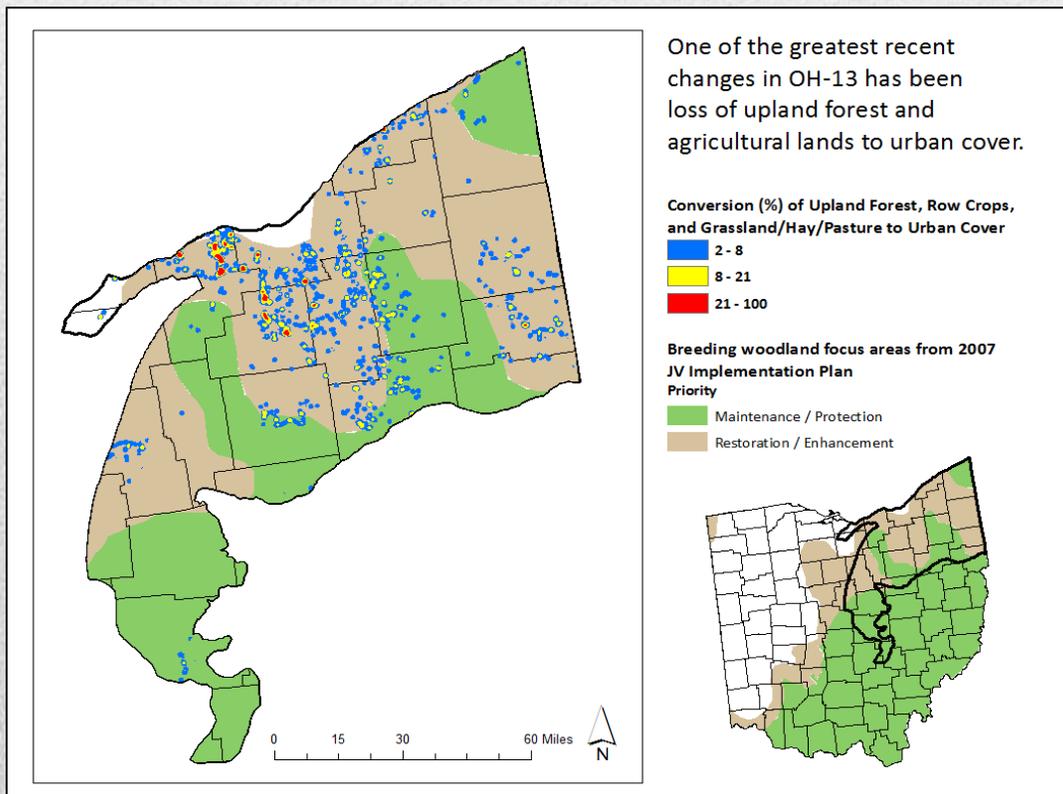




Ohio BCR 13 – Assessment Summary

Bird conservation Joint Ventures (JVs) were established to help achieve continental bird population goals by designing and managing landscapes with high value to birds at regional, state, and local scales. JVs develop Implementation Plans where “focal species” are used to represent guilds and biological models are employed to translate population objectives into habitat objectives. This summary includes highlights from a JV assessment of bird habitat objectives and landscape trends in the Ohio BCR 13 (OH-13) “State x Bird Conservation Region.” Objectives in the 2007 JV Implementation Plan were developed using spatial data from 2001, and JV partners have reported significant conservation accomplishments since objectives were established. However, trends in landscape cover types suggest mixed results in maintaining and increasing those land covers associated with key bird habitats. We provide general landscape trends based on the National Land Cover Database (2001 to 2006), comparisons between JV bird habitat objectives and cover type availability, and broad implications of those land-cover trends to bird habitat conservation. **Please see the complete OH-13 assessment for more details.**



Primary cover-types

OH-13 consists of extensive row crops (27%), urban cover (23%), and grassland/hay/pasture (15%), but its primary cover type is upland forest (31%). Urban land expanded (+32,500 ac) between 2001 and 2006, whereas areas of upland forest (-19,500), row crop (-8,900 ac), and grassland/hay/pasture (-7,100) declined. Gain in urban acreage was largely the result of conversion from upland forest and agricultural land.

Comparison (acres) of Joint Venture bird habitat objectives (maintenance and restoration combined, from 2007 JV Plan) and estimated cover type availability (NLCD 2006) and trend (NLCD 2001 to 2006) in Ohio Bird Conservation Region 13. Wetland and open water availability based on recent NWI, not NLCD. **Note: Bird "conservation objectives" represent quality habitats (high recruitment/high survival) for JV focal species whereas "cover type availability" reflects landscape cover types but not necessarily quality habitats.**

Habitat/cover types	Conservation objective	Cover type availability	Short-term land cover trend (%)
Woodland and openland			
Deciduous forest	103,246	1,608,090	-1.2
Evergreen forest	0	30,110	-1.0
Shrubland	775,580	26,175	3.0
Other forest	0	1,156	0.6
Grassland	185,250	106,509	-2.0
Savanna	370,500	n/a	n/a
Marsh, mudflat, and open water			
Emergent wetland	61,617 ^a	30,053	31.7
Woody wetland	3,693 ^b	207,665	-1.0
Dry mudflat	1,976	1,428,176 ^c	-0.6
Open water	32,283	93,853	-1.0

^a Includes habitat objectives for multiple focal species combined: shallow semi-permanent marsh, wet meadow with open water, wet mudflat/moist-soil plants, shallow water depth (<2 in), and moderate water depth (2-8 in) subcategories.

^b Includes habitats for multiple focal species combined: marsh with associated shrub/forest and forested wetlands.

