UPPER MISSISSIPPI RIVER & GREAT LAKES REGION
JOINT VENTURE
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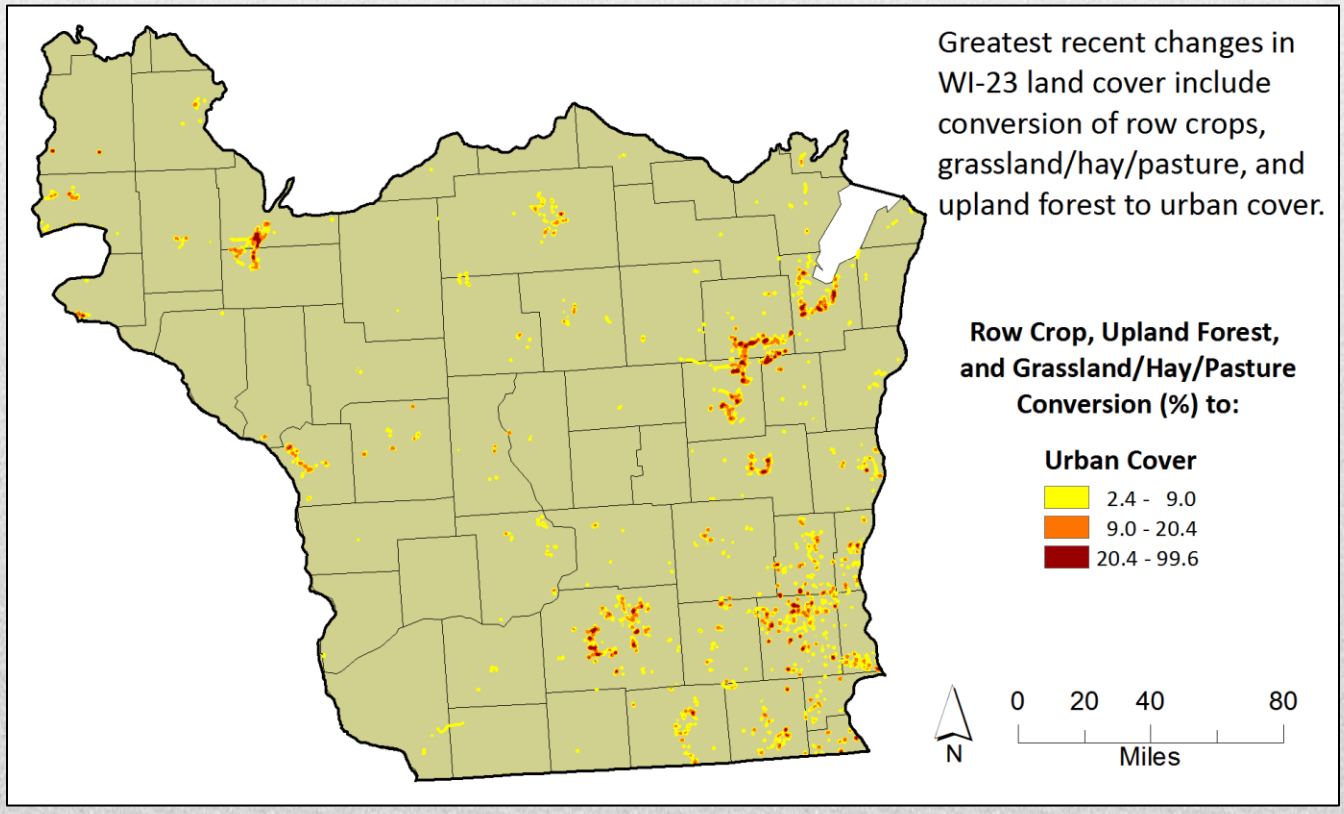
Wisconsin BCR 23 – Assessment Summary

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 Wisconsin BCR 23 (WI-23) "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 land-cover trends to bird habitat conservation. **Please see the complete WI-23 assessment for more details.**



Primary cover-types

WI-23 consists of extensive upland forest (27%), emergent and forested wetland (9%), and urban (8%), but its primary cover type is row crop (36%). Urban land (+85,600 ac) expanded significantly in recent years, whereas acreage of upland forest (-29,000 ac) and row crops (-56,700 ac) declined. Shrubland increased by 3.7% primarily due to conversion from forest cover.

