yellow Rail is considered focal species in the UMRGLRJV, but not for OBCI.
[c]Nesting strategy includes colonial (C) and non-colonial (N), or both (C/N); when the degree of coloniality varies, the most typical behavior is listed first.

Population Trends

Using standardized survey protocols for marsh birds, the National Marsh Bird Monitoring Program (NMBMP) has been collecting data in coastal wetlands around the Great Lakes since 1995 (Conway 2004). Data collected by the NMBMP suggest significant basin-wide population declines in some marsh-breeding birds since the start of the program, including Pied-billed Grebe, American Bittern, Least Bittern, Sora, Virginia Rail, Common Moorhen, and Black Tern (Crewe et al. 2005). Species that depend on emergent wetlands appear to be declining, especially in those areas that have a high human populations or agricultural development. However, some species such as Double-crested Cormorant and Ring-billed Gull have increased so much that they are considered nuisances in some areas. Long term (1966-2005) data on population trends for waterbird species that breed within the UMRGLRJV are provided by the North American Breeding Bird Survey (Table 2; Sauer et al. 2006).

PLANNING FRAMEWORK

The UMRGLRJV Waterbird Habitat Conservation Strategy Plan (Soulliere et al. 2007) used the Partners in Flight "five element process" to design landscapes to meet regional bird conservation objectives (Will et al. 2005). The five elements include: 1) landscape characterization and assessment, 2) bird population modeling, 3) conservation opportunities assessment, 4) landscape design and 5) monitoring and evaluation. Soulliere et al. (2007) identified population status and goals for all breeding waterbirds in the JV, but ultimately used a focal species approach for conservation planning with each species representing a different community type.

Table 2. Long term (1966-2005) and short term (1996-2005) population trend estimates (annual % change) for waterbird species that breed within FWS Region 3 [a] based on the North American Breeding Bird Survey (BBS, Sauer et al. 2006). These data are from entire UMRGLRJV region and are not Ohio specific.

Species[b]	1966-2005			1996-2005		
	Trend	p-value[c]	n[d]	Trend	p-value	n
Pied-billed Grebe	-2.7	0.07	86	-6.5	0.37	31
Double-crested Cormorant	6.0	0.11	58	-11.2	0.06	33
American Bittern	-5.0	0.00	116	6.7	0.28	42
Least Bittern	-6.8	0.25	6	na[e]	na	na
Great Blue Heron	3.1	0.00	542	-1.2	0.22	438
Great Egret	9.7	0.00	61	11.4	0.05	39
Snowy Egret	na	na	na	na	na	na
Little Blue Heron	-0.5	0.91	11	-1.4	0.53	7
Cattle Egret	2.6	0.33	11	-8.2	0.31	8
Green Heron	-0.7	0.21	399	0.1	0.93	239
Black-crowned Night-Heron	0.9	0.50	28	-7.6	0.43	8
Yellow-crowned Night-Heron	-5.2	0.20	3	na	na	na
King Rail	na	na	na	na	na	na
Virginia Rail	-3.2	0.11	19	43.3	0.12	2
Sora	-2.5	0.10	86	-3.6	0.39	32
Common Moorhen	10.6	0.44	11	na	na	na
American Coot	-5.5	0.00	44	-5.4	0.27	11
Sandhill Crane	9.7	0.00	121	5.9	0.00	115
Ring-billed Gull	3.8	0.16	114	-1.1	0.57	70
Herring Gull	-5.7	0.02	49	5.0	0.73	26
Caspian Tern[f]	-14.8	0.05	6	na	na	na
Common Tern	na	na	na	na	na	na
Forster's Tern[f]	3.8	0.22	9	14.5	0.10	4
Black Tern	-5.6	0.00	76	3.6	0.52	25

[a] FWS Region 3 includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin.
[b] Bold names are focal species selected for habitat planning and monitoring emphasis (Soulliere et al. 2007); Yellow Rail is considered focal species in the UMRGLRJV, but not for OBCI.
[c] p-values represent confidence in trend direction with values closer to 0.0 reflecting a greater degree of confidence in the trend; for example, values <0.05 reflect >95% confidence in trend direction.
[d] n = number of BBS routes used to generate regional trend average; results based on fewer than 20 BBS routes may be unreliable as a regional indicator of population trend.
[e] na = inadequate survey data to generate a trend estimate.
[f] indicates species that are non-breeders in Ohio.

POPULATION GOALS

Population estimates derived by the UMRGLRJV were used to generate population deficits (population goal – current population estimate = population deficit and habitat conservation objectives) (Table 3). Unlike other national conservation plans the National Waterbird Conservation Plan did not provide national population goals, instead the UMRGLRJV used regional goals provided in the Upper Mississippi Valley / Great Lakes Waterbird Conservation Plan (Wires et al., in review). Species population goals that were not in the UMRGLRJV plan were derived from state atlas data, survey data or expert opinion.

Table 3. Population estimates, goals, and deficits by Bird Conservation Region for waterbirds that breed in the UMRGLRJV, including BCRs within Ohio.

Species	BCR	Ohio estimate	UMRGLRJV estimate	UMRGLRJV goal	UMRGLRJV deficit
Pied-billed Grebe	13	56	56	84	28
	22	154	1,194	1,791	597
	24	na	72	108	36
	28	4	4	na	na
Double-crested Cormorant	13	na	7,844		
	22	na	8,296		
American Bittern	13	10	10	na	na
	22	12	112	224	112
	24	0	14	28	14
Least Bittern	13	35	35	53	18
	22	100	1,230	1,845	615
	24	na	55	83	28
	28	35	35	53	18
Green Heron	22	na	55,500		
	24	na	10,336		
Great Blue Heron	22	na	86,660		
	24	na	9,442		
Great Egret	22	na	12,475		
	24	na	879		
Snowy Egret	22	na	300		
	24	na	190		
Little Blue Heron	22	na	1,450		
	24	na	559		
Cattle Egret	22	na	2,040		
	24	na	4,402		
Black-crowned Night- Heron	13	na	654	981	327
	22	na	3,100	4,650	1,550
	24	na	333	500	167

Table 3. Continued.

Species	BCR	Ohio estimate	UMRGLRJV estimate	UMRGLRJV goal	UMRGLRJV deficit
Yellow-crowned Night- Heron	22	na	600	900	300
	24	na	656	984	328
Black Rail	13	0	0	na	na
	22	2	36	54	18
	24	0	8	12	4
	28	0	0	na	na
King Rail	13	0	4	6	2
	22	30	230	460	230
	24	na	21	42	21
Virginia Rail	13		160		
	22		572		
	24	na	16		
	28		12		
Sora	13		1,117	1,676	559
	22		3,950	5,925	1,975
	24	na	19		
Common Moorhen	13	400	400		
	22	230	1,860		
	24	na	80		
	28	30	30		
American Coot	13	25	25		
	22	400	1,545		
	24	na	110		
	28	5	5		
Sandhill Crane	22		300		
Ring-billed Gull	13		117,232		
	22		112,762		
Herring Gull	13		4,428		
	22		7,192		
Common Tern	13		1,426	2,139	713
	22		240	360	120
Black Tern	13		465	698	233
	22		100	150	50

[a]Population goals and deficits are included only for species identified as "high" conservation status in continental and regional conservation plans (Soulliere et al. 2007).
[b]Bold names are focal species selected for habitat planning and monitoring emphasis (Soulliere et al. 2007); Yellow Rail is considered focal species in the UMRGLRJV, but not for OBCI.

FOCAL SPECIES, HABITAT GOALS, AND OBJECTIVES

Focal Species

Yellow rail, Photo: ODNR Div. of Wildlife

The UMRGLRJV chose five focal species (Black-crowned Night-Heron, Yellow Rail, King Rail, Common Tern, and Black Tern) as the basis for their biological models and habitat objectives. The focal species are found in manageable numbers, breed in the JV and have enough data to allow for proper management. These focal species are representatives of the major habitat types found in Ohio and the JV which include: seasonal herbaceous wetland and meadows, shallow semi-permanent marshes, deep-water marshes and open water, herbaceous seasonal and hemi marsh with forest, island/shorelines with little or no vegetation (Table 4). A summary of information of UMRGLRJV waterbird focal species that occur within Ohio is given in Appendix C; for more information on waterbird focal species see Appendix A in Soulliere et al. (2007).

Table 4. General community preferences for breeding waterbird species (guilds) occurring in the Upper Mississippi River and Great Lakes Joint Venture (JV) region. Names in bold text are JV focal species, some of which occur in multiple community types.

Seasonal herbaceous wetlands and wet meadows (incl. mudflats)	Shallow semi-permanent marshes (emergent vegetation and open water mosaics – hemi marsh)	Deep-water marshes (submerged and emergent vegetation) and open water, islands with herbaceous or brush	Herbaceous seasonal and hemi-marsh wetlands with associated forest or forested/brushy islands (including river riparian areas)	Islands or shoreline with little or no vegetation surrounded by extensive open water
King Rail	**Black Tern**	**Black Tern**	**Black-crowned Night-Heron**	**Common Tern**
Yellow Rail	**King Rail**	Common Loon	Great Blue Heron	Double-cr. Cormorant
Black rail	Forster's Tern	American Coot	Green Heron	American White Pelican
Virginia Rail	Herring Gull	Red-necked grebe	Little Blue Heron	Caspian Tern
Sora	Little Gull	Eared Grebe	Yellow-crowned Night-Heron	Ring-billed Gull
American Bittern		Western grebe	Great Egret	Herring Gull
Least Bittern		Pied-billed Grebe	Cattle Egret	Great Black-backed Gull
Sandhill Crane		Common Moorhen	Snowy Egret	Least Tern
				Little Gull

Habitat Goals

Habitat goals and objectives are based on desired population numbers for the JV focal species. The focal species approach to derive habitat goals assumes that protecting and enhancing for focal species will also enhance populations for other waterbird species. Specific data used to

generate habitat goals and objectives are described in Appendix A in Soulliere et al. (2007). Habitat objectives derived by the UMRGLRJV will be refined as more information about focal species becomes available.

Restoration and Enhancement Objectives

The UMRGLRJV restoration and enhancement goals were based on focal species population deficits and habitat models. The term "restoration" implies converting a human altered landscape to a community type that would benefit the focal or target species. With any restoration or enhancement work, landscape context and capabilities are always important considerations including: current cover, hydrology, and historical vegetation.

The goals set for Ohio include 300 ha each of shallow semi-permanent marsh, deep water marsh, and herbaceous wetlands with brushy islands (See Table 5). All the restoration and enhancement objectives are within BCR 13 and 22, which occur around Lake Erie. Targeting areas along Lake Erie and within Western Lake Erie basin will enhance habitat for migratory, wintering and breeding waterbirds.

Protection Objectives

Similar to enhancement objectives, protection objectives were based on habitat needs of the waterbird focal species in the JV. While some habitat may already be protected by state and federal land holdings, there is a need to increase conservation land in Ohio. The JV suggests protecting 1,600 ha of shallow semi-permanent/hemi marshes and herbaceous wetlands, and 300 ha of deep water marsh (see Table 6). Most of the protection falls within BCR 22, which encompasses the Western Lake Erie Basin.

MONITORING NEEDS

Monitoring is an important step to reach any conservation goal. Monitoring helps involved agencies and partners detect changes in populations, evaluate habitat productivity, and help distinguish if management decisions are working. The following monitoring needs were described by the UMRGLRJV and reflect national monitoring goals as well:

- Standard methodologies -- Large-scale monitoring programs must use techniques that allow population and habitat data collected in different locations and across multiple geographic or temporal scales to be compared and combined. OBCI recommends using standardized survey protocols for marsh birds and specifically the protocol of the National Marsh Bird Monitoring Program (NMBMP). The monitoring goal of the NAWCP is to be able to detect >50% change over 10 years or 3 generations.

- Filling information gaps -- With a data repository and standard methodologies in place, partners will be able to identify gaps in current population survey efforts and coordinate an integrated network of statistically valid, long-term, waterbird population monitoring programs throughout the region and the continent.

Table 6. Waterbird habitat protection objectives by state and Bird Conservation Region (BCR) to meet breeding and migration population goals for the Upper Mississippi River and Great Lakes Joint Venture region. Objectives are presented in hectares (1 ha = 2.47 acres), except for the unvegetated islands. Distribution of protection effort based on BCR population estimates (Table 3) combined with waterbird distribution maps and habitat models (Appendix A).