^c Area of row crop, which can provide some value to dry mudflat bird species.

Management Implications

Woodland:

- Forest cover is abundant but fragmentation results in lower productivity of some breeding forest birds. Species dependent on mature forests generally have a substantial habitat base, whereas shrub and early-growth forest birds have been in population declines reflective of habitat shortfalls.
- Maintaining quality forest bird migration pathways, especially along Lake Erie and north-south river corridors (e.g., Grand River), should be considered a priority in management planning.
- Managers should also expand shrubland and young forest area where possible; strategically placed timber harvest (private and public lands) should be explored.

Openland:

- Grassland availability is only 62% of that needed to meet breeding grassland bird objectives, and the area of savanna (mixed wooded openland) could not be determined with NLCD spatial data, but it is far below the current objective for species dependent on this openland cover type.
- Cultivated cropland, urban cover, and mature forest dominate the landscape, and current JV population and habitat objectives for grassland/openland birds in OH-13 are probably beyond achievement with recent economic and land-use trends.

Marsh, mudflat, and open water:

- Current areas of open water, woody wetland / marsh with shrub, and dry mudflat appear adequate to meet habitat objectives for JV focal species, but shallow semi-permanent emergent marsh is below objective. Forested wetland is somewhat common in the region, but objectives for forested wetland were not established in the JV Plan.
- "Dry mudflat" availability is represented by the area of row crop, which provides value to some bird species during the spring migration period; the quality of dry mudflat and the other potential wetland bird habitats could not be assessed using available spatial data and most are unprotected.
- Partners should continue restoration and protection of high quality wetlands, especially shallow and deep marsh and wet meadow, while seeking and implementing effective control of invasive plants.

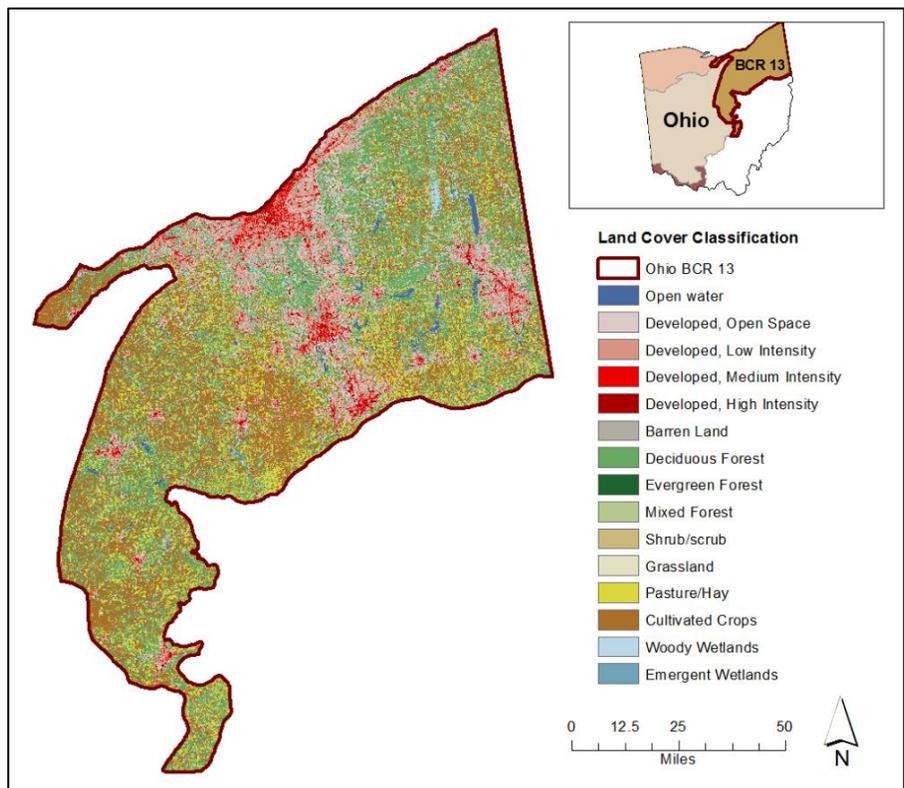


State by BCR Assessment

Ohio 13 – Lower Great Lakes/St. Lawrence Plain

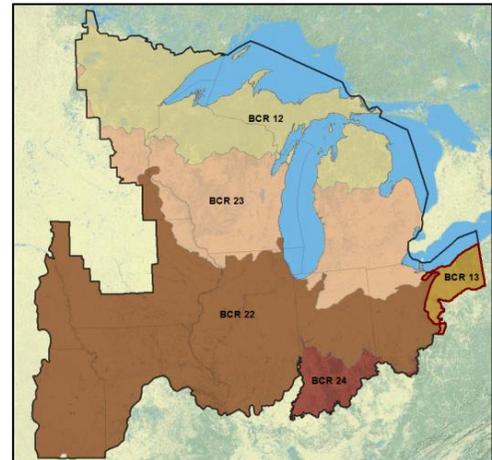
This document was developed to serve as a stepped-down version of the 2007 [Joint Venture \(JV\) Implementation Plan](#) with focus on Ohio BCR 13, the Lower Great Lakes/St. Lawrence Plain portion of Ohio. It includes lists of bird species used for JV regional planning (i.e., focal species) that represent land cover types, or bird habitat associations, important to bird guilds occurring in OH-13. Bird habitat (cover type) objectives are presented for maintenance/protection and restoration/enhancement based on the 2007 JV Plan.