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 Wisconsin Bird Conservation Region 23. 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 (%)
Marsh, mudflat, and open water			
Emergent wetland	881,359[a]	920,723	0.4
Woody wetland	68,896[b]	1,993,917	-0.1
Dry mudflat	67,557	8,713,318[c]	-0.6
Open water	110,982	648,263	-0.5
Woodland and openland			
Deciduous forest	8,398	5,791,721	-0.4
Evergreen forest	18,278	356,063	-0.8
Shrubland	1,595,620	194,243	3.7
Other forest	268,736	279,024	-1.1
Grassland	864,500	335,643	2.1
Savanna	2,799,498	n/a	n/a

[a] Includes habitat objectives for multiple focal species combined: deep water marsh, 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 habitat objectives 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

Marsh, mudflat, and open water:

- Current area of marsh, open water, and mudflat appear generally adequate to meet habitat objectives for JV focal species. However, the quality (high survival and reproduction) of these potential wetland bird-habitats could not be assessed using available data and most are unprotected.
- Invasive plants (e.g., *Phragmites australis*) and human disturbance can reduce habitat quality for wetland birds, especially in many coastal marsh and open water areas.
- Partners should continue to expand protection and restoration of marsh and wet meadow providing quality bird habitat while seeking and implementing effective control of invasive plants.

Woodland:

- Forest cover is greater than needed to meet current JV breeding bird objectives, but forest fragmentation may result in lower productivity for some breeding focal species and should be considered in management prescriptions.
- Habitat objectives for shrub and early-growth forest birds far exceed what is available on the landscape. Restoration and expansion of strategically placed young-growth forest remains a priority.

Openland:

- Grassland area appears inadequate to meet breeding grassland bird objectives, and savanna (mixed-wooded openland) could not be determined with NLCD spatial data.
- Future grassland abundance for birds will be largely related to private land management (e.g., CRP), but current high commodity prices present a significant obstacle for transition out of row crops.
- Cropland, forest, and urban cover dominate the WI-23 landscape, and current JV population and habitat objectives for grassland / openland birds are probably beyond achievement with existing economic and land use trends.

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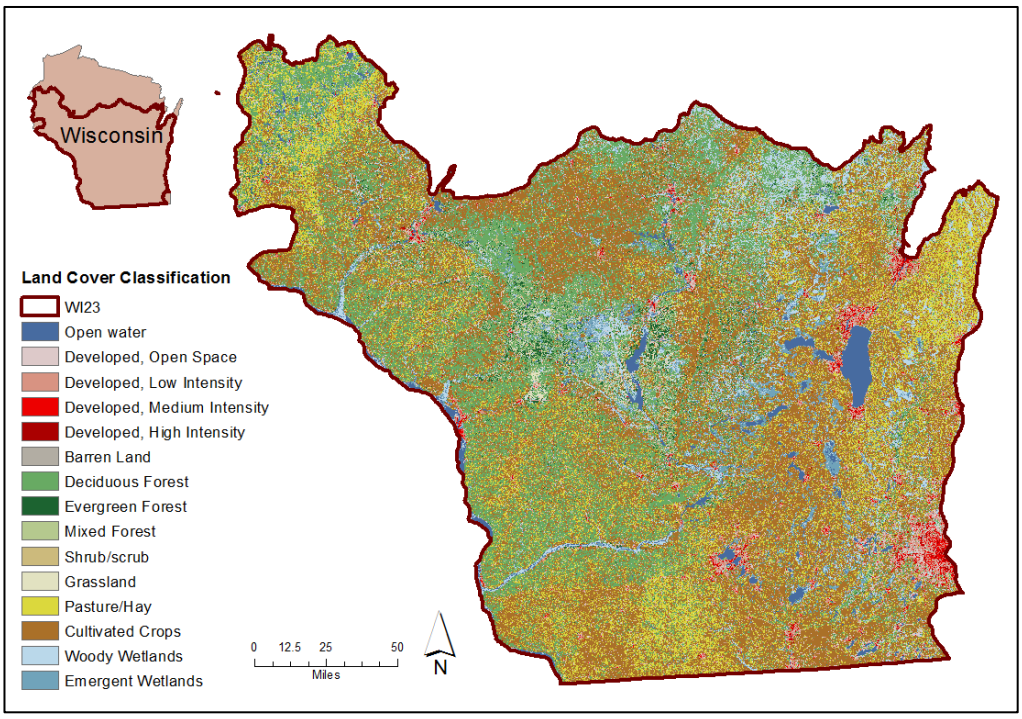
State by BCR Assessment