State	BCR	Seasonal wetlands and wet meadows	Shallow semi-permanent marshes, hemi-marsh	Deep water marshes and open water	Herbaceous wetlands with brushy islands	Unvegetated islands with open water[a]
Ohio	13	0	100	200	200	1
	22	0	700	100	600	2
	28	0	0	0	0	0
	Total	0	800	300	800	3
All States	12	11,300	200	1,600	1,000	17
	13	0	100	200	200	1
	22	0	4700	200	1400	4
	23	1,400	1,900	7,000	1,400	4
	24	0	400	0	0	0
	28	0	0	0	0	0
	Total	12,700	7,300	9,000	4,000	26

[a]Largely represents existing Common Tern nest colonies

RESEARCH NEEDS

Research needs were identified by the UMRGLRJV Waterbird Conservation Strategy (Soulliere et al. 2007). OBCI can in the future make this list more specific to Ohio. OBCI partners can contribute to a variety of these UMRGLJV research needs, including:

- Accurate distribution, abundance, and population trend data for all species to refine population goals and habitat conservation objectives, plus provide a means to measure management performance over time.
- Habitat requirements of waterbird groups, particularly the secretive marshbirds, during breeding and migration periods.
- An understanding of breeding and winter areas for waterbirds that use the region primarily for migration, and a better understanding of potential limiting factors in the life cycles of individual species.
- Identification of critical migration staging areas, migration corridors, and migration timing for species of greatest concern to refine migration habitat conservation planning.
- Understanding trends and effects of invasive species (e.g., *Phragmites australis*) on breeding and migrant waterbirds to guide wetland management and enhancement.
- Updated land-cover inventories (i.e., updated National Wetland Inventory and National Land Cover Data) to enhance waterbird conservation planning.

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Chapter 3
WATERFOWL PLAN

SUMMARY

This chapter is based on the Upper Mississippi and Great Lakes Joint Venture (UMRGLRJV) Waterfowl Habitat Conservation Strategy (Soulliere et al. 2007): http://www.uppermissgreatlakesjv.org/docs/UMRGLR_JV_WaterfowlHCS.pdf

We have included information from the JV plan that is most applicable to Ohio, but also suggest reviewing the UMRGLRJV plan for detailed information on their biological models, methodologies, and species accounts for UMRGLRJV focal species. Here we summarize Joint Venture (JV) efforts to "step-down" continental waterfowl conservation priorities to the Joint Venture (JV) region, and we have initiated step-down to a smaller scale, the state of Ohio. This will ultimately provide conservationists guidance in effectively increasing landscape carrying capacity through the protection, restoration, and enhancement of waterfowl habitats. Using the UMRGLRJV planning, we have summarized where, what, when and how much habitat is needed to increase and sustain populations of priority waterfowl species at target levels.

Because estimates of waterfowl populations are typically uncertain and regularly refined, population estimates and objectives used in this strategy will be periodically adjusted. Nonetheless, science-based recommendations were developed to help managers efficiently and effectively increase landscape carrying capacity through waterfowl habitat protection, restoration, and enhancement.

Mallard, Photo: ODNR Div. of Wildlife

To link population and habitat objectives for this diverse bird group, several "JV focal species" were selected for waterfowl breeding habitat planning and monitoring (Soulliere et al. 2007. Each JV focal species represents a primary cover type and waterfowl guild, an assemblage of species that share similar life requisites. The assumption was that habitat actions designed for JV focal species would accommodate populations of other breeding waterfowl dependent on designated cover types. Likewise, foraging guilds that correspond to different cover types were selected for habitat planning during the non-breeding period. Migration and wintering habitat objectives for the JV region were developed by employing an energy-based carrying capacity model using continental estimates of spring

population size, harvest and winter distribution (Soulliere et al 2007). A primary assumption of this strategy was that habitat carrying capacity established to accommodate spring migrating and winter populations also will suffice during fall migration.

Regional waterfowl population and habitat trends, in concert with population estimates and an assessment of habitat factors limiting populations, provide a biological planning foundation for conservation decision making. Planning steps included characterizing and assessing the landscape for JV focal species, modeling population response, identifying conservation opportunities, and developing an initial landscape design with capacity expected to sustain current waterfowl populations and eliminate population deficits. Much of the technical information, including habitat models and decision support maps, appears in breeding focal species and non-breeding guild accounts (see Appendix A, Soulliere et al. 2007). Sections regarding monitoring and research needs, measuring performance, adaptive management, and program coordination also are provided.

BACKGROUND

History and Goals

Migrating and winter waterfowl are commonly observed along Lake Erie and the Lake Erie marshes where more than 30 species of waterfowl can be seen using the wetland habitat. In fact, historically, Ohio marshes supported over a half million migrating waterfowl during fall migration. Also, the North American Waterfowl Management Plan (NAWMP 2004) recognizes Lake Erie as continentally significant for waterfowl.

Northern Pintail, Photo: ODNR Div. of Wildlife

There are a variety of waterfowl species that use Ohio for wintering, migrating and breeding. Ohio provides habitat for diving and dabbling ducks and some geese as well. Some diving ducks that are seen migrating and wintering in Ohio are: Lesser and Greater Scaup, Redhead, Long-tailed Duck, Bufflehead and White-winged Scoters. Some dabbling ducks that winter or migrate through Ohio include: American Black Duck, Mallard, American Wigeon and Wood Duck. The western Lake Erie Basin, historically has provided habitat for large concentrations of American Black Ducks and were considered to have the largest wintering groups in interior North America. Also, Canada Geese, and Snow Geese migrate and winter in Ohio. However, most waterfowl species primarily breed north of Ohio with some exceptions including: Wood Duck, Mallard, Canada Geese, Blue-winged Teal, Hooded Mergansers, and others (Table 1).

While some waterfowl species breed in the state, Ohio has a more important role in providing habitat for migratory and wintering waterfowl. Spring migration starts in late February and continues until the end of May with the largest numbers of waterfowl coming during March and early April. Fall migration lasts longer, with species concentrating at different times with some areas seeing migrants from August through December. Blue-winged Teal are the earliest migrants followed by Wood Duck, Northern Pintail, and American Wigeon. In October, Mallards,

Blue-winged teal, Photo: ODNR Div. of Wildlife

American Black Ducks, and Green-winged Teal concentrate in the area, followed by Scaup, Redhead, Canvasback and Canada Geese in late fall and Common Goldeneye appearing in late December. Harvest data from fall migration suggests that Lake Erie is very important for American Black Ducks and Canvasback. Also, it provides important habitat for wintering Scaup, Long-tailed Duck, Bufflehead, Common Goldeneye, and Common and Red-breasted Mergansers.

Factors affecting waterfowl populations include loss and degradation of wetlands and increases in housing and human population. Ohio has lost more than 80% of its wetlands since the 1800's. Only with partnership-based land conservation focused efforts can we help restore wetlands and grasslands for healthy waterfowl populations.

PLANNING FRAMEWORK

The UMRGLRJV Landbird Habitat Conservation Strategy Plan used the Partners in Flight "five element process" to design landscapes (Will et al. 2005). The five elements include: 1) landscape characterization and assessment, 2) bird population modeling, 3) conservation opportunities assessment, 4) landscape design and 5) monitoring and evaluation. The UMRGLRJV produced population status and goals for all focal species to represent a variety of species using the same community type. Population estimates, population goals, and population deficits are given for each focal species for conservation planning. Using these goals, the UMRGLRJV set specific, biologically driven habitat goals that each state within the JV should try to reach, broken down by bird conservation region.

Table 1. Continental importance of Bird Conservation Regions (BCRs) in providing breeding (B) and non-breeding habitat (N) (migration or wintering habitat).[a] Adapted from UMRGLRJV Waterfowl Habitat Conservation Strategy (Soulliere et al. 2007). Data are largely from the North American Waterfowl Management Plan (NAWMP 2004). This table only contains information about BCRs found within Ohio; these data are not specific to Ohio and include portions of the BCRs in other states.

Species (population)	Bird Conservation Region[b]			
	13	22	24	28
Greater Snow Goose	**N**			
Lesser Snow Goose (Mid-continent)		**N**		
Ross's Goose		n		
Atlantic Brant	N			
Cackling Goose (Tallgrass Prairie)		N	n	
Canada Goose (Atlantic)	**N**			N
Canada Goose (Southern James Bay)	**N**	n	N	
Canada Goose (Mississippi Valley)		**N**	**N**	
Canada Goose (Eastern Prairie)		**N**	n	
Canada Goose (Tallgrass Prairie)		n		
Canada Goose (Mississippi Flyway Giant)	N	**B**, N	B, N	
Mute Swan	B, N	b, N	N	
Trumpeter Swan (Interior)				
Tundra Swan (Eastern)	N			
Wood Duck	B	**B**, N	B, n	b, n
Gadwall	N	b, n	N	N
American Wigeon	B	n	N	
American Black Duck	B, N	N	N	N
Mallard	B, n	b, N	N	n
Blue-winged Teal	B	**B**, N	n	
Northern Shoveler		N	n	
Northern Pintail	N		N	
Green-winged Teal	b, n	n		
Canvasback	b, N	N	n	N
Redhead	b, n	n		
Greater Scaup	N	n	n	
Lesser Scaup	**N**	N	n	
Common Eider	N			
Surf Scoter	N			
White-winged Scoter	N			
Black Scoter	N			
Long-tailed Duck	**N**			
Bufflehead	b, n	N	N	n
Common Goldeneye	b, **N**	N	N	n
Common Merganser	N	N		
Hooded Merganser	**B**	N	N	
Common Merganser	N	N		
Red-breasted Merganser	b, **N**			
Ruddy Duck	N	N	n	

[a] Importance was determined by the UMRGLRJV by using relative abundance and distribution estimates based on continental breeding and harvest surveys.

[b] B/b = breeding season, M/m = non-breeding season (migration or wintering); **B, M** = high importance relative to other regions, and high concentrations; B, M = common or locally abundant. Area is moderate or moderately high importance to species; b, m = uncommon to fairly common, species occurs in low abundance.

Population and Habitat Trends

Populations of breeding waterfowl are not easily surveyed, making it difficult to assess population trends. However, the Breeding Bird Survey (BBS) does record some waterfowl and this can provide an index over time for some species. Within the UMRGLRJV, the BBS shows some species decreasing tremendously such as the American Black Duck, and other species increasing such as Ring-necked Duck (Table 2).

Table 2. Long term (1966-2005) and short term (1995-2005) estimates of population trends (annual % change) for waterfowl species that breed within USFWS Region 3[a] and are recorded during the North American Breeding Bird Survey (BBS, Sauer et al. 2006).

Species	1966-2006			1997-2006		
	Trend	p-value[b]	n[c]	Trend	p-value	n
Blue-winged Teal	-4.21	0.00	136	-4.30	0.12	54
American Black Duck	1.40	0.54	16	na[d]	na	3
Mallard	1.17	0.02	476	-3.64	0.00	340
Wood Duck	2.61	0.00	376	1.70	0.48	217
Redhead	-13.56	0.04	9	na	na	2
Ring-necked Duck	5.48	0.38	26	3.29	0.58	10
Common Goldeneye	-10.31	0.63	5	na	na	na
Canada Goose (resident population)	11.36	0.00	406	6.87	0.01	326

[a]USFWS Region 3 includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin.

[b]p-values represent confidence in trend direction with values closer to 0.0 reflecting a greater degree of confidence in the trend; for example, values <0.05 reflect >95% confidence in trend direction.

[c]n = number of BBS routes used for regional trend average.

[d]na = inadequate survey data to generate a trend estimate.

Wintering populations of waterfowl are increasing for some species in the UMRGLRJV due to warmer winters and the availability of important high-energy foods. The increase of agricultural fields has helped numerous species including: Mallards, Swans, and Canada Geese. However, the losses of shallow seasonal wetlands are threatening migrating populations of Northern Pintail and Blue-winged Teal. Diving ducks are also threatened on their wintering grounds in Ohio and throughout the JV because of loss of important foods, increased sedimentation, invasive plants, and changes in hydrology.

Focal Species and Population Goals

The UMRGLRJV has provided population goals for focal species within the region (Table 4) and the typical habitat that each focal species is found in. Focal species are representative of a certain habitat type, with the assumption that they would represent other species found in the same habitat. The UMRGLRJV chose species that are less sensitive to habitat structure, landscape, and habitat management. Also, these species have well known life histories and are dependent on the area. A summary of information of UMRGLRJV waterfowl focal species that occur within Ohio is given in Appendix D; for more detailed information on these focal species see Appendix A in Soulliere et al. (2007). Blue-winged Teal, Wood Duck and American Black

Duck all have very different nesting habitat requirements, while Mallards are more generalists. Mallards were chosen because of their importance in recreation for duck hunters but also because of the abundance of available data.

Table 3. Upper Mississippi River and Great Lakes Region Joint Venture (JV) waterfowl focal species selected for monitoring and habitat planning. These species were identified as having a high JV region "habitat need" in the North American Waterfowl Management Plan (2004).

Breeding habitat	Non-breeding habitat	
Mallard	Mallard	
Blue-winged Teal	Blue-winged Teal	Lesser Scaup
Wood Duck	Wood Duck	Canvasback
American Black Duck	American Black Duck	Tundra Swan

For non-breeding habitat, the same dabbling ducks were chosen because they use a variety of habitat. Canvasback, an herbivore, and Lesser Scaup, mostly a carnivore, were selected to get a broad habitat representation for diving ducks. Tundra Swans were chosen for migratory habitat because the UMRGLRJV provides critical stopover habitat and their use of submerged aquatic vegetation in open water and their use of agricultural fields.

Breeding goals were developed via a variety of methods by the UMRGLRJV. Unlike other states, Ohio does not have an annual survey for breeding ducks so the UMRGLRJV used an interpolation technique for our BCR population goals. Wisconsin, Michigan and Minnesota all have state aerial surveys making population goals easier to estimate. Goals were established for each BCR (Table 4). For more specific information on how goals were established, please see the UMRGLRJV Waterfowl Conservation Strategy Plan.