Spatial data were not available to assess each bird habitat type identified in the JV Plan, but recent trends in broad land cover categories believed to be important to JV focal species are provided. Land cover trend analyses are based on quantities (acres) calculated from the 2001 and 2006 National Land Cover Database (NLCD). Although area estimates do not translate into high quality bird habitats, significant increases or decreases in specific cover types likely result in similar population trends for species associated with those cover types. Also included in this assessment are the amount and location of land currently protected, primary modes of recent cover type conversion, and general management implications for OH-13 bird conservation partners.



JV focal species were selected to facilitate planning and monitoring when developing the 2007 Implementation Plan. Population and habitat objectives for landbirds and waterbirds included the breeding period only, whereas objectives generated for waterfowl and shorebirds also included the non-breeding period (migration/winter). The following JV focal species represent bird guilds requiring specific cover types found in OH-13 (species within guild may be more common than focal species, see 2007 JV Plan).

Landbird	Shorebird	Waterbird
Chimney Swift	American Golden-Plover	Black-crowned Night-Heron
Red-headed Woodpecker	Piping Plover	King Rail
Willow Flycatcher	Killdeer	Black Tern
Wood Thrush	Sanderling	Common Tern
Blue-winged Warbler	Dunlin	Waterfowl
Cerulean Warbler	Short-billed Dowitcher	Tundra Swan
Kentucky Warbler	Wilson's Snipe	Wood Duck
Yellow-breasted Chat	American Woodcock	American Black Duck
Henslow's Sparrow	Wilson's Phalarope	Mallard
Eastern Meadowlark		Blue-winged Teal
		Canvasback
		Lesser Scaup



Bird Conservation Regions (BCR's) in the Upper Mississippi River and Great Lakes JV region.

Introduction

A primary goal of bird habitat Joint Ventures is to achieve continental bird population targets by designing landscapes with greater value to birds and employing conservation actions at regional, state, and smaller scales. To contribute to this goal, the UMRGLR JV developed an all-bird Implementation Plan in 2007, which included explicit regional bird population and habitat conservation objectives. These objectives were created by sequentially stepping-down continental population goals to the JV region, Bird Conservation Regions (BCRs), and the intersections of states and BCRs (e.g., OH-13). This “top-down” planning process relied on accurate population estimates and biological models to determine the amount of high quality habitat area needed to achieve bird population goals. A key assumption of the planning process was that population goals could be achieved with current and potential bird habitat cover types available on the landscape. JV planners also assumed existing bird habitats would remain available through time, but given the dynamic nature of some landscapes, this is not always the case.

Compared to the 2007 JV Implementation Plan, this complementary document includes updated and refined information to help guide OH-13 managers in decision making for bird habitat conservation. Its primary purpose was to use existing spatial data to evaluate the suitability of established focal species habitat objectives by comparing them with the area of cover type associated with that species (i.e., capacity of the landscape to support the objectives). Spatial data used in this analysis were the [National Land Cover Database \(NLCD\)](#) and [National Wetland Inventory \(NWI\)](#); however, these data are imperfect. Classification accuracy is 80-85% but lower for some cover types such as grassland, shrubland, and pasture/hay. In addition, these spatial data do not necessarily identify “high quality” bird habitats, where focal species abundance, survival and reproduction are relatively high. Despite these inadequacies, NLCD and NWI are useful for indicating current land use and patterns of change, and are sufficient for identifying gross disparities between the JV’s bird habitat objectives and available land covers. Updated cover type information, coupled with new bird research and monitoring data and JV partner priorities, will be used to improve future versions of the JV Implementation Plan.

Land Cover Change

Bird habitat objectives and decision-support maps in the 2007 JV Plan were developed using population information and 2001 NLCD. Although NLCD categories were often more general than JV habitat categories, NLCD (supplemented with NWI) provided a source of spatial data for the whole JV region. However, smaller-scale landscape conditions, trends in land cover, or how these conditions might correspond with JV objectives were not considered. Landscapes are not static, which inevitably has a strong bearing on the attainability of bird habitat objectives. As such, this assessment aims to provide a better understanding of land cover conditions in OH-13 and to illustrate how the landscape has changed since development of the 2007 JV Plan. Periodic assessment of landscape conditions allows us to identify land cover trajectories and provides a means to continually reevaluate the feasibility of achieving bird population and habitat objectives. Furthermore, knowledge of whether we are gaining or losing priority bird habitats and where on the landscape this change is occurring provides managers an additional tool to assist in focusing on-the-ground conservation efforts.

Table 1. General land cover types (acres) and percent change between 2001 and 2006 in Ohio BCR 13 based on NLCD. **Note: The correct classification rate of NLCD is 80 to 85%; misclassification often occurs between pasture and grassland categories and forested wetlands and upland forest categories.**

Cover Type	Year		% change from 2001	Acres gained/lost
	2001	2006		
Open Water	78,544	77,742	-1.0	-802
Urban	1,214,996	1,247,402	2.7	32,406
Barren	2,353	5,676	141.2	3,323
Upland Forest	1,658,860	1,639,358	-1.2	-19,502
Shrub/Scrub	25,372	26,132	3.0	760
Grassland/Hay/Pasture	823,307	816,218	-0.9	-7,090
Grassland	108,552	106,335	-2.0	-2,217
Row Crops	1,434,684	1,425,841	-0.6	-8,842
Wetlands	134,347	134,094	-0.2	-253
Emergent Wetlands	3,212	4,230	31.7	1,019
Woody Wetlands	131,135	129,863	-1.0	-1,272
Total	5,372,463	5,372,463		

OH-13 is dominated by agricultural land, upland forest, and urban cover (Table 1).¹ Upland forest declined between 2001 and 2006, accounting for a 19,500 acre loss. Likewise, row crops and grassland/hay/pasture declined by a combined 16,000 acres. Conversely, urban cover in OH-13 increased substantially, by an estimated 32,000 acres or roughly the collective footprint of cities Youngstown and Warren. Gains in urban cover came primarily from land previously in upland forest and agriculture (Figure 1, Table 2), and urbanization was concentrated largely around existing developed areas (Figure 2). There was gain in emergent wetland but loss in forested wetland. Areas of open water, shrub/scrub, and woody wetlands were relatively stable.