Wisconsin 23 – Prairie Hardwood Transition

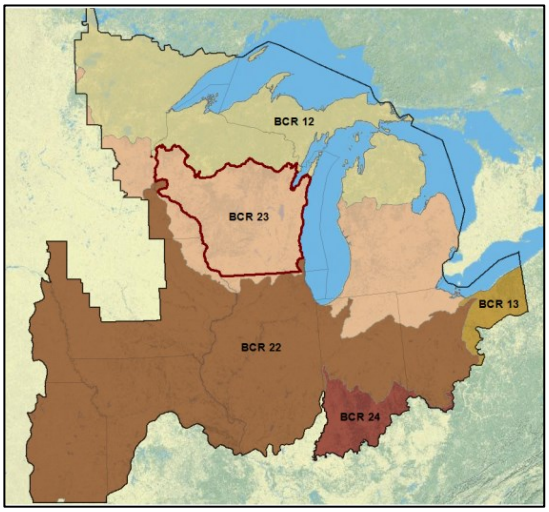
This document was developed to serve as a "stepped-down" version of the 2007 Joint Venture (JV) Implementation Plan with focus on Wisconsin BCR 23, the Prairie Hardwood Transition portion of Wisconsin. It includes lists of bird species used for JV regional planning (i.e., focal species) that represent land cover types, or bird habitat associations, important to bird guilds occurring in WI-23. 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 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 WI-23 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 WI-23 (species within guild may be more common than focal species, see 2007 JV Plan).

Landbird	Shorebird	Waterbird
Greater Prairie-Chicken	American Golden-Plover	Black-crowned Night-Heron
Whip-poor-will	Piping Plover	King Rail
Chimney Swift	Killdeer	Black Tern
Red-headed Woodpecker	Upland Sandpiper	Common Tern
Olive-sided Flycatcher	Sanderling	**Waterfowl**
Willow Flycatcher	Dunlin	Tundra Swan
Veery	Short-billed Dowitcher	American Black Duck
Blue-winged Warbler	American Woodcock	Mallard
Golden-winged Warbler		Blue-winged Teal
Cape May Warbler		Canvasback
Black-throated Blue Warbler		Lesser Scaup
Cerulean Warbler		
Prothonotary Warbler		
Connecticut Warbler		
Canada Warbler		
Henslow's Sparrow		



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., WI-23). 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 WI-23 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 they are sufficient to identify 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 bird 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 WI-23 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 Wisconsin BCR 23 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.

	Year			
Cover Type	2001	2006	% change	Acres gained/lost
Open Water	705,371	701,508	-0.5	-3,863
Urban	1,937,241	2,022,890	4.4	85,649
Barren	12,742	18,040	41.6	5,298
Upland Forest	6,465,942	6,436,809	-0.5	-29,133
Shrub/Scrub	187,308	194,243	3.7	6,935
Grassland/Hay/Pasture	3,828,826	3,818,488	-0.3	-10,339
Grassland	328,630	335,643	2.1	7,013
Row Crops	8,784,227	8,727,464	-0.6	-56,763
Wetlands	2,177,902	2,180,117	0.1	2,214
Emergent Wetlands	734,586	737,682	0.4	3,095
Woody Wetlands	1,443,316	1,442,435	-0.1	-881
Total	24,099,558	24,099,558		

WI-23 has a mixed landscape including heavily forested areas and abundant wetland and urban coverage, but its most prominent cover types are related to agricultural, with row crop and hay/pasture representing 50% of the land base (Table 1).[1] Row crop area declined between 2001 and 2006, accounting for an estimated 56,800 acre loss in this cover type. Likewise, upland forest area declined by nearly 29,100 acres. Conversely, urban cover substantially increased, by 85,600 acres. Gains in urban cover came primarily from land previously in agricultural and forest (Figure 1, Table 2) and represents permanent habitat loss for some JV focal species. Most conversion to urban cover occurred adjacent to metropolitan areas (Figure 2). Wetlands, open water, and grassland cover types were largely stable in area between 2001 and 2006.

[1] To evaluate landscape change, we compared satellite imagery (NLCD) of WI-23 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 general landscape composition and a means for prioritizing finer scale analysis.