American black ducks, Photo: ODNR Div. of Wildlife

Table 4. Breeding population estimates, goals, and deficits for priority duck species by Bird Conservation Region (BCR) in Ohio. These species represent JV focal species for breeding habitat planning.

Species and BCR	Current population[a]	Population goal	Population deficit	Deficit recovery distribution
Mallard				
BCR 13	21,700	26,040	4,340	2
BCR 22	215,300	258,360	43,060	20
BCR 24	12,700	15,240	2,540	1
BCR 28	8,700	10,440	1,740	1
Total	258,400	310,080	51,680	24
Blue-winged Teal				
BCR 22	31,300	37,560	6,260	10
Total	31,300	37,560	6,260	10
Wood Duck				
BCR 13	4,800	5,760	960	1
BCR 22	197,600	237,120	39,520	32
BCR 24	24,500	29,400	4,900	5
BCR 28	4,900	5,880	980	1
Total	231,800	278,160	46,360	34

[a] Current populations = 1996-2005 mean estimate. BCR 12 and 23 estimates were based on average densities, determined from the Spring Waterfowl Population and Habitat Survey (MN, WI, and MI), multiplied by the area in the BCR; BCR 22, 13, 24 and 28 estimates were based on N.A. Breeding Bird Survey relative abundance adjusted to density estimates from aerial survey data (see Appendix D, Soulliere et al. 2007).

The UMRGLRJV also established migration and wintering population goals for the JV in waterfowl use days (Table 5). The JV used information from the continental spring estimates and harvest data to calculate the goals. Winter population goals were calculated in a similar manner, but they used the Mid-winter Inventory. Please see the UMRGLRJV plan for more information. These goals were not stepped down to each BCR region. While habitat preferences can be broadly categorized, habitat requirements may change throughout the life cycle of a bird. Waterfowl may need a different type of cover for nesting, brooding, post-breeding molt, staging for migration, and wintering. However, to help give broad habitat preferences for focal species, the JV has provided community types in Table 6.

HABITAT GOALS

Habitat objectives are linked to population goals for waterfowl focal species. The main goal for this strategy is to not only maintain waterfowl breeding populations, but also to increase the health of migrating and wintering waterfowl, which will productively affect survivorship and recruitment. The focal species approach to derive habitat goals assumes that protecting and enhancing habitat for focal species will also enhance populations for other waterfowl species. Habitat objectives derived by the UMRGLRJV will be refined as more information about focal species becomes available.

Table 5. Migration and winter population and use-day goals (1,000s) in the Upper Mississippi River and Great Lakes Joint Venture (JV) region for JV focal species used in migration habitat conservation planning. Numbers are based on continental population estimates (average for 1994-2003) and estimates of the proportion of each population occurring in the JV region during spring, fall, and winter.

| | Migration | | | |
Guild and species	Spring	Fall	Winter	Total
Population goals				
Dabblers				
Mallard	2,860	3,718	1,820	0
Wood Duck	1,276	1,659	0	0
Blue-winged Teal	1,520	1,977	0	0
American Black Duck	155	201	100	0
Tundra Swan	40	9	0	0
Divers				
Lesser Scaup	1,124	1,461	267	0
Canvasback	220	286	111	0
Use-day goals				
Dabblers				
Mallard	42,900	55,770	163,800	262,470
Wood Duck	19,140	24,882	0	44,022
Blue-winged Teal	22,806	29,648	0	52,454
American Black Duck	2,320	3,017	9,009	14,346
Subtotal	87,166	113,317	172,809	373,292
Tundra Swan	1,200	180	0	1,380
Diving ducks				
Lesser Scaup	16,852	43,816	24,075	84,743
Canvasback	4,400	8,580	9,990	22,970
Subtotal	21,252	52,396	34,065	107,713
Total	109,618	165,893	206,874	482,385

Maintenance and Protection Objectives

Waterfowl habitat maintenance and protection objectives were based on habitat needs of the waterfowl bird focal species in the UMRGLRJV (Soulliere et al. 2007). While some habitat may already be protected within state and federal lands, there is a need to increase wetland conservation in Ohio. Maintenance objectives are the goals to maintain and protect habitats that are already on the landscape through acquisition and conservation easement. The UMRGLRJV has broken down waterfowl maintenance and protection objectives by BCR within Ohio and other states in the JV (Soulliere et al. 2007; Table 6).

Table 6. Upper Mississippi River and Great Lakes Joint Venture (UMRGLRJV) waterfowl habitat maintenance and protection objectives (ha) by Bird Conservation Region (BCR) for breeding (B) and migrating/wintering (N) season population goals for Ohio (Soulliere et al. 2007). See Table 1 in Chapter 5 for habitat descriptions.

State(s)	BCR	Wet meadow with open water	Wet mudflat/ moist soil plants	Shallow semi-permanent marsh, hemi-marsh		Deep water marsh	Marsh with associated shrub/forest	Extensive open water
		B	N	B	N	N	B	N
Ohio	13	4	239	10,841	13,324	2,079	1,198	10,221
	22	0	850	20,735	25,194	1,222	4,590	10,384
	24	0	0	209	457	24	87	282
	28	0	31	4,326	11,146	477	1,224	5,212
	Total	4	1,121	36,111	50,121	3,802	7,099	26,099
All States	13	4	239	10,841	13,324	2,079	1,198	10,221
	22	39,104	8,329	107,667	333,195	11,101	49,402	57,422
	24	519	284	6,349	22,494	607	6,129	4,118
	28	0	31	4,326	11,146	477	1,224	5,212
	Total	39,627	8,883	129,183	380,159	14,264	57,953	76,973

The UMRGLRJV suggests maintaining/protecting total of 88,246 hectares for breeding and non-breeding waterfowl in Ohio. Shallow semi-permanent marsh/hemi-marsh has the highest need for protection, with the statewide goal set at 50,121 ha for non-breeding waterfowl (36,111 for breeding waterfowl). Ohio objectives include protecting and maintaining approximately 3,800 ha of deep water marsh, 7,100 ha of marsh associated with forest, and about 26,100 ha of open water.

Restoration and Enhancement Objectives

The UMRGLRJV restoration and enhancement goals were based on focal species population deficits and habitat models. The term "restoration" implies converting a human altered landscape to a community type that would benefit the focal or target species. With any restoration or enhancement work, landscape context and capabilities are always important considerations including: current cover, hydrology, and historical vegetation. For waterfowl, restoring surrounding uplands around a wetland would improve habitat for species that rely on uplands for breeding and foraging. Also, this may be especially important around degraded river systems as this may help to restore water quality and food resources.

The JV has broken down waterfowl restoration and enhancement goals by BCR within each state (Table 7). Ohio needs to restore/enhance approximately 14,400 ha to meet carrying capacity objectives for breeding, migrating, and wintering waterfowl. In terms of area, Ohio's largest goals will be to restore approximately 7,200 ha of shallow semi-permanent marsh and hemi-marsh, 5,500 ha of open water, and 1,400 ha of marsh associated with forest.

Table 7. Upper Mississippi River and Great Lakes Region Joint Venture (UMRGLRJV) waterfowl habitat restoration/enhancement objectives (ha) by Bird Conservation Region (BCR) to meet carrying capacity goal for breeding (B) and migrating/wintering (N) populations for Ohio and the UMRGLRJV (Soulliere et al. 2007). See Table 1 in Chapter 5 for habitat descriptions.

State(s)	BCR	Wet meadow with open water	Wet mudflat/ moist soil plants	Shallow semi-permanent marsh, hemi-marsh		Deep water marsh	Marsh with associated shrub/forest	Extensive open water
		B	N	B	N	N	B	N
Ohio	13	1	54	2,168	1,316	0	240	2,849
	22	0	177	4,147	1,700	0	918	1,806
	24	0	0	42	52	0	17	44
	28	0	7	865	1,025	0	245	818
	Total	1	239	7,222	4,092	0	1,420	5,516
All States	13	1	54	2,168	1,316	0	240	2,849
	22	7,821	1,738	21,533	4,114	0	9,880	7,118
	24	104	58	1,270	882	0	1,226	294
	28	0	7	865	1,025	0	245	818
	Total	7,926	1,857	25,836	7,337	0	11,591	11,079

To help with our restoration efforts the JV has provided maps showing the areas of greatest restoration value (Figure 2). The figure indicates that most high restoration value habitat can be found in the western Lake Erie basin and in BCR 22. Other important areas for restoration are found in Southwestern Ohio and Northeastern Ohio close to Lake Erie.

Monitoring Needs

The UMRGLRJV described a variety of important monitoring needs that will help with future conservation planning.

- Abundance. Expand, enhance, or revise surveys that provide the primary means of tracking changes in waterfowl abundance to enable assessment of status and the development of abundance objectives.

- Coordinated Environmental Monitoring. Expand and integrate environmental monitoring with surveys that estimate abundances and vital rates to test hypotheses about factors limiting growth, test assumptions underlying habitat conservation objectives, and evaluate conservation actions.

- Cross-scale Integration. Integrate and coordinate bird and environmental monitoring at continental, regional, and local scales so that patterns of change in bird demographics or habitat at one scale are informative of ecological processes responsible for patterns at other scales.

RESEARCH NEEDS

The UMRGLRJV provided research needs that will help refine models that were designed for habitat planning (Soulliere et al. 2007). OBCI can in the future make this list more specific to Ohio. OBCI partners should contribute towards these UMRGLRJV goals to the extent possible.

- An ability to identify landscape-level factors limiting priority breeding, migrating, and wintering waterfowl populations in the region (similar to study of vital rates completed on Great Lakes breeding mallards) and how current landscape cover-type trends will influence these factors.

- An ability to quantify the capacity of the region to produce waterfowl and accommodate migrating and wintering birds, plus be able to predict how habitat quality and carrying capacity will likely change with natural precipitation cycles and predicted climate change.

- An understanding of migration corridors and movement chronology for migrating and wintering waterfowl to better predict habitat needs and target conservation areas.

- Determining optimum spatial arrangement of wetland types within and between breeding waterfowl habitat, including 1) inter-wetland distances, and 2) juxtaposition with upland cover types such as cropland, urban areas, other human developments, and permanent grassland and forest.

- An understanding of how human-induced limiting factors (e.g., disturbance, water quality, pollutants, contaminants, and sedimentation) can be most effectively and efficiently mitigated (Soulliere et al. 2007).

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Chapter 4
LANDBIRD PLAN

SUMMARY

This chapter is based on the UMRGLRJV Landbird Habitat Conservation Strategy (Potter et al. 2007): http://www.uppermissgreatlakesjv.org/docs/UMRGLR_JV_LandbirdHCS.pdf

Indigo bunting, Photo: ODNR Div. of Wildlife

We have included information from the JV plan that is most applicable to Ohio, but also suggest reviewing the UMRGLRJV plan for detailed information on their biological models, methodologies, and species accounts for UMRGLRJV focal species. Here we summarize Joint Venture (JV) efforts to "step-down" continental landbird conservation priorities to the Joint Venture (JV) region, and we have initiated step-down to a smaller scale, the state of Ohio. Tables have been modified to reflect only species or information applicable to Ohio. This will ultimately guide conservationists in effectively increasing landscape carrying capacity through the protection, restoration, and enhancement of landbird habitats. Using the UMRGLRJV planning, we have summarized where, what, when and how much habitat is needed to increase and sustain populations of priority landbird species at target levels.

To link population and habitat objectives for this diverse bird group, 16 JV focal species were selected for landbird breeding habitat planning and monitoring (Potter et al. 2007). Each JV focal species represents a primary cover type and landbird guild, an assemblage of species that share similar life requisites. The assumption was that habitat actions designed for JV focal species would accommodate populations of other breeding landbirds dependent on designated cover types. Likewise, foraging guilds that correspond to different cover types were selected for habitat planning during the non-breeding period. These focal species provide the basis for the habitat goals set by the joint venture.

BACKGROUND

The term "landbird" refers to a diverse group of species that are typically associated with non-aquatic habitats (e.g., forests, grasslands, bottomlands, prairies, riparian forests, and shrublands). Birds in this group include: songbirds, woodpeckers, raptors, owls, nighthawks, vultures, nuthatches, swallows, swifts, and hummingbirds. Included here are two shorebirds associated with upland habitat (American Woodcock, Upland Sandpiper).

Cooper's Hawk, Photo: TK Tolford

Ohio has over 170 species of landbirds that regularly breed within the state, with many more that are regular migrants. The Cerulean Warbler and other species of conservation concern breed in large numbers within Ohio, giving the state high responsibility to increase the population within the UMRGLRJV. Although not covered in-depth in this version of the All-Bird Plan, Ohio has important stopover sites for migrating landbirds especially within the Western Lake Erie Basin where songbirds accumulate in continentally significant numbers during migration. For information on stopover habitat, see The Nature Conservancy's report, Migratory Stopover Site Attributes in the Western Lake Erie Basin (Ewert et al. 2006).