¹ To evaluate landscape change, we compared satellite imagery (NLCD) of OH-13 between 2001 and 2006. We used ArcGIS to determine whether a given pixel (30 x 30 m resolution) changed from one cover type to another. We collapsed cover types into eight distinct categories; open water, urban, barren, upland forest, shrub/scrub, grassland/hay/pasture, row crops, and wetlands. Although coarse, these broad cover types provide a good indication of landscape composition and a means for prioritizing finer scale analyses.

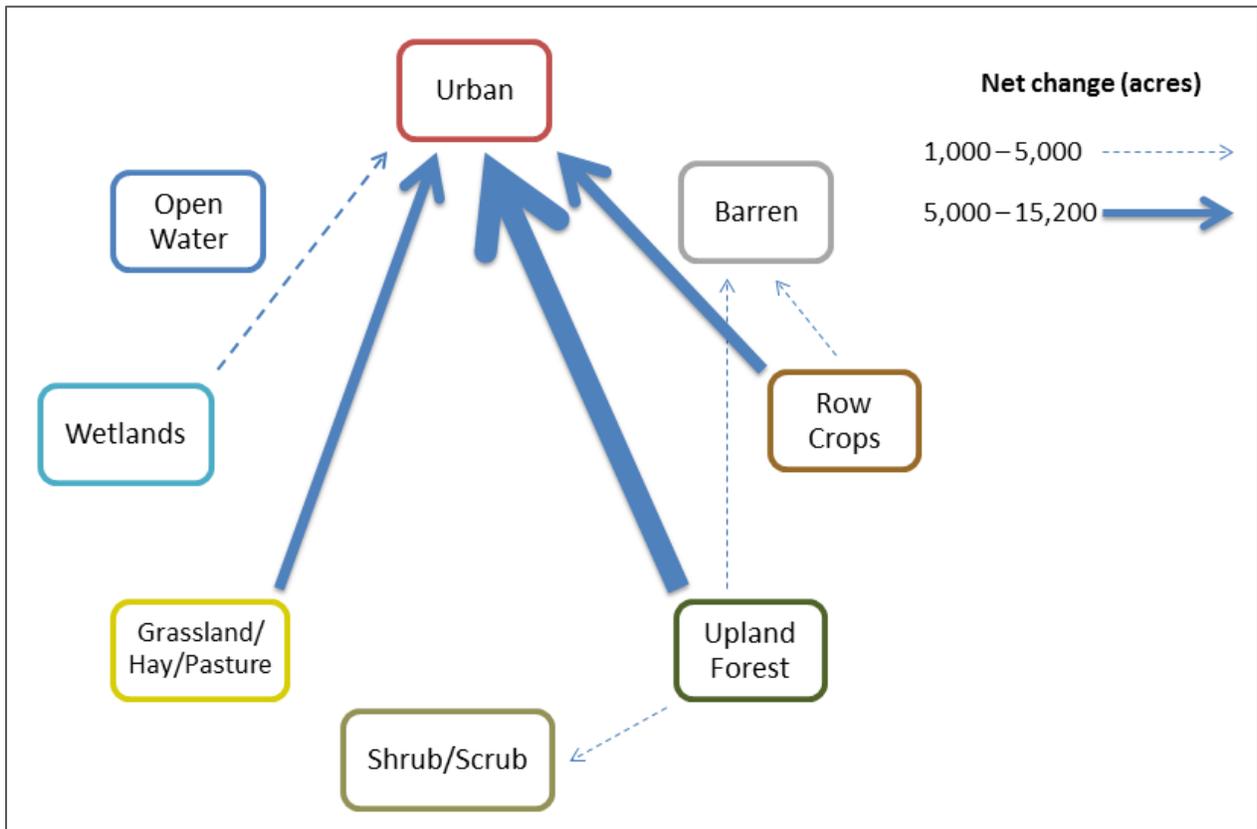


Figure 1. Net change of general land cover types (>1,000 acres converted) in Ohio BCR 13 between 2001 and 2006 (NLCD). Arrows point in the direction of change between two cover types and line thickness increases in proportion to amount of net change. “Wetlands” include woody and emergent herbaceous wetland, whereas “upland forest” represents upland (non-wetland) forest cover.

Table 2. Conversion (acres) of primary land cover types in Ohio BCR 13 between 2001 and 2006. Grey cells represent the acreage in which no change occurred, whereas remaining cells represent the area of 2001 cover types (vertical axis) converted to other cover types by 2006 (horizontal axis). For example, between 2001 and 2006, 891 acres of open water converted to wetland and 81 acres of wetland converted to open water, for a net change of +810 wetland acres (also see Figure 1). **Note: The correct classification rate of NLCD is 80 to 85%; misclassification often occurs between pasture and grassland categories and forested wetland and upland forest categories.**

Land Cover Type	2006							
	Open Water	Urban	Barren	Upland Forest	Shrub/Scrub	Grassland/Hay/Pasture	Row Crops	Wetlands
2001 Open Water	77,092	187	148	22	2	64	138	891
Urban	0	1,214,996	0	0	0	0	0	0
Barren	6	56	2,203	0	0	85	0	3
Upland Forest	234	15,152	1,260	1,639,010	1,033	1,035	885	251
Shrub/Scrub	4	282	34	0	24,923	17	95	16
Grassland/Hay/Pasture	87	7,113	731	130	87	814,830	94	235
Row Crops	239	7,982	1,258	185	26	96	1,424,543	356
Wetlands	81	1,633	42	12	61	91	87	132,341