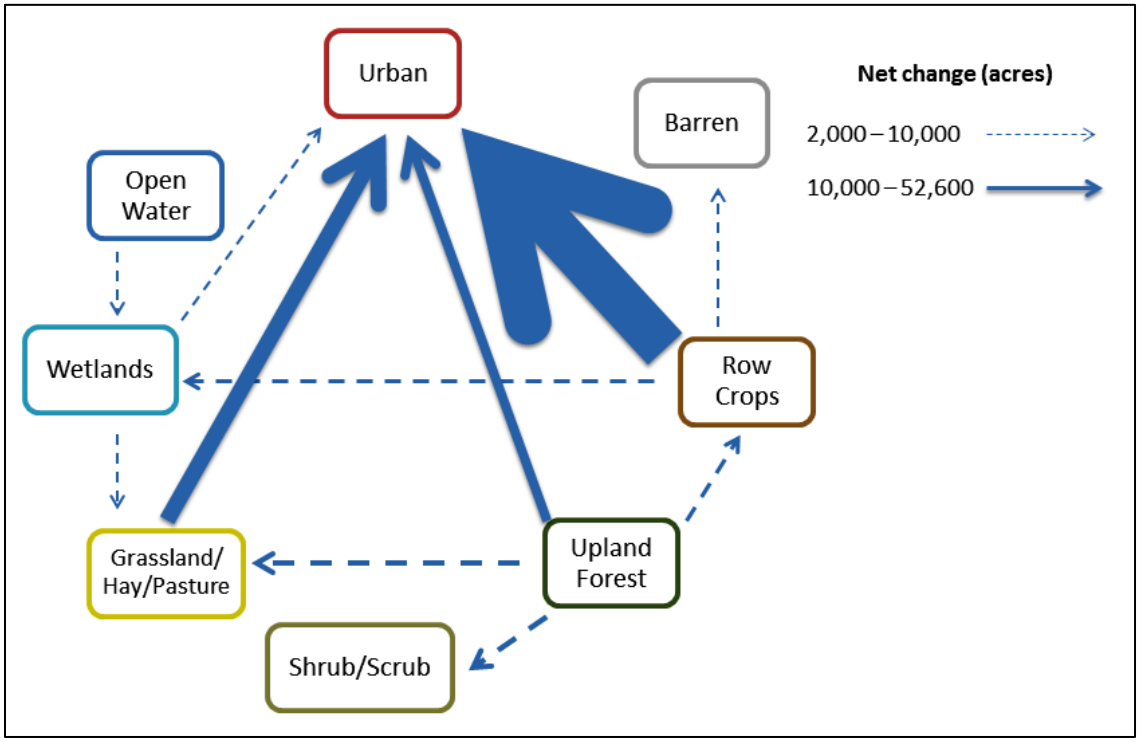


Figure 1. Net change of general land cover types (>1,000 acres converted) in Wisconsin BCR 23 between 2001 and 2006 (NLCD). Arrows point in the direction of change between two cover types and line thickness increases in proportion to amount of net change. "Wetlands" include woody and emergent herbaceous wetland, whereas "upland forest" represents upland (non-wetland) forest cover.

Table 2. Conversion (acres) of primary land cover types in Wisconsin BCR 23 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) coverted to other cover types by 2006 (horizontal axis). For example, between 2001 and 2006, an estimated 5,669 acres of open water converted to wetland and 2,837 acres of wetland converted to open water, for a net change among these two cover types of +2,832 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	693,712	313	451	898	249	1,138	1,788	5,669
	Urban	0	1,934,066	4	0	0	3	0	1
	Barren	67	184	12,302	3	7	8	150	0
	Upland Forest	495	10,056	591	6,421,349	7,456	8,932	5,044	1,447
	Shrub/Scrub	19	1,003	70	1,259	183,158	768	619	105
	Grassland/Hay/Pasture	516	18,475	1,059	2,097	2,271	3,796,232	762	1,154
	Row Crops	2,715	52,501	3,290	566	757	539	8,702,932	6,567
	Wetlands	2,837	2,986	244	113	27	4,625	1,901	2,161,609