Brown-headed cowbird, Photo: ODNR Div. of Wildlife

Important habitats for landbirds have changed dramatically over the past 150 years in Ohio. Early settlers deforested nearly all of Ohio, and wetland and grassland habitats have been strongly modified. The marshes and oak savannahs found near Lake Erie were drained or cut down. Changes to Ohio's landscape have come from agriculture, land development, invasive species, strip-mining, and logging. Landscape changes continue with agriculture declining, and urbanization increasing.

Although there is more forest cover in Ohio today than in the early 1900's, forested landscapes are more fragmented, which can result in higher rates of nest predation and brood parasitism by Brown-headed Cowbirds. Grassland birds have been heavily affected by loss of grassland and the switch to industrial farming (e.g., Henslow's Sparrow, Dickcissel, Eastern Meadowlark) (Table 1), whereas Cerulean Warblers have declined precipitously within declines in mature deciduous forests.

Table. 1. Modified from the UMRGLRJV Landbird Conservation Strategy Plan. Shows breeding population trends for species that breed within Ohio and are considered continental priority species by the North American Landbird Conservation Plan (Rich et al. 2004). Trends are estimated from Breeding Bird Survey Data (Sauer et al. 2005).

Species	JV focal species	Trend 1966-2004	p-value [a]	n [b]	Trend 1995-2004	p-value	n
Upland Sandpiper	x	-0.8	0.43	191	3.1	0.19	90
American Woodcock	x	-2.4	0.76	33	-15.1	0.10	7
Short-eared Owl		5.9	0.00	8	57.3	0.29	3
Whip-poor-will [c]	x	-2.4	0.03	136	-1.9	0.41	52
Chimney Swift	x	-1.8	0.00	529	-3.3	0.00	430
Red-headed Woodpecker	x	-4.1	0.00	468	-4.6	0.00	326
Willow Flycatcher	x	-0.5	0.31	340	1.0	0.27	247
Bell's Vireo		-4.4	0.22	75	4.0	0.40	34
Wood Thrush	x	0.3	0.32	451	2.1	0.00	333
Blue-winged Warbler	x	0.7	0.51	142	-2.7	0.10	100
Golden-winged Warbler	x	-1.4	0.04	103	-7.5	0.00	63
Cerulean Warbler	x	-6.3	0.00	68	-9.2	0.07	33
Prothonotary Warbler	x	1.1	0.18	44	6.6	0.02	32
Worm-eating Warbler		3.8	0.04	35	2.9	0.64	26
Louisiana Waterthrush	x	4.1	0.04	58	-0.2	0.97	32
Kentucky Warbler	x	0.8	0.11	119	-0.5	0.83	92
Yellow-breasted Chat	x	-1.3	0.01	225	0.3	0.71	155
Henslow's Sparrow	x	-7.7	0.00	106	5.7	0.33	41
Dickcissel		-3.0	0.00	382	-0.4	0.63	297
Rusty Blackbird		na	na	na	na	na	na
Eastern Meadowlark	x	-2.5	0.00	527	-2.5	0.00	450

[a]p-values represent confidence in trend direction with values closer to 0.0 reflecting a stronger trend; for example, values <0.05 reflect >95% confidence in trend direction.
[b]n = number of BBS routes used for UMRGLRJV regional trend average.
[c]bold species have a significant negative trend.

PLANNING FRAMEWORK

The UMRGLRJV Landbird Habitat Conservation Strategy Plan used the Partners in Flight "five element process" to design landscapes (Will et al. 2005). The five elements include: 1) landscape characterization and assessment, 2) bird population modeling, 3) conservation opportunities assessment, 4) landscape design and 5) monitoring and evaluation. The UMRGLRJV produced population status and goals for all focal species but ultimately used a focal species approach for planning with each species representing a different community type. Population estimates, population goals, and population deficit are given for each focal species for conservation planning. Using these goals, the UMRGLRJV set specific, biologically driven habitat goals that each state within the JV should try to reach, broken down by bird conservation region.

The following information needs were identified by the UMRGLRJV (Potter et al. 2007):
- Identify and map important breeding (source populations), migration, and winter habitats for species of conservation concern in the JV.

- Use biological models to link population goals with habitat objectives.
- Identify and map areas where habitat should be restored or maintained to meet population objectives.
- Clearly identify the habitat needs of JV focal species at multiple spatial scales (landscape to local) so that site-specific management contributes to species needs across all scales.
- Identify the consequences of specific land management actions on landbirds of conservation concern.
- Consider issues outside the JV region such as events during migration or on the wintering grounds that may affect bird populations of concern, and improve inter-JV collaboration.
- Map critical migration habitat for protection, where isolated forest patches, stretches of Great Lakes shoreline, and north-south riparian corridors are most needed for stopover areas.
- Provide guidance to those implementing the U.S. Farm Bill and other landscape scale land management programs to assure substantive contributions to bird population goals identified in this strategy are achieved (e.g., Conservation Reserve Program and Wetland Reserve Program).

Population Goals and Focal Species

The UMRGLRJV has provided population goals for focal species within the region (Table 2) and the typical habitat that each focal species is found in (Table 3). Focal species are representative of a certain habitat type, with the assumption that they would represent other species found in the same cover type. Specifically, the UMRGLRJV chose species that would be less sensitive to habitat structure, landscape, and habitat management. A summary of information of UMRGLRJV landbird focal species for in Ohio is given in Appendix E. For more detailed information on these focal species, see Appendix A in Potter et al. (2007).

Table 2. Population estimates, goals, deficits and habitat objectives (km^2) for 15 focal species breeding in UMRGLRJV and Ohio (Potter et al. 2007). Data are presented by BCR for both the entire UMRGLRJV and the BCR within Ohio.

| Species | UMRGLRJV population information for BCRs | | | Ohio population information | | | Ohio habitat objectives in km^2 | |
	Estimate	Goal	Deficit	Estimate	Deficit	Relative concentration	Protection	Restoration
Upland Sandpiper[a]								
BCR 22	33,000	45,000	12,000	na	na	na	1	0
Total	33,000	45,000	12,000	na	na	na	1	0
American Woodcock[b]								
BCR 13	13,200	24,100	10,800	13,200	18,100	na[b]	2,360	780
BCR 22	62,700	100,600	37,900	14,400	21,100	na	1,100	1,610
BCR 24	11,900	20,300	8,400	200	0	na	140	0
BCR 28	na[b]	na[b]	na[b]	8,700	10,000	na	1,500	1,370
Total	860,000	1,070,000	212,000	36,500	49,200	na	5,100	3,760
Whip-poor-will								
BCR 28	12,000	18,000	6,000	12,000	6,000	0.39	1,348	674

Species	UMRGLRJV population information for BCRs			Ohio population information			Ohio habitat objectives in km^2	
	Estimate	Goal	Deficit	Estimate	Deficit	Relative concentration	Protection	Restoration
Total	12,000	18,000	6,000	12,000	6,000		1,348	674
Chimney Swift								
BCR 13	180,000	270,000	90,000	180,000	90,000	8.21	9,184	4,592
BCR 22	2,093,200	3,105,100	1,011,900	330,000	120,000	6.32	16,837	6,122
BCR 24	343,600	515,400	171,800	3,600	1,800	2	184	92
BCR 28	270,000	410,000	140,000	270,000	140,000	9	13,776	7,143
Total	2,886,800	4,300,500	1,413,700	783,600	351,800		39,981	17,949
Red-headed Woodpecker								
BCR 13	9,000	18,000	9,000	9,000	9,000	0.41	750	750
BCR 24	9,000	18,000	9,000	24,000	24,000	0.46	2,000	2,000
BCR 28	76,000	152,000	76,000	2,200	2,200	0.07	183	183
Total	94,000	188,000	94,000	35,200	35,200		2,933	2,933
Willow Flycatcher								
BCR 13	46,000	69,000	23,000	46,000	23,000	2.1	2,556	1,278
BCR 22	141,360	213,600	72,240	40,000	20,000	0.77	2,222	1,111
BCR 24	10,870	16,760	5,890	380	190	0.2	21	11
BCR 28	42,000	63,000	21,000	42,000	21,000	1.36	2,333	1,167
Total	240,230	362,360	122,130	82,380	41,190		4,576	2,289
Wood Thrush								
BCR 13	66,000	99,000	33,000	66,000	33,000	3.01	660	330
BCR 22	210,130	312,350	102,220	76,000	34,000	1.46	760	340
BCR 24	250,000	375,000	125,000	12,000	6,000	6.25	120	60
BCR 28	430,000	650,000	220,000	430,000	220,000	13.91	4,300	2,200
Total	956,130	1,436,350	480,220	518,000	260,000		5,180	2,600
Blue-winged Warbler								
BCR 13	7,600	11,000	3,400	7,600	3,400	0.35	152	68
BCR 22	4,230	6,300	2,070	900	500	0.02	18	10
BCR 24	7,500	11,300	3,800	1,500	800	0.78	30	16
BCR 28	41,000	62,000	21,000	41,000	21,000	1.33	820	420
Total	60,330	90,600	30,270	51,000	25,700		1,020	514
Cerulean Warbler								
BCR 13	18,000	36,000	18,000	18,000	18,000	0.82	375	375
BCR 22	4,300	8,600	4,300	2,800	2,800	0.05	58	58
BCR 24	19,850	39,700	19,850	850	850	0.44	18	18
BCR 28	54,000	108,000	54,000	54,000	54,000	1.75	1,125	1,125
Total	96,150	192,300	96,150	75,650	75,650		1,576	1,576
Prothonotary Warbler								
BCR 22	26,810	40,215	13,405	140	70	0	2	1
BCR 28	120	180	60	120	60	0	2	1
Total	26,930	40,395	13,465	260	130		4	2
Louisiana Waterthrush								
BCR 22	4,140	4,140	0	220	0	0	55	0
BCR 24	6,500	6,500	0	1,100	0	0.57	275	0

Species	UMRGLRJV population information for BCRs			Ohio population information			Ohio habitat objectives in km^2	
	Estimate	Goal	Deficit	Estimate	Deficit	Relative concentration	Protection	Restoration
BCR 28	6,200	6,200	0	6,200	0	0.2	1,550	0
Total	16,840	16,840	0	7,520	0		1,880	0
Kentucky Warbler								
BCR 13	60	90	30	60	30	0	1	1
BCR 22	20,570	30,885	10,315	1,100	550	0.02	26	13
BCR 24	61,700	92,550	30,850	1,700	850	0.89	40	20
BCR 28	116,330	174,525	58,195	34,000	17,000	1.1	810	405
Total	198,660	298,050	99,390	36,860	18,430		877	439
Yellow-breasted Chat								
BCR 13	6,400	6,400	0	6,400	0	0.29	64	0
BCR 22	89,800	89,800	0	9,800	0	0.19	98	0
BCR 24	242,000	242,000	0	14,000	0	7.3	140	0
BCR 28	150,000	150,000	0	150,000	0	4.85	1,500	0
Total	488,200	488,200	0	180,200	0		1,802	0
Henslow's Sparrow								
BCR 13	350	700	350	350	350	0.02	3	3
BCR 22	19,030	38,060	19,030	600	600	0.01	5	5
BCR 24	7,540	15,080	7,540	200	200	0.1	2	2
BCR 28	5,000	10,000	5,000	5,000	5,000	0.16	44	44
Total	31,920	63,840	31,920	6,150	6,150		54	54
Eastern Meadowlark								
BCR 13	30,000	60,000	30,000	30,000	30,000	1.37	375	375
BCR 22	1,399,300	2,798,600	1,399,300	87,000	87,000	1.67	1,088	1,088
BCR 24	114,100	228,200	114,100	2,100	2,100	1.09	26	26
BCR 28	36,000	72,000	36,000	36,000	36,000	1.16	450	450
Total	1,579,400	3,158,800	1,579,400	155,100	155,100		1,939	1,939

[a]Population estimate, goal, deficit, relative concentration not provided for species in Ohio (Potter et al. 2007).
[b]Population estimate, goal, deficit for singing males based on American Woodcock Conservation Plan (Kelley et al. 2008). Values not provided in table were not included in the woodcock plan.

Table 3. UMRGLRJV focal landbird species and the habitats where they occur. Table only shows focal species that regularly breed within Ohio.

Species	Deciduous forest	Woody wetland	Mixed forest	Scrub	Grassland	Savanna	Residential Commercial
Upland Sandpiper					X		
American Woodcock				X			
Whip-poor-will	X		X				
Chimney Swift	X						X
Red-headed Woodpecker	X					X	
Willow Flycatcher		X		X			
Wood Thrush	X		X				
Blue-winged Warbler				X			
Cerulean Warbler	X						
Prothonotary Warbler		X					
Louisiana Waterthrush	X						
Kentucky Warbler	X						
Yellow-breasted Chat				X			
Henslow's Sparrow					X		
Eastern Meadowlark					X		

HABITAT GOALS AND OBJECTIVES

Habitat Goals

Protecting large and intact landscapes will most likely protect and maintain avian populations. Also, these landscapes are most likely to work as source populations that can possibly drive metapopulations. Conserving the largest and most intact landscapes or habitat patches will result in the best benefits to avian populations.