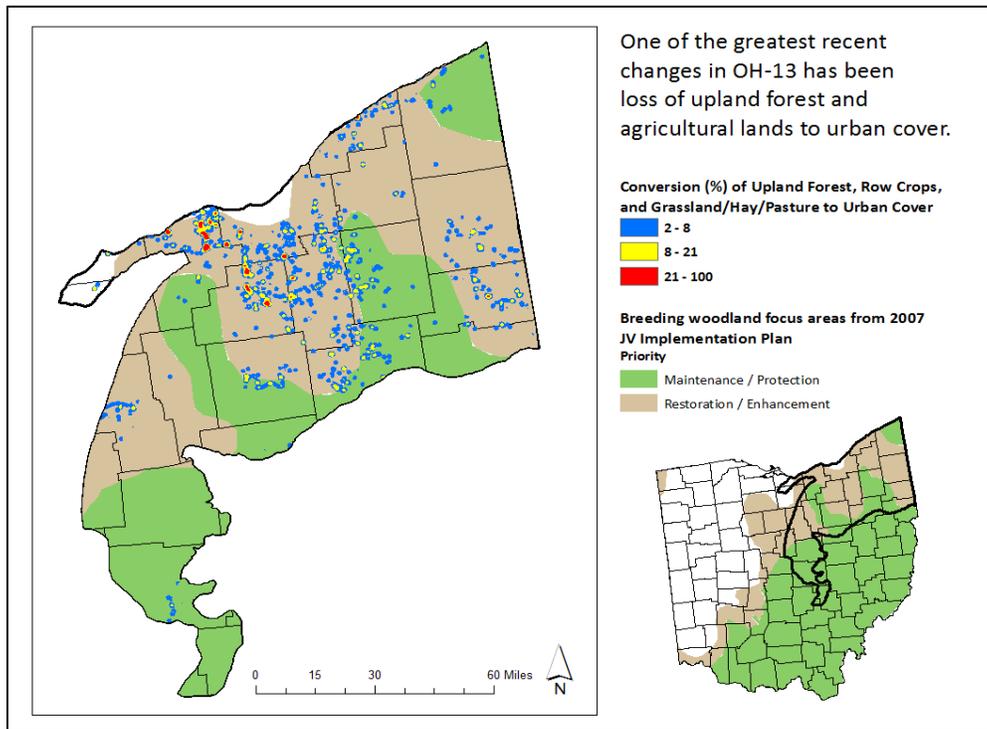


Figure 2. Conversion (percent total area converted within 1 km circular radius) from upland forest, row crop, and grassland/hay/pasture to urban cover in Ohio BCR 13, 2001 to 2006 (NLCD). Green and tan areas reflect areas with greater emphasis on habitat maintenance/protection and restoration/enhancement for woodland breeding birds (2007 JV Implementation Plan).

Bird Habitat Objectives and Cover Type Availability

JV bird habitat conservation objectives fall under two categories: “maintain and protect” (hereafter maintenance) and “restore and enhance” (hereafter restoration). Maintenance objectives reflect estimated area of habitat needed to maintain current bird populations, whereas restoration objectives were generated based on population deficits (deficit = population goal - current population) and represent the amount of new habitat needed to achieve JV population goals. For each category, there are breeding and non-breeding bird habitat objectives. Breeding objectives were established for all four bird groups – waterfowl, waterbirds, shorebirds, and landbirds – whereas non-breeding (migration and wintering) objectives were developed only for shorebirds and waterfowl. Breeding habitat needs were estimated based on cover-type area required for successful reproduction and non-breeding habitat was based on food-energy needs critical to survival.

Objectives presented here represent the total of OH-13 objectives in the 2007 JV Plan. The area of cover types potentially providing bird habitat was estimated using the National Wetland Inventory for wetlands and National Land Cover Database (NLCD 2006) for upland / openland. Location and ownership of public lands was also assessed. Spatial data from the [Protected Areas Database \(PAD\)](#), the [Conservation and Recreation Lands Database \(CARL\)](#), and the [National Conservation Easement Database](#) were pooled to display IN-22 protected land configuration and ownership composition (Figure 3). In [December 2013](#), 282,000 acres were enrolled in the Conservation Reserve Program (CRP) in Ohio with roughly 99,400 acres scheduled to expire by 2018. We were unable to partition total Ohio CRP acreage to the OH-13 portion of the state or assess the land cover composition of CRP lands due to privacy protections in the U.S. Farm Bill.