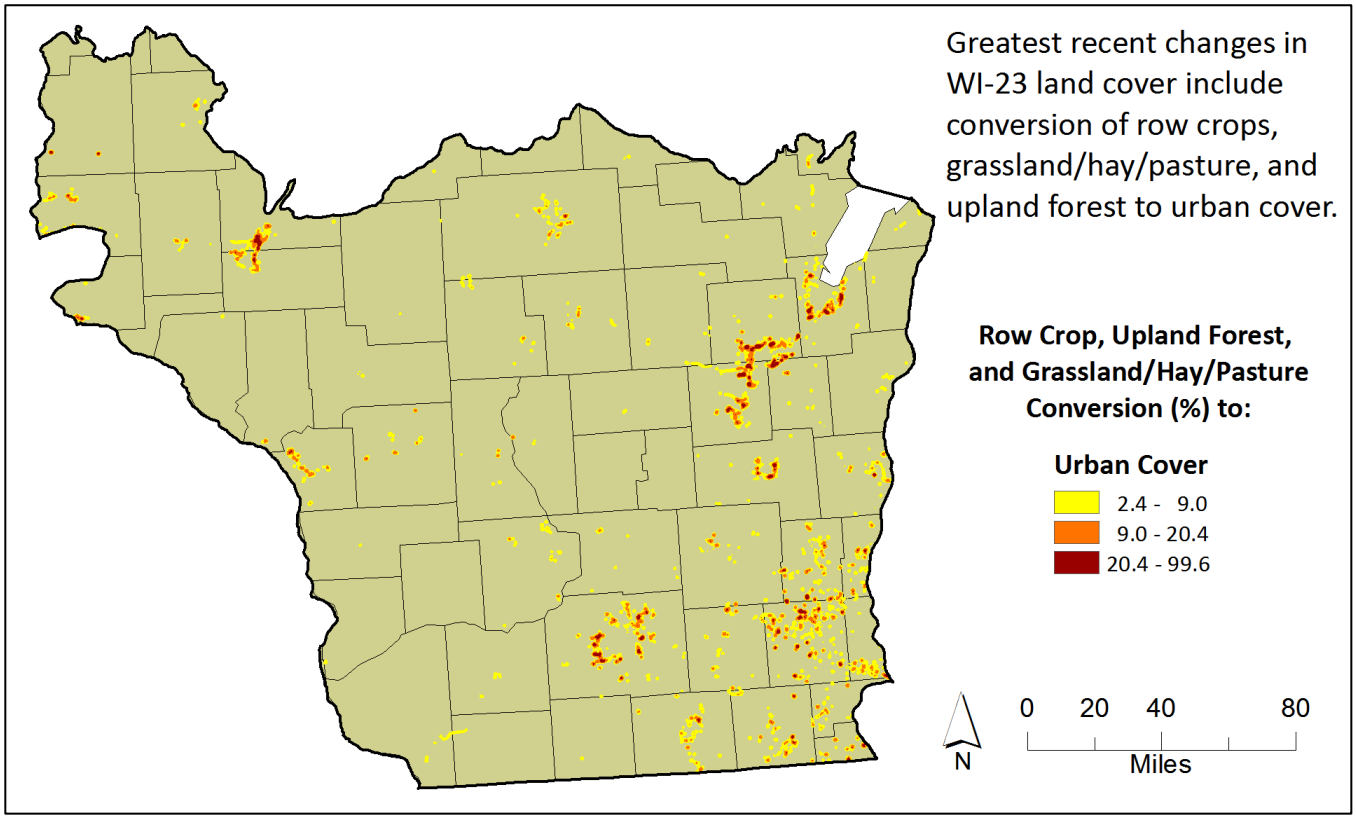


Figure 2. Conversion (percent total area converted within 1 km circular radius) from row crop, grass/hay/pasture, and forest cover (upland forest and woody wetlands) to urban in Wisconsin BCR 23, 2001 to 2006 (NLCD).

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 reflect the amount of new habitat needed to achieve JV populations 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 for only shorebirds and waterfowl. Breeding habitat was calculated based on cover-type area needed for successful reproduction and non-breeding habitat was based on food-energy needs critical to survival.

The area of wetland cover types potentially providing wetland bird habitat was estimated using the National Wetland Inventory and Wisconsin Wetlands Inventory whereas the National Land Cover Database (NLCD 2006) was used to estimate area of upland / openland cover types. 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 WI-23 protected land configuration and ownership composition (Figure 3). In December 2013, 265,000 acres were enrolled in the Conservation Reserve Program (CRP) in Wisconsin with roughly 119,000 acres scheduled to expire by 2018. We were unable to partition total Wisconsin CRP acreage to the WI-23 portion of the state or asses the land cover composition of CRP lands due to privacy protections in the U.S. Farm Bill.