Habitat goals and objectives are based on desired population numbers for the JV focal species. Specifically, these goals are based on breeding habitat for landbirds because the JV could use simple models to generate habitat goals. Stopover habitat was not considered in the initial version of the JV plan but will be added in other versions. The focal species approach to derive habitat goals assumes that protecting and enhancing for focal species will also enhance populations for other landbird species. Habitat objectives derived by the UMRGLRJV will be refined as more information about focal species becomes available.

Maintenance and Protection Objectives

Maintenance and protection objectives were based on habitat needs of the landbird focal species (Table 4). For BCR's that had more than one focal species that represented the same habitat type, the JV used the one with greatest need within each BCR. Maintenance and protection goals for Ohio include maintaining and protecting 1,092 km^2 of deciduous forest, 4 km^2 of forested wetland, 5,100 km^2 of shrublands, 1,939 km^2 of grassland and 2,933 km^2 of mixed-wooded openland (Table 4.) Areas to emphasize for grassland and mixed openland habitats (Chapter 5, Figure 1), evergreen and mixed forest habitats (Chapter 5, Figure 2), deciduous forest habitats (Chapter 5, Figure 3), and forested wetland habitats (Chapter 5, Figure 4) were based on JV focal species.

Table. 4. Maintenance and Habitat protection goals for Ohio and the UMRGLRJV region presented by (Bird Conservation Region (BCR) and cover type in km^2. See Table 1 in Chapter 5 for habitat descriptions.

	BCR	Deciduous forest[c]	Forested wetland	Shrubland	Grassland	Mixed wooded openland
Ohio	13	209	0	2,360	375	750
	22	33	2	1,100	1,088	2,000
	24	40	0	140	26	0
	28	810	2	1,500	450	183
	Total	1,092	4	5,100	1,939	2,933
All States	12	606	0	21,900	1,193	908
	13	209	0	2,360	375	750
	22	506	419	5,039	17,592	61,826
	23	115	54	6,532	3,177	10,709
	24	1,583	217	3,320	1,426	6,333
	28	810	2	1,500	450	183
	Total	3,829	692	40,651	24,213	80,709

Restoration and Enhancement Objectives

The UMRGLRJV restoration and enhancement goals were based on focal species population deficits and habitat models. The term "restoration" implies converting a human altered landscape to a community type that would benefit the focal or target species. With any restoration or enhancement work, landscape context and capabilities are always important considerations, and these include current cover, hydrology, and historical vegetation.

The UMRGLRJV restoration and enhancement goals for Ohio include maintaining and protecting an additional 890 km^2 of deciduous forest, 2 km^2 of forested wetland, 2,826 km^2 of shrublands, 1,939 km^2 of grassland and 193 km^2 of mixed-wooded openland (Table 5). Using land cover classes and focal species model, the JV has put together figures to help determine important areas for bird conservation (Chapter 5, Figures 1-4).

Table 5. Restoration and enhancement goals for Ohio by BCR and for all of the UMRGLRJV by cover type in km^2. See Table 1 in Chapter 5 for habitat descriptions.

		Forest	Deciduous forest	Forested wetland	Shrubland	Grassland	Mixed wooded openland
Ohio	13	0	209	0	780	375	750
	22	0	33	1	1,610	1,088	2,000
	24	0	20	0	16	26	0
	28	0	628	1	420	450	183
	Total	0	890	2	2,826	1,939	2,933
All States	12	4,133	19	0	3,560	1,193	908
	13	0	209	0	780	375	750
	22	0	277	209	2,861	17,592	61,826
	23	687	115	26	6,120	3,177	10,709
	24	0	735	108	2,090	1,426	6,333
	28	0	628	1	420	450	183
	Total	4,820	1,983	344	15,831	24,213	80,709

Conservation Strategies

Several strategies were identified by the UMRGLRJV (2007) to provide land managers with guidelines for maintaining and increasing landbird populations of conservation concern. These strategies have been adapted for Ohio and are included below:

- Promote "best practices" guidelines for land managers and promote planning across ownerships to ensure viable breeding populations of all landbirds in the region.
- Promote planning across joint ventures, state, and international boundaries.
- Promote private lands services within Ohio and within associated JV regions.
- Focus on land supporting viable populations of focal species, in relatively unfragmented landscapes >10,000 ha that have the fewest threats (e.g., low deer density, few invasive plants, low probability of being degraded; see Appendix D in Potter et al. 2007).
- Focus conservation efforts on landscapes that are >70% intact (undeveloped) and contain core sites with source populations of focal species. Landscapes with <70% cover should also be conserved if focal species habitat needs are met, especially if few or no landscapes meet the 70% criteria. In landscapes with <70% in cover, retain or increase size of forest and grassland tracts to enhance population viability (Pashley et al. 2000).
- Create coordinated conservation programs in countries where migrants winter and migrate, including identification and conservation of key sites (Rich et al. 2004).
- Identify and/or maintain critical breeding areas for Blue-winged Warbler, Cerulean Warbler, Kentucky Warbler, Louisiana Waterthrush, Yellow-breasted Chat, and Henslow's Sparrow since UMRGLRJV is particularly important to breeding populations (>50% of the breeding population; Pashley et al. 2000).

- Areas where stopover sites are especially needed include Great Lakes shorelines and islands. These areas often will be different than sites important for breeding birds and require different conservation strategies (Ewert et al. 2006). Conservation strategies needed to maintain a network of stopover sites in the JV region include:
    - Seek partnerships to create vegetation patches on small parcels, privately owned or municipal lands along the Lake Erie shoreline.

    - Along Lake Erie, protect as much natural and restored habitat within 0.4 km of the lake edge and sites that are more than 4 km from other vegetation on the shoreline (Ewert et al. 2006).
    - Near Lake Erie, in agriculture or urban areas, identify the most isolated natural and restored vegetation patches. Create strategies to protect and enhance these patches, especially those >4 km from other habitat.

RESEARCH NEEDS

Priority research needs were identified in the Landbird Habitat Conservation Strategy (Potter et al. 2007) for the Upper Mississippi River and Great Lakes Joint Venture. The five research objectives below are listed in order of importance. See Potter et al. (2007) for additional details.

Research objective 1. Identify landscape and habitat characteristics (e.g., composition, structure, configuration) associated with high productivity and/or survivorship, including source populations.

Research objective 2. For migrating birds, identify a network of sites to meet their energetic needs. Document key landscape and site-level features at important stopover sites, especially near the Great Lakes and in agricultural and urban settings. This information is needed to better manage habitats for migrant landbirds.

Research objective 3. Improve understanding of habitat requirements, management needs, and landscape attributes for species of high conservation concern. Information is needed to develop site specific management protocols for bird population maintenance and restoration.

Research objective 4. Quantify fine scale site characteristics important to JV focal species by providing information for explicit habitat prescriptions and identifying research/monitoring needs for fine scale characteristics that are unknown. This information is needed to develop site specific management protocols for bird population maintenance and restoration.

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Appendix A. Other bird conservation plans applicable to Ohio.

National Bird Conservation Plans

- o North American Waterfowl Conservation Plan:
  http://www.fws.gov/birdhabitat/NAWMP/files/ImplementationFramework.pdf

- o North American Waterbird Conservation Plan
  http://www.waterbirdconservation.org/pubs/complete.pdf

- o North American Shorebird Conservation Plan
  http://www.fws.gov/shorebirdplan/USShorebird/downloads/USShorebirdPlan2Ed.pdf

- o Partners in Flight North American Landbird Conservation Plan
  http://www.partnersinflight.org/cont_plan/default.htm

- o Northern Bobwhite Conservation Initiative
  http://www.acjv.org/documents/Northern_Bobwhite_Plan.pdf

- o North American Grouse Management Strategy
  http://www.grousepartners.org/pdfs/Plandraft.pdf

- o Ruffed Grouse Conservation Plan
  http://www.ruffedgrousesociety.org/pdf/RG_ConservationPlan.pdf

- o American Woodcock Conservation Plan
  http://www.timberdoodle.org/documents/american_woodcock_conservation_plan.pdf

Regional Bird Conservation Plans produced by the Upper Mississippi River and Great Lakes Region Joint Venture (UMRGLRJV)

- o UMRGLRJV 2007 All-Bird Implementation Plan
  http://www.uppermissgreatlakesjv.org/docs/JV2007All-BirdPlanFinal2-11-08.pdf

- o UMRGLRJV Shorebird Habitat Conservation Strategy
  http://www.uppermissgreatlakesjv.org/docs/UMRGLR_JV_ShorebirdHCS.pdf

- o UMRGLRJV Waterbird Habitat Conservation Strategy
  http://www.uppermissgreatlakesjv.org/docs/UMRGLR_JV_WaterbirdHCS.pdf

- o UMRGLRJV Waterfowl Habitat Conservation Strategy
  http://www.uppermissgreatlakesjv.org/docs/UMRGLR_JV_WaterfowlHCS.pdf

- o UMRGLRJV Landbird Habitat Conservation Strategy
  http://www.uppermissgreatlakesjv.org/docs/UMRGLR_JV_LandbirdHCS.pdf

Regional Bird Conservation Plans produced by Partners in Flight

- o Prairie Peninsula - http://www.blm.gov/wildlife/plan/pl_31_10.pdf

- o Interior Low Plateaus - http://www.blm.gov/wildlife/plan/pl_14_10.pdf

- o Upper Great Lakes Plain **-** http://www.blm.gov/wildlife/plan/pl_16_10.pdf

- o Ohio Hills **-** http://www.blm.gov/wildlife/plan/pl_22_10.pdf

- o Allegheny Plateau - http://www.blm.gov/wildlife/plan/pl_24_10.pdf

- o Ohio Partners in Flight Habitat Manual - http://www.ohiobiologicalsurvey.org/ (available through Ohio Biological Survey)

Appendix B. Summary of information about UMRGLRJV shorebird focal species that occur within Ohio. For more information and detailed maps on these species please consult the Shorebird Habitat Conservation Strategy (Potter et al. 2007).

Focal species	Breeding habitat	Season(s) found in Ohio	Monitoring needs	Research needs	Notes
Piping Plover	Open Beach	Migration	Ohio should contribute to range wide- monitoring efforts	Over-winter survival and migration habitat needs	Possible critical habitat designated east of Cedar Point NWR
Killdeer	Open areas: Mudflats, sandbars, short grass	Breeding and migration	Monitoring through BBS sufficient	None identified	Killdeer use natural and human made habitat, need to increase naturally occurring habitat
Wilson's Snipe	Swamps and wetlands: bogs, fens, willow/alder swamps. Marshy fringes of rivers and ponds	Breeding and migration	Marshbird survey should detect presence, and International Shorebird Survey	None identified	Successional wetlands will not be effective, too dense.
Spotted Sandpiper	Shorelines, river edges, grasslands	Breeding and migration	Monitoring through BBS and International Shorebird Survey	None identified	Habitat loss along Lake Erie may contribute to future declines in SPSA populations
Wilson's Phalarope	Shallow Herbaceous wetlands: open water and cattails. Potholes, wet prairies. Use adjacent grasslands to wetlands	Breeding and migration	Status in Ohio?	Surveys for breeding status in Ohio; migration habitat needs	Very few breeding records for Ohio
Upland Sandpiper	Open grassland: prairie, meadows, hayfields	Breeding and migration	BBS, migration and winter information	Surveys for OH breeding status, demographics, winter and migration habitat use	unknown how often birds are hunted on wintering habitat
American Woodcock	Old fields and early successional forests with openings for displaying	Breeding and migration	BBS and Woodcock Singing Ground Survey	Migration habitat use	migration needs may be affecting populations

Appendix C. Summary of information about UMRGLRJV waterbird focal species that occur within Ohio. For more information and detailed maps on these species please consult the Waterbird Habitat Conservation Strategy (Soulliere et al. 2007).

Focal species	Focal species	Breeding habitat	Season(s) found in Ohio	Monitoring needs	Research needs	Notes
Black Tern	Marshes with open water, emergent vegetation	Lakes, river, and wetlands.	Breeding and migration	BBS, colonial waterbird survey. Need more detailed information on monitoring	Nest-site selection at landscape scale, human cause disturbances on nests, and demographic information	Ohio has very few nesting pairs. Perhaps potential in restoration to attract more breeding pairs?
Common Tern	Great Lakes, large inland lakes with marsh. Need sand, gravel or shells and vegetation for nests	Shallow and deep lakes, rivers and wetlands. Need sand flats or beaches for roosting.	Breeding and migration	Ohio Division of Wildlife annually surveys colonies	Winter survivorship and foraging ecology, energetics, molt and other info that is limiting on wintering grounds	
King Rail	Marshes and river floodplains. Need cattail, grasses, sedges or rushes	Mississippi River historically and shallow native-plant wetlands	Breeding and migration	USFWS/USGS secretive marshbird survey insufficient. Need more surveys in potential habitat	Surveys for breeding status in Ohio, impact of habitat size and isolation on breeding success, foraging ecology, how waterfowl and king rail management can integrate	Need approx 250 ha to restore, protect or acquire in Ohio to reach target JV goal
Black-crowned Night-Heron	Wetlands: swamps, marshes, lakes and ponds. Prefers trees, shrubs for nesting	Wetlands similar in breeding and Mississippi River corridor	Breeding, migration, some year round	BBS is inadequate, Ohio Wetland Breeding Bird Survey, USFWS colonial waterbird survey, Ohio Breeding Bird Atlas	Habitat requirements, productivity, impacts of Double-crested Cormorant populations, effects of contaminants, status away from Lake Erie	

Appendix D. Summary of information about waterfowl focal species. For more information and detailed maps on these species please consult the UMRGLRJV Waterfowl Conservation Strategy Plan (Soulliere et al. 2007).