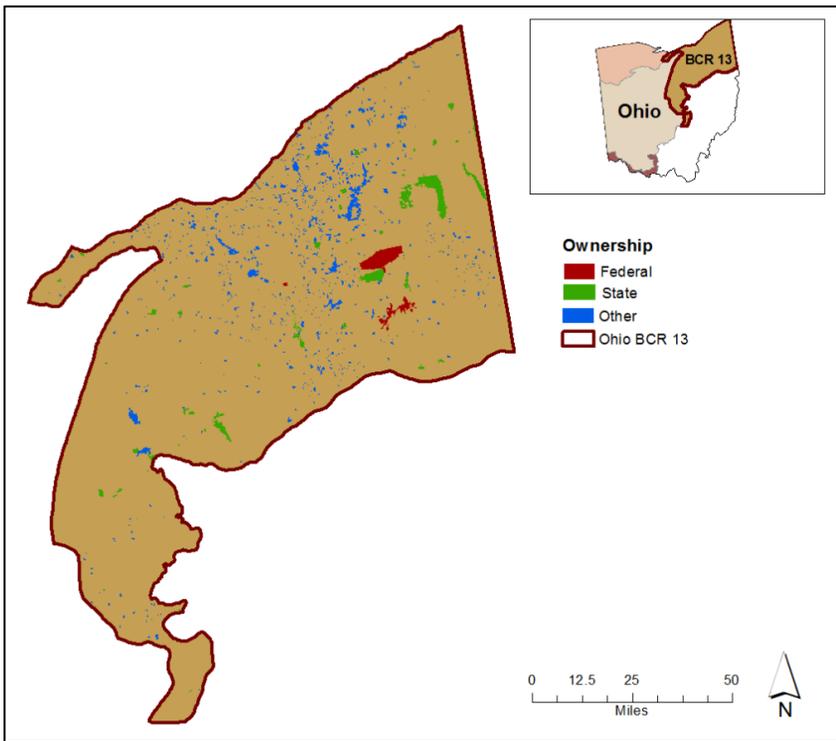


Figure 3. Location of federal, state or other conservation lands in Ohio Bird Conservation Region 13. “Other” ownership category includes private land with temporary and permanent easements, conservancy land, and county, township and city owned land. Total land area conserved (excluding CRP lands) is 338,000 acres, including about 212,200 woodland/grassland acres and 74,700 acres of marsh wetland, agriculture, and open water.

Woodland and Openland

Based on the 2007 JV Plan, the estimated amount of woodland and openland/grassland needed in a high quality habitat condition to maintain current landbird populations is 912,400 acres (Table 3). This area, plus an additional 522,200 acres of restored, high quality woodland and openland is predicted to achieve a landscape design adequate (i.e., provide carrying capacity) to meet JV population goals for breeding upland birds in OH-13. The overall 1,434,600-acre upland bird habitat objective represents 27% of the total area of OH-13 and considerably more than what is currently under federal, state, or other protection (Table 3).

Woodland.—Objectives developed for deciduous forest, forested wetland, shrubland, and other mixed forest were all driven by the needs of breeding landbirds. OH-13 encompasses about 1,821,000 acres of woodland and 186,900 acres are protected (Table 3). Available forest cover is well above objective levels and especially abundant along river floodplains, but forest fragmentation is a concern because it can limit habitat quality for breeding forest birds. For example, an estimated 103,200 acres of mature, deciduous forest in large tracts (> 5,000 contiguous acres) is required to meet the high quality habitat criteria for some JV focal species using this cover type. However, OH-13 forests are largely fragmented and have size and configuration that may limit daily survival and productivity of species sensitive to forest fragmentation.

Shrubland accounts for a majority (54%) of OH-13 upland bird habitat objectives in the 2007 JV Plan. Estimated habitat needed for shrubland birds (775,600 acres) is substantially more than the estimated area of shrubland

Landbird cover types and focal species	
Deciduous forest	Wood Thrush, Cerulean Warbler, Kentucky Warbler
Forest generalist	Chimney Swift
Shrubland	American Woodcock, Willow Flycatcher, Blue-winged Warbler, Yellow-breasted Chat
Grassland	Henslow's Sparrow, Eastern Meadowlark
Savanna	Red-headed Woodpecker

available (26,100 acres; Table 3). However, shrubland cover types are poorly mapped and estimates based on remote sensing (i.e., NLCD) are not sufficient for assessment. Local managers should consult the [USDA Forest Service Forest Inventory and Analysis \(FIA\)](#) program for county-level measures of this rather dynamic cover type.

Table 3. Upland bird habitat maintenance and restoration objectives (acres) by primary woodland and openland cover types and the estimated amount of each currently on the landscape in Ohio BCR 13. Objectives are from the 2007 JV Implementation Plan and represent estimated area of high quality habitat required to meet the needs of JV focal species during the breeding period. Cover types were measured using the National Land Cover Database (2006), except forested wetland which was determined using National Wetland Inventory. Conservation status (protected land) and ownership was determined using the Protected Areas Database and National Conservation Easement Database.

Bird habitat categories	Habitat objective ^a		Cover type area on landscape	Land cover			
	Maintenance	Restoration		Conservation status (protected)			
				Federal	State	Other	Total
Woodland							
Deciduous forest	51,623	51,623	1,608,090	32,479	36,638	81,685	150,802
Evergreen forest	0	0	30,110	499	1,107	3,393	4,999
Forested wetland	0	0	155,555	2,478	12,862	12,948	28,288
Shrub/scrub	582,920	192,660	26,132	998	924	586	2,508
Other forest	0	0	1,156	22	42	190	254
Openland							
Grassland	92,625	92,625	106,335	2,167	1,507	5,006	8,680
Pasture/Hay ^b	--	--	709,883	1,544	2,407	12,765	16,716
Savanna	185,250	185,250	na ^c	na	na	na	na
Total	912,418	522,158	2,637,261	40,187	55,487	116,573	212,247

^aUpland bird habitat objectives are for the breeding period only; non-breeding habitat objectives were not calculated for landbirds (see 2007 JV Implementation Plan for more detail).

^bBird habitat objectives were not established for this primary NLCD cover type with potential openland value.

^cna indicates cover type area could not be estimated due to resolution limitations of spatial data.