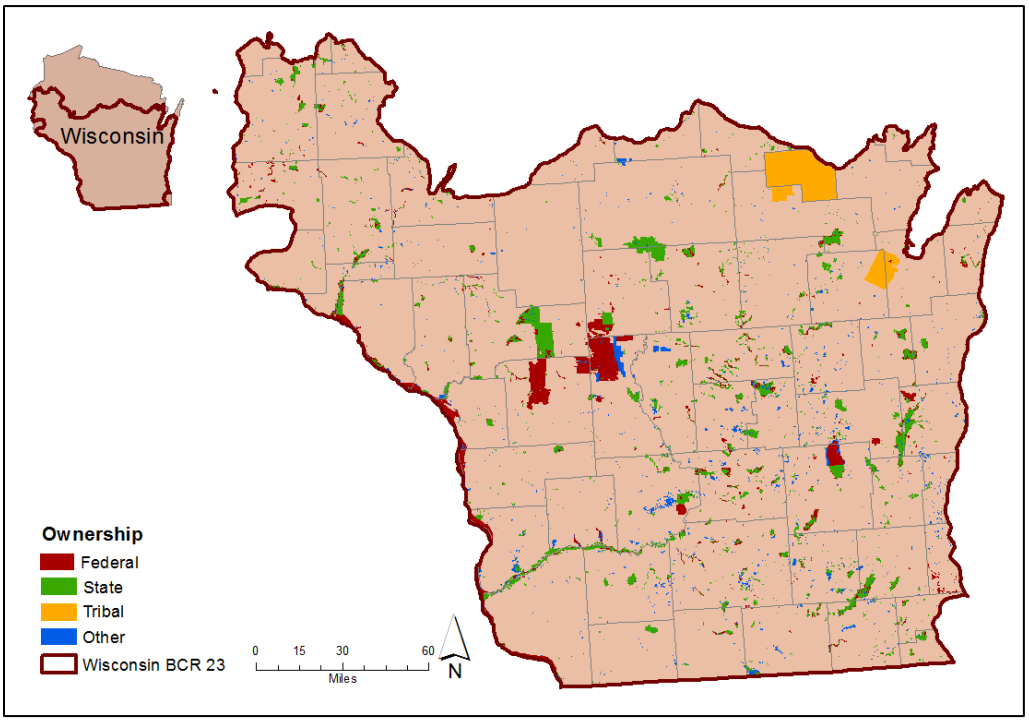


Figure 3. Location of federal, state or other conservation lands in Wisconsin Bird Conservation Region 23. "Other" ownership category includes private land with temporary and permanent easements, conservancy land, and county, township and city owned land. Total land area conserved (excluding CRP) was up to 2,181,800 acres, including 1,336,400 woodland/grassland acres and 721,800 acres of marsh wetland, row crop, and open water.

Marsh, Mudflat, and Open Water

The estimated area of high quality bird habitat needed in marsh wetland, mudflat, and open water to maintain current bird populations is about 897,300 acres (Table 3)[2]. This area, plus an additional 230,500 acres of restored high quality wetland cover types, is predicted to achieve a landscape design adequate (i.e., provide carrying capacity) to meet JV goal populations for breeding and non-breeding wetland birds in WI-23. JV wetland bird habitat objectives represent about 5% of the total area in WI-23.

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, Yellow Rail
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, Wilson's Snipe
Shallow water (<5 cm)	Short-billed Dowitcher
Moderate water (5-20 cm)	Wilson's Phalarope
Dry mudlfat/agriculture	American Golden-Plover, Killdeer
Open water	Canvasback, Lesser Scaup
Beach	Piping Plover, Sanderling
Islands with limited vegetation	Common Tern

Marsh.—Habitat objectives were developed for breeding wetland-bird groups dependent on four general marsh categories: wet meadow, shallow semi-permanent marsh / hemi-marsh, deep-water marsh, and marsh with associated shrub or forest. There were a total of 1.5 million acres of available marsh and marsh/shrub wetlands, of which 25% were protected (Table 3). Conservation objectives for marsh cover types were driven primarily by the needs of breeding waterfowl. Habitat objectives for the non-breeding period include shallow semi-

[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 WI-23 to maintain current populations of birds dependent on deep water marsh is 19,780 acres, as the breeding non-objective (19,780 ac) is greater than the breeding objective (8,213 ac) (See Table 3).

permanent marsh and deep-water marsh, and also open water. These values were generated based on the needs of migrating and wintering waterfowl.