Focal species	Breeding habitat	Migratory and wintering habitat	Season(s) found in Ohio	Monitoring needs	Research needs
Mallard	Variety of habitats from grasslands, marshes, bogs, lake shorelines, river edges and beaver ponds	Wetlands and open water. Will forage in small shallow wetlands and grain fields	year round	Spring Waterfowl Population and Habitat Survey should be conducted in Ohio	Information on fuel and foraging habitat needed during migration
Wood Duck	Wetlands associated with mature hardwood forest including, beaver ponds, marshes streams and rivers.	Rivers, streams and ponds near forest cover. Prefer hard mast	year round	BBS used and band recoveries. Need method to find more accurate population estimates	Studies designed to look at population status, nest predation, duckling survivorship, non-breeding habitat use
Blue-winged Teal	Semi-permanent wetlands with surrounding open areas, especially grassland.	Shallow lakes and ponds with dense emergent vegetation	breeding	BBS used and band recoveries. Need regional method for monitoring vital rates for habitat quality	Need information on how changes in landscape affect habitat quality and how vital rates affect population growth
American Black Duck	Herbaceous and wooded wetlands: beaver ponds, shallow lakes with emergent vegetation, swamps	Great Lake coastal bays and marsh. Large rivers	year round	None suggested for Ohio	Information on hunting effects and interaction with Mallards needed
Lesser Scaup	Does not breed in Ohio	Marshes along the great lakes, large rivers, impounded rivers, deltas, wetlands and reservoirs.	migration/winter	Mid-winter Inventory, CBC. Need information on fitness on staging areas	Impacts of containments on productivity. Id markers b/w Greater Scaup, Impacts of zebra mussels, thermal pollution, and disturbance.
Canvasback	Does not breed in Ohio	Shallow lakes, large rivers, deep-water marsh. Need productive diverse aquatic plants and invertebrates	migration/winter	Fitness on migration staging areas for habitat quality.	None identified
Tundra Swan	Does not breed in Ohio	Shallow ponds, lakes and riverine marshes and agricultural fields	migration/winter	Mid-winter Inventory, CBC. No additional monitoring needed	Information on competition between feral Mute Swans for food resources.

Appendix E. Summary of focal species information in Landbird Conservation Strategy Plan (Appendix A, Potter et al. 2007). This table only includes land bird focal species that breed in Ohio[1] and does not include Olive-sided Flycatcher, Greater Prairie Chicken, Golden-winged Warbler, Cape May Warbler, Kirtland's Warbler, Canada Warbler, and Connecticut Warbler; Canada Warbler breeds in Ohio, but only very locally in hemlock ravines and is too rare to include here.

Focal species	Breeding habitat	Main season(s) found in Ohio	Monitoring needs	Research needs	Notes
Upland Sandpiper	Open grassland, prairie, meadows, hayfields	Breeding	BBS insufficient	Demographic data in breeding/wintering areas	
American Woodcock	Young shrubland, forest edge; openings for display	Breeding & migration	American Woodcock Singing Ground Survey	Migration habitat use	
Whip-poor-will	Open woodland, deciduous & mixed forest	Breeding	BBS insufficient	Demographic data, population trend, habitat use, basic biology	
Chimney Swift	Urban/suburban areas; chimneys for breeding	Breeding & migration	BBS insufficient. Monitor large roosts during fall migration	Data on natural habitat use	
Red-headed Woodpecker	Oak savannah, open forest with little understory	Breeding & wintering	BBS & CBC fairly adequate	Demographic data	
Willow Flycatcher	Shrubland in wetland & upland areas, willows	Breeding & migration	BBS needs to be expanded to include more habitat. Site specific monitoring	None identified	
Veery	Moist deciduous forests with dense understory	Breeding & migration	BBS adequate	Demographic studies in breeding/wintering areas, impacts of habitat loss	Ohio breeder (locally common in BCR 13), Ohio pop. & habitat objectives not given by UMRGLRJV
Wood Thrush	Mature mesic mixed & deciduous forests with understory	Breeding & migration	BBS insufficient. Need species- specific surveys	None identified	Uses early-successional forest in post-breeding

Focal species	Breeding habitat	Main season(s) found in Ohio	Monitoring needs	Research needs	Notes
Blue-winged Warbler	Early-succesional forest, shrubland, powerlines, & clearcuts	Breeding	BBS sufficient.	Interactions with Golden-winged Warblers	Ohio has largest population in UMRGLRJV
Cerulean Warbler	Mature deciduous forest with understory & gaps.	Breeding	BBS & other specific monitoring.	Demographic studies in breeding/wintering areas	Ohio has largest population in UMRGLRJV
Prothonotary Warbler	Floodplain forests, swamps	Breeding	BBS inadequate, under samples habitat	Demographic studies	
Louisiana Waterthrush	Gravel-bottom streams in deciduous forests	Breeding	BBS inadequate; need stream surveys in early breeding season	Demographic studies in breeding/wintering areas	Ohio has largest population in UMRGLRJV
Kentucky Warbler	Deciduous forest & forest edges in lowland & upland	Breeding	BBS adequate	Demographic studies in breeding/wintering areas, dispersal	Ohio has largest population in UMRGLRJV
Yellow-breasted Chat	Shrubland, early-successional forest	Breeding	BBS adequate, new routes would help with population estimates	Demographic studies in breeding/wintering areas, population trends, response to land management	Ohio has largest population in UMRGLRJV
Henslow's Sparrow	Dense tall grassland	Breeding	BBS adequate	None identified	Ohio has high proportion of population in UMRGLRJV
Eastern Meadowlark	Grasslands, pasture, roadsides	Breeding/some winter	BBS adequate	Determine best habitat actions to increase population size	

[1]Golden-winged Warbler was listed as a UMRGLRJV focal species (Potter et al. 2007), but is not included here since the species essentially does not presently breed in Ohio; rarely summering males are recorded in Ohio, so this species should be reevaluated in the future as a potential focal species.

Appendix F. Summary of potential funding sources for conservation of priority birds, habitat, monitoring, and research projects in Ohio.

Organization	Grant name	Website	Purpose of grant program
Federal grants			
U.S. Department of the Interior	Inter-Agency Challenge Cost-share program	http://www.doi.gov/initiatives/conservation.html	Funds programs that engage local communities in conservation, restore wetlands and uplands, foster innovation and achieve conservation goals while maintaining working landscapes
U.S. Fish & Wildlife Service - Region 3	Great Lakes Fish & Wildlife Restoration Act Grant Program	http://www.fws.gov/midwest/Fisheries/glfwra-grants.html	Funds states and other entities to encourage cooperative conservation, restoration and management of fish and wildlife resources and habitats in Great Lakes basin
U.S. Fish & Wildlife Service	North American Wetlands Conservation Act Grant Program	http://www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm	Supports projects in Canada, U.S., and Mexico that involve long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats
U.S. Fish & Wildlife Service	Neotropical Migratory Bird Conservation Act Grant Program	http://www.fws.gov/birdhabitat/Grants/NMBCA/index.shtm	Supports public-private partnerships carrying out projects in U.S., Canada, Latin America, and Caribbean that promote long-term conservation of Neotropical migratory birds and their habitats
U.S. Fish & Wildlife Service	National Coastal Wetlands Conservation Grants Program	http://www.fws.gov/coastal/CoastalGrants/	Provides matching grants to States for acquisition, restoration, management or enhancement of coastal wetlands
U.S. Fish & Wildlife Service	Partners for Fish and Wildlife Grant Program	http://www.fws.gov/partners/	Provides technical assistance and cost-share incentives directly to private landowners to restore fish and wildlife habitats
U.S. Fish & Wildlife Service	State Wildlife Grant Program	http://wsfrprograms.fws.gov/Subpages/GrantPrograms/SWG/SWG.htm	Funds programs for wildlife and their habitats, including nongame species, with priority on species of greatest conservation concern as identified by State Comprehensive Wildlife Conservation Plan

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U.S. Fish & Wildlife Service	Landowner Incentive Program	http://wsfrprograms.fws.gov/Subpages/GrantPrograms/LIP/LIP.htm	Funds given to state wildlife agencies to protect/restore habitats on private lands for federally listed, candidate, at-risk species
U.S. Fish & Wildlife Service	Wildlife Restoration Program	http://wsfrprograms.fws.gov/Subpages/GrantPrograms/WR/WR.htm	Funds for state wildlife agencies to restore and conserve wild birds, mammals, and their habitat, and provide public access to wildlife resources
Assoc. of Fish and Wildlife Agencies and U.S. Fish & Wildlife Service	Multistate Conservation Grant Program	http://www.fishwildlife.org/multistate_grants.html	Funds projects on biological research/ training, species population status, outreach, economic value of fishing/ hunting, and regional habitat needs assessments; priorities identified by Assoc. of Fish & Wildlife Agencies
U.S. Fish & Wildlife Service	Grants-at-a-glance	http://www.fws.gov/grants/	Provides an overall summary of grants available through U.S. Fish & Wildlife Service
USDA - Natural Resources Conservation Service	Conservation Reserve Program	http://www.nrcs.usda.gov/programs/crp/	Technical/financial assistance to farmers that address soil, water, and natural resource concerns. Encourages landowners to convert erodible cropland or environmentally sensitive land to permanent cover (i.e. native grasses, wildlife plantings, trees, riparian buffers
USDA – Natural Resources Conservation Service	Conservation Reserve and Enhancement Program	http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=cep	A voluntary land retirement program helping agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water. CREP is a partnership among producers, and state and federal governments
USDA - Natural Resources Conservation Service	Conservation Security Program	http://www.nrcs.usda.gov/programs/csp/	Provides financial/technical assistance to promote conservation and improvement of soil, water, air, energy, plant and animal life on private working lands (cropland, grassland, prairie land, pasture, range land, and forests in agricultural areas). Available to all producers, regardless of size of operation, crop type, or geographic location.

USDA – Natural Resources Conservation Service	Environmental Quality Incentives Program (EQIP)	http://www.nrcs.usda.gov/programs/eqip/	Program promoting agricultural production and environmental quality by offering financial/technical assistance to implement management practices on agricultural land. EQIP offers 1-10 year contracts that provide incentive payments and cost-shares to implement conservation practices.
USDA - Natural Resources Conservation Service	Grassland Reserve Program	http://www.nrcs.usda.gov/programs/GRP/	Provides assistance to landowners to restore and protect grassland, rangeland, pastureland, shrubland on their property
USDA - Natural Resources Conservation Service	Wetlands Reserve Program	http://www.nrcs.usda.gov/programs/wrp/	Provides technical and financial support to help landowners protect, restore, and enhance wetlands on their property
USDA - Natural Resources Conservation Service	Wildlife Habitat Incentives Program	http://www.nrcs.usda.gov/programs/whip/	A program for people who want to develop and improve wildlife habitat primarily on private land
U.S. Environmental Protection Agency, Office of Water	Catalog of Federal Funding Sources for Watershed Protection	http://cfpub.epa.gov/fedfund/	Searchable database of financial assistance sources (grants, loans, cost-sharing) available to fund a variety of watershed protection projects
U.S. Environmental Protection Agency, Office of Environ. Education	Environmental Education Grants	http://www.epa.gov/enviroed/grants.html	Supports environmental education projects that enhance public's awareness, knowledge, and skills to make informed decisions that affect environmental quality
U.S. Environmental Protection Agency	Five Star Restoration Challenge Grant Program	http://www.epa.gov/owow/wetlands/restore/5star/	Supports students, citizen groups, corporations, landowners, and government agencies to working together to provide environmental education and training through wetland restoration
U.S. Environmental Protection Agency - Region 5	Wetland Program Development Grants	http://www.epa.gov/region5/water/stpb/pdf/rfp_wetland080815.pdf	Projects that promote the coordination of research, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution

U.S. Environmental Protection Agency - Office of Grants	Great Lakes Program Funding	http://www.epa.gov/greatlakes/monitor.html	Mostly aquatic research. Projects should advance protection/restoration of the Great Lakes ecosystem in support of Healthy Communities, Ecosystems, improving Health of Great Lakes Ecosystems
U.S. Environmental Protection Agency - Office of Grants	Current Funding Opportunities	http://www.epa.gov/ogd/competition/open_awards.htm	Provides a list of all current EPA grants
NOAA - Office of Ocean and Coastal Resource Management	Coastal Estuarine & Land Conservation Program	http://coastalmanagement.noaa.gov/land/welcome.html	Provides state and local governments with matching funds to purchase significant coastal and estuarine lands, or conservation easements on such lands
U.S. National Park Service	Land and Water Conservation Fund	http://www.nps.gov/ncrc/programs/lwcf/fed_state.html	Provides funds to acquire new federal recreation lands and as grants to State and local governments
U.S. Department of Health and Human Services	Grants.gov	http://www.grants.gov/index.jsp	A central storehouse for information on over 1,000 grant programs