Openland.—The grassland-bird guild used for JV planning requires an estimated 185,300 acres of high quality habitat in OH-13, and the region contains an estimated 106,300 acres of grassland plus 709,900 acres of pasture/hay based on the 2006 NLCD (Table 3). The amount of grassland appears inadequate to meet JV objectives assuming hay and pasture cover are not serving as high quality grassland bird habitat. Common agricultural practices (i.e., early hay mowing, over-stocked pastures) and fragmentation of large grasslands have generally been detrimental to breeding grassland birds.

Savanna objectives (370,500 acres; Table 3) are based on the breeding habitat requirements of birds occupying mixed wooded openlands (e.g., Red-headed Woodpecker). This cover type is not mapped by NLCD and assessing the landscape's capacity for supporting current and future populations of savanna birds is not possible with these spatial data. In addition, the savanna area objective will likely be reduced substantially in future JV planning based on new information.

Marsh, Mudflat and Open Water

The estimated area of high quality habitat needed in OH-13 to maintain current populations of birds dependent on marsh, mudflat/shallows, and open water is about 77,000 acres (Table 4)². This area, plus an additional 23,300 acres of restored high quality wetland is predicted to achieve a landscape design adequate (i.e., provide carrying capacity) to meet JV population goals for breeding and non-breeding wetland birds in OH-13. The overall 100,300-acre wetland bird habitat objective represents about 2% of the area in OH-13. Some wetland categories reviewed below were combined for this analysis (Table 4) due to resolution limitations of NWI and NLCD spatial data.

Wetland and open water cover types and focal species	
Deep water marsh	Tundra Swan, American Black Duck, Black Tern
Wet meadow w/ open water	Blue-winged Teal
Semi-permanent/hemi-marsh	American Black Duck, Mallard, King Rail
Marsh with shrub/forest	Wood Duck, Black-crowned Night-Heron
Wet mudflat/moist soil plants	Blue-winged Teal, Dunlin
Shallow water (<5 cm)	Short-billed Dowitcher
Moderate water (5-20 cm)	Wilson's Phalarope
Dry mudflat	American Golden-Plover, Killdeer, Wilson's Snipe
Open water	Canvasback, Lesser Scaup
Beach	Piping Plover, Sanderling
Islands with limited vegetation	Common Tern

Marsh.—Habitat objectives were developed in the JV Plan for breeding wetland bird groups dependent on four marsh categories and totaling about 50,800 acres: wet meadow with open water and shallow semi-permanent marsh (41,700 ac), marsh with associated shrub or forest (3,700 ac), and deep-water marsh (5,422 ac). Based on spatial data there were a total of 82,200 acres of marsh wetlands available in OH-13 and 20% are protected (Table 4). Thus, JV conservation objectives for marsh cover types, driven largely by the habitat needs of breeding waterfowl, are roughly similar to the total area of marsh wetland currently available. Habitat objectives for the non-breeding period were most substantial for shallow semi-permanent marsh and deep water marsh (Table 4), reflecting the habitat needs of migrating and wintering waterfowl. Marsh wetlands available during the breeding season can also accommodate birds during the non-breeding period, although the deep-water marsh is primarily important for non-breeding birds. We were unable to determine the quality of existing marsh for breeding or non-breeding wetland birds based on NWI spatial data.

Mudflat and Shallows.—Objectives for wet mudflat, shallow-depth (<2 in), and moderate-depth (2-8 in) open wetland communities were based on the energetic needs of migrating shorebirds and waterfowl. These objectives total 14,500 acres of high quality wet mudflat and shallow-water habitat for wetland birds (Table 4). However, assessing the area of these bird habitats is difficult using remotely sensed data as they are not adequately identified by NWI. These cover types are also dynamic and conditions can change daily and seasonally making one-time static assessments (i.e., NWI) poor estimators of cover type availability. The area of dry mudflat, which is represented by row crop fields in NLCD (i.e., agricultural fields provide value to some shorebirds), is far greater than objectives in the JV Plan. About 26,000 acres of OH-13 row crops are on protected land; 6,200 acres of state and federal lands are apparently in agriculture (Table 4).

Open Water and Beach.—Objectives for extensive open-water areas are based on the habitat needs of migrating and wintering diving ducks and sea ducks. This group requires an estimated 32,300 acres of high quality foraging and resting habitat when populations are at goal levels. Whereas the region has abundant open water locations (Table 4), low food availability and human disturbance may negatively influence use of some

² Acreage totals for habitat objectives in this section represent cumulative total of highest values between breeding and non-breeding habitat objectives for each cover type. For example, the estimated area of quality habitat needed in OH-13 to maintain current populations of birds dependent on dry mudflat is 1,228 acres, as the nonbreeding objective (1,228 ac) is greater than the breeding objective (568 ac) (See Table 4).

open-water areas. Some species of shorebirds and terns occurring in OH-13 depend on beach. Beach cover type objectives total about 590 acres, and available beach area appears adequate to meet JV objectives.

Table 4. Wetland bird habitat maintenance and restoration objectives (acres) for marsh, mudflat, and open water and the estimated amount of each cover type currently on the landscape in Ohio BCR 13. Objectives are from the 2007 JV Implementation Plan and represent estimated area of high quality habitat required to meet the needs of JV focal species and planning guilds during both breeding and non-breeding periods. Cover types were measured using National Wetland Inventory; National Landcover Data (2006) was used for dry mudflat and beach. Conservation status (protected land) and ownership was determined using the Protected Areas Database, Conservation and Recreation Lands Database, and National Conservation Easement Database.

Bird habitat categories	Habitat objective ^a				Cover type area on landscape	Land cover			
	Maintenance		Restoration			Conservation status (protected)			
	B	N	B	N		Federal	State	Other	Total
Marsh									
Deep-water marsh	576	5,135	287	0	1,070	2	203	178	383
Shallow semi-permanent marsh ^a	33,913	32,910	7,763	3,251	28,983 ^b	371	3,566	1,814	5,751
Marsh with shrub/forest	2,959	0	734	0	52,110	830	4,302	4,969	10,101
Mudflat and shallows									
Wet mudflat/shallows ^c	0	8,280	0	6,239	na ^d	na	na	na	na
Dry mudflat ^e	568	1,228	818	748	1,425,841	1,258	4,917	19,865	26,040
Open water and beach									
Extensive open water	0	25,246	0	7,037	93,853 ^f	5,795	16,395	10,020	32,210
Beach	2	170	0	420	5,676 ^f	35	99	116	250
Total	38,018	72,969	9,602	17,695	1,607,533	8,291	29,482	36,962	74,735

^aBird habitat objectives for "shallow semi-permanent marsh" also include objectives for "wet meadow with areas of open water" in the 2007 JV Plan.

^bCover type area for "shallow semi-permanent marsh" includes emergent marsh within palustrine, lacustrine, and riverine categories

^cBird habitat objectives for "wet mudflat/shallows" category incorporates objectives for "wet mudflat," "shallow water depth (<2 in)" and "moderate water depth (2-8 in)" open flats in the 2007 JV Plan.

^dna indicates that bird habitat objectives were not set for a cover type or that a cover type could not be estimated due to resolution limitations of spatial data.

^eDry mudflat/agriculture was a bird habitat category in the 2007 JV Plan; row crop (NLCD) was the actual land cover measured and can provide some value to dry mudflat bird species.

^fCover type area for "extensive open water" represents lacustrine, riverine, and unconsolidated bottom and shore categories (NWI) whereas "beach" is the area of sand/gravel/bedrock with little vegetation (NLCD).

Management Implications

OH-13 is heavily influenced by agriculture and urban cover, but large portions of the region remain valuable to birds, especially those dependent on upland forest, shrubland, marsh, and forested wetland. Although not addressed in the 2007 JV Plan, habitat for migrating landbirds is important, especially forest and grassland birds traversing OH-13 during spring and fall. Maintaining quality landbird migration pathways and stopover sites, especially along Lake Erie and north-south river corridors, should be considered a priority in management planning. The full life cycle for landbirds occupying OH-13 during both breeding and non-breeding periods will be addressed when the JV Plan is next updated.

Slight declines in forest cover occurred in recent years, but OH-13 forest is abundant relative to JV objectives and considerable amounts of forest area are currently in public ownership. Restoring large tracts of mature

forest for breeding edge-sensitive forest birds is probably impractical considering trends in urban expansion. However, forest management opportunities exist for other priority woodland species. For example, area of shrub/scrub appears to be substantially lower than habitat objectives for shrubland birds. Although this cover type is poorly mapped with available spatial data, populations of species dependent on shrub and young-growth forest are generally declining in the JV region and should be considered in forest management planning. Because OH-13 is predominantly private land, JV partner collaboration with landowners, foresters (e.g., private land consultants), and the timber industry may be necessary to conduct strategic cutting operations that provide a commercial means to create shrub and young-growth forest. Public and private land managers must carefully consider location and fragmentation trends, particularly relating to landbird migration pathways.

The 2007 JV Implementation Plan includes significant habitat objectives for savanna birds dependent on mixed-wooded openland in OH-13. We could not assess the abundance or quality of this cover type given the spatial data available, but savannah area is expected to be far below objective levels. However, the JV objective for this cover type will likely be reduced in the future due to new information regarding Red-headed Woodpecker, the JV focal species driving objectives for savanna. The amount of grassland in OH-13 is well below the established habitat objective for JV focal species. Grassland and hay/pasture declined slightly between 2001 and 2006, and only a small portion of these openland cover types are protected under conservation ownership. Because permanent protection (public ownership) and management of large grasslands and savannas is often unfeasible, OH-13 partners must continue seeking opportunities to promote grassland bird conservation on private lands. Natural resource managers may have a greater impact by working with the agricultural community, especially where a focused effort may connect open landscapes valuable to birds. Connecting “permanent” openings associated with right-of-ways (e.g., highways, utility corridors), perpetual grassland/pasture easements, and marsh complexes can result in management efficiencies by providing larger openland areas/unit cost.

Wetland cover types were relatively stable between 2001 and 2006, but there was expansion of emergent wetland area, mostly related to open water conversion toward emergent marsh on state lands. Whereas the total area of OH-13 emergent marsh cover types (deep marsh, shallow marsh, and marsh with shrub/forest) is similar to the combined JV objectives for these marsh types, the value of marsh for wetland birds may be low due to water quality and lack of forage, plus the negative influence of invasive plants, particularly *Phragmites* and hybrid cattail. *Phragmites australis*, the most problematic invasive wetland plant in OH-13, will require biological control (<http://greatlakesphragmites.net/control-options/>) at large scales but inventory and treatment of small and newly colonized areas remains valuable during bio-control development. Spatial data were inadequate to thoroughly assess emergent wetland types (hemi-marsh vs. wet meadow), quality (high vs. low reproduction / survival), and timing of availability (recently wet vs. wet when image was taken). Likewise, the area of wet mudflat and shallows providing forage to migrating wetland birds could not be determined using spatial data. Due to altered hydrology in much of the region, management may be necessary to assure mudflat and shallows are available during shorebird migration periods. OH-13 partners should also continue expanding protection of marsh and wet meadow providing quality wetland-bird habitat, while implementing effective management of invasive plants. Open water area seems adequate for foraging waterfowl during the non-breeding period, but some locations may require management to address water quality and human disturbance.

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