State grants

ODNR-Division of Wildlife	Wetland Restoration Program	http://www.dnr.state.oh.us/wildlife/Home/resources/mgtplans/wetlandrestoration/tabid/5810/Default.aspx	Provides funds to restore private wetlands; up to $750 per acre, for landowners willing maintain site for up to 10 years. A maintenance agreement of 20 years will pay 100% of costs, up to $1,500 per acre
State of Ohio	Clean Ohio Fund – Green Space Conservation	http://clean.ohio.gov/GreenSpaceConservation/Default.htm	Funds preservation of open space, especially areas with rare & endangered species, high quality wetlands, riparian forests, enhance eco-tourism, & eliminate nonnative, invasive plants and animals
State of Ohio	Clean Ohio Fund – Farmland Preservation	http://clean.ohio.gov/FarmlandPreservation/	Provides funds to assist landowners and communities in preserving Ohio's farmland, which can also benefit the environment and provide wildlife habitat

State of Ohio	Clean Ohio Fund – Recreational Trails	http://clean.ohio.gov/RecreationalTrails/	Funds recreational trails; emphasizes projects consistent with state and regional trail plans, involve the purchase of rail lines, and preserve natural corridors
Ohio Environmental Protection Agency	Ohio Nonpoint Source Management Program - 319 Grant Program	http://www.epa.state.oh.us/dsw/nps/319Program.html	Funds watershed groups and others who implement locally developed watershed management plans and restore watersheds, wetlands, and surface waters impaired by nonpoint source pollution.
ODNR-Division of Coastal Management	Ohio Coastal Management Assistance Grants	http://www.ohiodnr.com/LakeErie/Grants_CMAG/tabid/9337/Default.aspx	Funds projects that protect coastal resources (e.g., habitat restoration/demonstrations, land acquisition, land use planning, resource management education and outreach
Ohio Lake Erie Commission	Lake Erie Protection Fund	http://lakeerie.ohio.gov/	Funds projects that improve management decisions, both for environmental protection and economic development, while implementing objectives in the Lake Erie Protection and Restoration Plan

Private grants

National Fish & Wildlife Foundation	Acres for America	http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	Provides funding for projects that conserve important habitat for fish, wildlife, and plants through acquisition of property to offset the footprint of Wal-Mart's stores on an acre by acre basis
National Fish & Wildlife Foundation	ArcelorMittal Great Lakes Watershed Restoration Program	http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	Provides grants to organizations working to protect, restore or enhance the habitat for fish wildlife and plants of the Great Lakes watershed
NFWF, U.S. Fish & Wildl. Serv., Bur. of Land Management, U.S. Forest Serv., Trout Unlimited	Bring Back the Natives: A Public-Private Partnership for Restoring Populations of Native Aquatic Species	http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	Funds projects that restore, protect, and enhance native populations of sensitive aquatic species, especially on lands on or adjacent to federal agency lands

National Fish & Wildlife Foundation	National Wildlife Refuge System "Preserve America" Grant Program	http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	Provides grants to fund national wildlife refuge interpretive/education projects focusing on historic sites and how they contribute to our conservation and understanding of natural resources
National Fish & Wildlife Foundation	Native Plant Conservation Initiative	http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	Supports on-the-ground conservation projects that protect, enhance, and/or restore native plant communities on public and private lands. Projects may involve protection and restoration, information and education, and inventory and assessment
National Fish & Wildlife Foundation	Nature of Learning	http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	Supports costs associated with The Nature of Learning, a community-based conservation education initiative that uses National Wildlife Refuges as outdoor classrooms and enhances natural resource stewardship in the community.
National Fish & Wildlife Foundation, USDA Forest Service	Upper Mississippi River Watershed Fund	http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	Provides grants that benefit the stewardship of the forests and the restoration of watersheds in the Upper Mississippi River drainage
National Fish & Wildlife Foundation and United States Golf Association	Wildlife Links	http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	Funds research, management, and education projects that will enhance wildlife management on golf courses on at least a state-wide, and preferably a region-wide or national basis
National Fish & Wildlife Foundation	Wildlife & Habitat Conservation Initiative	http://www.nfwf.org/am/template.cfm?section=Wildlife_and_Habitat	Conserve landscape-scale habitats by protecting private lands adjacent to conserved lands, enhancing land stewardship to achieve habitat objectives in priority landscapes, and increase populations of federally-listed or candidate species
Wildlife Conservation Society	Wildlife Action Opportunities Fund	http://wcs.org/wildlifeopportunity	Provides competitive grants to conservation organizations that are focused on implementing priority actions and strategies identified in State Wildlife Action Plans

Great Lakes Protection Fund	Great Lakes Protection Fund Grant	http://www.glpf.org/	Seeks projects that will improve Great Lakes ecosystem health, promote interdependence of healthy ecological and economic systems, and are innovative, creative, and venturesome.
FMC Corporation	FMC Corporation Bird and Habitat Conservation Fund	http://www.nabci-us.org/funding.html	Projects that implement priorities of conservation plans (e.g. PIF); work on private lands or outreach to landowners is desirable. Funds mainly for habitat conservation projects

Appendix G. Prioritization of Ohio bird species and habitat suites

Ohio Priority Bird Species

The OBCI All-Bird Conservation Plan is based on focal species for conservation planning in the Upper Mississippi River and Great Lakes Region Joint Venture. These species are highlighted in chapters 2, 3, 4, and 5.   Appendix G offers an additional species list that was developed by OBCI prior to the existence of final UMRGLRJV habitat conservation strategies for the four bird groups. There is a large degree of overlap in species on the two lists, but many are not included in this OBCI Plan because these species were considered in the UMRGLRJV conservation planning. OBCI will need to decide how species listed below should be incorporated into future conservation planning.

The goal in prioritizing Ohio's birds is to identify species of highest conservation concern based on state, regional, and continental threats and concern. In addition, we quantified an area importance factor that helped identify species that Ohio has high responsibility to protect. Using both a regional and national approach will allow Ohio to contribute to the conservation needs of species that are declining in both Ohio and throughout their range. The national bird conservation groups have (or will) set specific population and/or habitat restoration goals for individual species. By prioritizing our species list, we will be able to identify those species that we should target to achieve goals set at the regional and national level. Quantifying conservation concerns and needs for Ohio species will help direct limited funding resources towards species that need more immediate attention. Therefore, the main goal of prioritization is to identify species that have global or continental concern and threats, are regionally declining or threatened, and for which Ohio has specific responsibility to manage, restore, or monitor populations. Using this plan will give interested parties two choices for implementation: to protect as many priority species as possible, or to use the focal species described in the second part of this plan to direct management (see Conservation Strategy, Chaps 3-5 section for more information).

Methods

Methods used for species prioritization were similar to those used at the BCR level, but, some modifications were made to fit Ohio's needs. These methods were derived at a BCR Coordinators meeting with the intention that they should be used in planning throughout the country (pers. communication, Mitch Hartley). Most recently, this method was used for BCR 14: Atlantic Northern Forest (Dettmers 2006) and BCR 13: Lower Great Lakes/ St. Lawrence River (Hartley 2007). In the past, species prioritization, although based partly on objective data, was usually determined by expert opinion instead of objective criteria. Expert opinion can be subjective and possibly biased by the scientists' opinion. The BCR method used in this plan uses objective data with validation of the results by experts.

Data for the species prioritization came from peer-reviewed information directly obtained from the national bird conservation plans: The U.S. Shorebird Conservation Plan, North American Waterfowl Plan, Waterbird Conservation Plan for the Americas and the North American Landbird Conservation Plan. Whenever possible, data were taken straight from online databases (landbirds and shorebirds) or from appendices (waterbirds and waterfowl). Variables used to determine species prioritization included: population status at the continental level (Continental concern), population status at the BCR level (BCR Concern), and responsibility at the state level (Ohio Responsibility). For specific

information on these terms please consult the national plans. Continental concern and BCR concern for BCR's 13, 22, 24 and 28 were taken from national plans and summarized as either high, moderate, or low. Ohio Responsibility scores were obtained from Swanson and Dettmers (2002) or through expert opinion for those species not included in the paper.

Decision rules were based on similar criteria used at the BCR level. Because Ohio contains four BCR's we included conservation concern for each of the regions. While this made our decision rules more complicated, it did highlight species at risk within each BCR. This method should keep regionally important species within the state on our list. This should become increasingly important as regional-scale planning continues to take place. Species prioritization was decided on six factors: continental concern, state responsibility, and concern within the four BCRs (13, 22, 24, 28). Priority species were placed into one of five categories: Highest, High, Moderate, Low, or State. Table 1 summarizes the decision rule and criteria for species prioritization. To validate the method and results, a group of experts reviewed the species and decision rules once the list was compiled.

Table 1. Criteria for conservation priority tiers for Ohio.

Priority	Decision Rule / Criteria
HIGHEST (Table 4)	High Continental Concern *and* High or Moderate Ohio Responsibility *and* High Concern in at least two four Ohio BCRs
	OR
	Moderate Continental Concern *and* High Responsibility *and* High Concern in at lea three of four Ohio BCRs
HIGH (Table 5)	High Continental Concern *and* High Ohio Responsibility *and* Moderate Concern in at least one BCR
	OR
	High or Moderate Continental Concern *and* High or Moderate concern in three BCRs
	OR
	Low Continental Concern a*nd* High Concern in at least three BCRs
MODERATE (Table 6)	High Continental Concern *and* Low or Moderate Ohio Responsibility *and* High Concern in at least one BCR
	OR
	Moderate Continental Concern *and* Low Ohio Responsibility and a combination of High *and* moderates in at least two BCRs
	OR
	Low Continental Concern and Moderate Ohio Responsibility and High or Moderate Concern in at least two BCRs
LOW (Table 2)	Low or Moderate Continental Concern *and* Low or Moderate Ohio Responsibility *and* High Concern in one BCR or Moderate Concern in at least two BCRs
STATE (Table 3)	Species on the Ohio list of endangered, threatened, species of concern, or species of special interest classified into either the Low" or drop category

Results of Prioritization

A total of 104 species fell into the Highest, High, or Moderate priority tiers. Sixty-nine species were dropped due to stable populations and/or low conservation concern in Ohio and elsewhere in their range. Low priority species may not have strongly declining populations but do have some conservation concern in Ohio and were retained (Tables 2 and 3). Species were dropped if they occur too rarely to warrant conservation attention (e.g., Western Grebe). Fifty species were considered Low priority and thirty-four were put into the State Concern tier. Other BCR plans have dropped Low priority species from their plans, we decided to err on the conservative side and retain these species in the OBCI Plan. These species are not immediately threats, but do have low-level conservation concern and can be reconsidered in the future. Ohio-listed species that received a priority rating lower than Moderate were kept on the list so that managers are aware of possible state efforts to restore their populations. Some of the state-listed species may be in need of monitoring because their status in Ohio is unclear (Tables 2 and 3).

Table 2. State Concern and Low Priority species for Ohio[1].

Common Loon	Ring-billed Gull	Eastern Kingbird
Horned Grebe	Great Black-backed Gull	White-eyed Vireo
Pied-billed Grebe	Bonaparte's Gull	Blue-headed Vireo
Northern Shoveler	Franklin's Gull	Gray Catbird
Gadwall	Little Gull	Black-throated Green Warbler
American Wigeon	Forster's Tern	Chestnut-sided Warbler
Ruddy Duck	Black-crowned Night Heron	Northern Parula
Bufflehead	Green Heron	Yellow-throated Warbler
Common Merganser	Black Rail	Common Yellowthroat
Trumpeter Swan	Red-shouldered Hawk	Yellow Warbler
Tundra Swan	Broad-winged Hawk	Ovenbird
Snow Goose	American Kestrel	*Savannah Sparrow*
Lesser Yellowlegs	Barred Owl	Song Sparrow
Red-necked Phalarope	Pileated Woodpecker	Swamp Sparrow
American Avocet	Red-bellied Woodpecker	Summer Tanager
Long-billed Dowitcher	Ruby-Throated Hummingbird	Rose-breasted Grosbeak
Pectoral Sandpiper	Bank Swallow	American Goldfinch
Spotted Sandpiper	Barn Swallow	Horned Lark
American Coot	Cliff Swallow	Baltimore Oriole
Herring Gull	Alder Flycatcher	

[1]Low priority species are those that may not have dramatic declining populations across their range but do show some conservation concern within Ohio. State Concern Priority species are those species that when prioritized came out as "Low" or "drop"; they were kept and moved to the "State Concern Priority" tier because they are classified as endangered, threatened, species of concern, or special interest by the state of Ohio. Note: some state endangered and threatened species are in tiers higher than Low- they were kept in their priority tier unless original fell out as a "Low Priority" species or would have been dropped.

Table 3. State Concern Priority Species for Ohio

Redhead	Long-eared Owl	Mourning Warbler
Sandhill Crane	Barn Owl	Golden-winged Warbler
Little Blue Heron	Yellow-bellied Sapsucker	Northern Waterthrush
Cattle Egret	Brown Creeper	Hermit Thrush
Great Egret	Red-breasted Nuthatch	Dark-eyed Junco
Sora	Least Flycatcher	Blue Grosbeak
Virginia Rail	Winter Wren	Yellow-headed Blackbird
Black Vulture	Bewick's Wren	Pine Siskin
Bald Eagle	Blackburnian Warbler	Purple Finch
Osprey	Black-thr. Blue Warbler	
Sharp-shinned Hawk	Magnolia Warbler	

Ten species fell into the Highest Priority tier (Table 4). These species require immediate conservation action, and when possible, funding and effort should be directed towards these species. Highest Priority species have high conservation threats and concern across their range and are also regionally threatened.

Table 4. Highest Priority Species for Ohio.

American Black Duck	Blue-winged Warbler
Short-billed Dowitcher	Cerulean Warbler
Solitary Sandpiper	Worm-eating Warbler
American Woodcock	Wood Thrush
King Rail	Henslow's Sparrow

Twenty-six species were categorized as High Priority (Table 5). These species have widely decreasing populations, but the current threat is not as strong as for species in the Highest Priority tier. These species are perceived to be threatened at both regional and continental scales. Ohio has 68 species of Moderate Priority (Table 6). In general, these species have slightly more stable populations or Ohio has lower responsibility for these species. However, Moderate Priority species may have a high concern within one or two of the BCRs and Ohio needs to pay attention to their population trends.

Table 5. High priority bird species for Ohio.

Buff-breasted Sandpiper	Northern Harrier	Prothonotary Warbler
Greater Yellowlegs	Short-eared Owl	Kentucky Warbler
Piping Plover	Whip-poor-will	Hooded Warbler
Upland Sandpiper	Black-billed Cuckoo	Louisiana Waterthrush
Wilson's Phalarope	Red-headed Woodpecker	Bobolink
Black Tern	Loggerhead Shrike	Dickcissel
Common Tern	Bell's Vireo	Field Sparrow
American Bittern	Acadian Flycatcher	Grasshopper Sparrow
Northern Bobwhite	Prairie Warbler	

Table 6. Moderate Priority Species for Ohio.

Canvasback	Sedge Wren	Eastern Wood-Pewee
Common Goldeneye	Sanderling	Willow Flycatcher
Greater Scaup	Dunlin	Yellow-throated Vireo
Lesser Scaup	Common Moorhen	Golden-crowned Kinglet
Ring-necked Duck	Least Tern	Marsh Wren
Blue-winged Teal	Black-crowned Night-Heron	Sedge Wren
Green-winged Teal	Yellow-crowned Night-Heron	Blue-gray Gnatcatcher
Northern Pintail	Least Bittern	Brown Thrasher
Mallard	Snowy Egret	American Redstart
Wood Duck	Sora	Black-and-white Warbler
Hooded Merganser	Virginia Rail	Canada Warbler
American Golden-Plover	Ruffed Grouse	Yellow-breasted Chat
Black-bellied Plover	Peregrine Falcon	Eastern Towhee
Ruddy Turnstone	Eastern Screech-Owl	Lark Sparrow
Killdeer	Northern Saw-whet Owl	Vesper Sparrow
Hudsonian Godwit	Chuck-will's-widow	Veery
Marbled Godwit	Common Nighthawk	Scarlet Tanager
Whimbrel	Chimney Swift	Orchard Oriole
Red Knot	Belted Kingfisher	Rusty Blackbird
Wilson's Snipe	Northern Flicker	Eastern Meadowlark
Least Sandpiper	Yellow-billed Cuckoo	Western Meadowlark
Semipalmated Sandpiper	Purple Martin	Indigo Bunting
Western Sandpiper	Great Crested Flycatcher	

Habitat Suites for Priority Species

Conservation of Ohio's priority species will require the conservation of habitats important for their survival. To implement all-bird conservation we have broken down the top priority species (*Highest, High, and Moderate priority species only*) into associated habitat types. The habitat types described below are those used in other bird conservation plans and were derived from National Land Cover Data (For definitions see Table 7).   While these habitat types are broad, this is the first step towards combining bird species into habitat-based groups to facilitate conservation of all species associated with habitats of concern. The following habitats will be critical in our goal to achieve all-bird conservation for Ohio.

Table 7. Habitat types and definitions for species habitat suites

Habitat type	Definition
Agricultural Grasslands	Grasslands, prairies, fallow fields. Areas dominated by forbs and grasses within agriculturally-dominated landscapes
Deciduous/Mixed Forest	Forests dominated by deciduous, coniferous forest or a mixture of the two
Shrub-early Successional	Areas characterized by shrubs and sapling-stage trees
Forested Wetland	Wetland area dominated by trees> than 6 meters in height
Emergent Wetland	Areas that have frequent inundation and dominated by emergent herbaceous vegetation
Lakeshore Sand/Mud	Exposed mudflats, beaches with sand, little or no vegetation present
Open Water/Riverine	Areas with open water and no vegetation

Ohio priority species fell into seven habitat types: Agricultural Grassland, Deciduous/Mixed Forest, Shrub-early Successional, Forested Wetland, Emergent Wetland, Lakeshore Sand/ Mud, Open Water/Riverine. No habitat clearly supported more species in Highest or High priority categories; i.e., all habitat types supported at least two Highest Priority species except for Open Water/Riverine. Deciduous/ Mixed Forest supported the most priority species (24) followed by Emergent Wetland (22), and Agricultural Grassland (20).

Agricultural Grassland

Less than 1% of the original tallgrass prairie remains in the Midwestern United States. In Ohio, grasslands are found in patches throughout the state, but the most important areas occur in the western half of the state within BCR 22 or are associated with reclaimed strip mine areas of BCR 28. Henslow's Sparrow is the only Highest Priority species associated with Agricultural Grassland, however, 38% of all High Priority species are found in grassland habitats (Table 8). Northern Harrier and Short-eared Owl are also associated with Emergent Wetlands.

Table 8. Ohio's Priority birds associated with Agricultural Grassland. All Highest priority species are in bold, High are in italics, and text with no formatting are Moderate priority species.

Henslow's Sparrow	*Loggerhead Shrike*	Northern Flicker
Northern Harrier	*Grasshopper Sparrow*	Purple Martin
Northern Bobwhite	*Dickcissel*	Sedge Wren
Upland Sandpiper	*Bobolink*	Vesper Sparrow
Buff-breasted Sandpiper	Peregrine Falcon	Lark Sparrow
Short-eared Owl	Killdeer	Eastern Meadowlark
Red-headed Woodpecker	Common Nighthawk	Western Meadowlark

Deciduous/Mixed Forest

Forested habitats are increasing in Ohio with a rise from only 10% forest cover in 1940 to over 30% today (Ervin et al. 1994). The most forested region of the state is BCR 28 (southeast) and BCR 13 (northeast) (Flegel 2003). For more information on specific habitat associations for these species and forest management see Flegel 2003. The largest number of Ohio's priority species were associated with Deciduous/Mixed Forest (23% of all priority species), with three Highest Priority and five High Priority species (Table 9).

Table 9. Ohio's Priority birds associated with Deciduous or Mixed Forest. All Highest priority species are in bold, High are in italics, and text with no formatting are Moderate priority species.

Wood Thrush	Ruffed Grouse	Yellow-throated Vireo
Worm-eating Warbler	Yellow-billed Cuckoo	Golden-crowned Kinglet
Cerulean Warbler	Northern Saw-whet Owl	Blue-gray Gnatcatcher
Whip-poor-will	Eastern Screech-Owl	Veery
Black-billed Cuckoo	Chuck-will's-widow	Canada Warbler
Hooded Warbler	Northern Flicker	American Redstart
Kentucky Warbler	Eastern Wood-Pewee	Black-and-white Warbler
Red-headed Woodpecker	Great Crested Flycatcher	Scarlet Tanager

Shrub-early Successional

Shrub-early Successional habitats are dominated by shrubs and sapling-stage trees. Such habitats occur throughout Ohio at forest edges, regenerating forest cuts, or areas where groups of canopy trees have died due to disease, ice damage, flooding, or wind-throw. Large areas of shrubland habitat are found in northeast Ohio, BCR 13 and in central Ohio (Lee and Holtzman 2003). The largest tracts of Scrub-shrub Wetlands (a seasonally inundated shrub-dominated habitat) are found in Northwest Ohio near Lake Erie in BCR 22. For more information on habitat associations and management of Shrubland habitat see the Partners in Flight Habitat Manual (Lee and Miller 2003). There are thirteen priority species associated with Shrub-early Successional habitat; two are in the Highest and five are in the High priority tier (Table 10).

Table 10. Ohio's Priority birds associated with Shrub-early Successional. All Highest priority species are in bold, High are in italics, and text with no formatting are Moderate priority species.

American Woodcock	*Prairie Warbler*	Eastern Towhee
Blue-winged Warbler	*Field Sparrow*	Indigo Bunting
Northern Bobwhite	Willow Flycatcher	Orchard Oriole
Loggerhead Shrike	Brown Thrasher	
Bell's Vireo	Yellow-breasted Chat	

Forested Wetland

Forested Wetlands are widely dispersed in Ohio and associated with rivers, lakes, ponds, and areas with poorly drained soils. Fifteen priority species are associated with Forested Wetland habitat; two are Highest and three are High Priority tier species (Table 11). Cerulean and Canada Warblers also are associated with Deciduous/Mixed Forests.

Table 11. Ohio's Priority birds associated with Forested Wetland. All Highest priority species are in bold, High are in italics, and text with no formatting are Moderate priority species.

American Black Duck	Yellow-crowned Night-Heron
Cerulean Warbler	Belted Kingfisher
Acadian Flycatcher	Yellow-throated Vireo
Prothonotary Warbler	Veery
Louisiana Waterthrush	American Redstart
Hooded Merganser	Canada Warbler
Wood Duck	Rusty Blackbird
Black-crowned Night-Heron	

Emergent Wetland

Emergent Wetlands are widely dispersed within Ohio, but are most prevalent in BCR 13-Lower Great Lakes St. Lawrence Plain and BCR 22-Eastern Tallgrass Prairie. Few large emergent marshes exist, but good examples can be found within Ottawa National Wildlife Refuge, Magee Marsh-Metzger Marsh Wildlife Areas in northwest Ohio, and Big Island-Killdeer Plains Wildlife Areas, and Funk Bottoms-Killbuck Marsh Wildlife Areas in north-central Ohio. The second largest number of priority species (22) is associated with Emergent Wetlands, with two Highest Priority species, and five High Priority species (Table 12).

Table 12. Ohio's Priority birds associated with Emergent Wetland. All Highest priority species are in bold, High are in italics, and text with no formatting are Moderate priority species.

King Rail	Snowy Egret	Ring-necked Duck
American Black Duck	Black-crowned Night Heron	Wilson's Snipe
American Bittern	Yellow-crowned Night Heron	Common Moorhen
Northern Harrier	Mallard	Sora
Black Tern	Blue-winged Teal	Virginia Rail
Wilson's Phalarope	Green-winged Teal	Marsh Wren
Short-eared Owl	Northern Pintail	Sedge Wren
Least Bittern		

Lakeshore Sand/Mud

These habitats are widely distributed within the state and may vary in their availability from year to year depending on rainfall and management of water levels within managed wetlands. Sandy lakeshore is located primarily along the Lake Erie shoreline; mudflats occur along shorelines of lakes, reservoirs, rivers, ponds, and within managed marshes and bare agricultural fields (especially in spring). The best locations for habitats primarily occur within BCR 22 and BCR 13. Priority species associated with Lakeshore Sand and Mud habitat are entirely shorebirds; only Killdeer breeds in the state; all other species are only found in Ohio during migration (Table 13). Spring migration for priority shorebirds primarily occurs from late April to early June. During fall migration, the bulk of migrants pass through Ohio between mid-July and early October.

Table 13. Ohio's Priority birds associated with Lakeshore Sand/Mud. All Highest priority species are in bold, High are in italics, and text with no formatting are Moderate priority species.

Solitary Sandpiper	Black-bellied Plover	Semipalmated Sandpiper
Short-billed Dowitcher	Killdeer	Western Sandpiper
Piping Plover	Whimbrel	Least Sandpiper
Greater Yellowlegs	Hudsonian Godwit	Stilt Sandpiper
Buff-breasted Sandpiper	Marbled Godwit	Dunlin
Wilson's Phalarope	Ruddy Turnstone	Red Knot
American Golden-Plover	Sanderling	

Open Water/Riverine

Open Water habitats are most prevalent along the shoreline of Lake Erie and at larger lakes and reservoirs, but also along larger rivers within the state. Priority bird species associated with Open Water/Riverine habitats are all ducks and terns (Table 14). The priority waterfowl occur during winter and both spring (March and April) and fall (November and December) migrations. Common Tern is an endangered breeding species in the state and a rare to uncommon spring and fall migrant. Least Tern is federally endangered and a very rare migrant in Ohio during both spring and fall.

Table 14. Ohio's Priority birds associated with Open Water/Riverine. All Highest priority species are in bold, High are in italics, and text with no formatting are Moderate priority species.

Canvasback	Lesser Scaup
Common Goldeneye	Common Tern
Ring-necked Duck	Least Tern
Greater Scaup	

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