The JV Plan calls for high quality wetland-bird habitat totaling 701,100 acres of shallow semi-permanent marsh / hemi marsh (includes 451,000 acres for wet meadow with open water) and 56,600 acres of marsh with associated shrub/forest during the breeding period (Table 3). Shallow emergent marsh communities are relatively abundant in WI-23 according to NWI (Table 3), however we were unable to determine the quality of these areas for wetland birds based on spatial data. Moreover, coastal wet meadows have been nearly eliminated due to agriculture and development, and remaining fragments of this unique Great Lakes community remain vulnerable to human actions. Objectives for deep water marsh were higher during the non-breeding period and totaled nearly 19,800 acres, exceeding what is available on the landscape.

Table 3. Wetland bird habitat maintenance and restoration objectives (acres) for marsh, mudflat, and open water and the estimated amount of each cover type on the landscape in Wisconsin BCR 23. 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 (B) and non-breeding (N) periods. Cover types were measured using National Wetland Inventory; National Landcover Database (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, National Conservation Easement Database.

Bird habitat categories	Habitat objective				Land cover				
	Maintenenace		Restoration		Cover type area on landscape	Conservation status (protected)			
	B	N	B	N		Federal	State	Other	Total
Marsh									
Deep-water marsh	8,213	19,780	4,108	0	4,443	983	398	42	1,423
Shallow semi-permanent marsh[a]	701,094	133,583	143,900	3,176	916,280[b]	64,775	119,332	44,932	229,039
Marsh with shrub/ forest	56,590	0	11,318	0	551,482	26,277	69,726	30,550	136,553
Mudflat and shallows									
Wet mudflat/ shallows[c]	0	9,439	0	3,038	na[d]	na	na	na	na
Dry mudflat[e]	27,713	603	39,844	353	8,713,318	50,706	103,878	109,090	263,584
Open water and beach									
Extensive open water	0	82,693	0	28,289	648,263[f]	64,262	18,419	7,438	90,119
Beach	15	96	0	254	18,399[f]	744	151	143	1,038
Total	793,625	246,194	199,170	35,110	10,852,185	217,747	311,904	192,195	721,756

[a]Bird habitat objectives for "shallow semi-permanent marsh" include objectives for "wet meadow with areas of open water" in the 2007 JV Plan.

[b]Cover type area for "shallow semi-permanent marsh" includes emergent marsh within palustrian, lacustrine, and riverine categories in NWI.

[c]Bird 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.

[d]na indicates bird habitat objectives were not developed for a cover type or that a cover type could not be estimated due to resolution limitations of spatial data.

[e]Dry mudflat / agriculture was a bird habitat category used in the 2007 JV Plan and "row crop" (NLCD) is the land cover measured on the landscape.

[f]Cover type area for "extensive open water" represents lacustrine, riverine, and unconsolidated bottom and shore categories (NWI) whereas beach is sand/gravel/bedrock with little vegetation (NLCD).

Mudflat and Shallows.—Objectives for wet mudflat, shallow (<2 in), and moderate-depth (2-8 in) open wetland communities were based primarily on the energetic needs of migrating shorebirds. These objectives total about 12,500 acres of wet mudflat and shallow-water providing high quality foraging habitat (Table 3). However, assessments of mudflat and shallow water are difficult using remotely sensed data and are not adequately identified by NWI. These cover types are also dynamic, especially along the Great Lakes shoreline, where 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, represented by row crop in NLCD (i.e., agricultural fields in spring provide value to some shorebirds), is far greater than JV objectives. Some dry mudflat is protected, with areas of row crop occurring on state and federal lands based on spatial data.

Open Water and Beach.—Open-water bird habitat objectives are based on the needs of migrating and wintering diving ducks and sea ducks. This group requires an estimated 111,000 acres of high quality foraging and resting habitat. Whereas the region has abundant open water locations (Table 3), low food availability and human disturbance can negatively influence use of open-water areas. Some species of shorebirds and terns depend on beach. Beach objectives total only 350 acres, thus beach is abundant relative to JV objectives.

Woodland and Openland

The amount of woodland and openland/grassland needed in a high quality habitat to maintain current landbird populations is approximately 3 million acres (Table 4). This represents 12.5% of the total area of WI-23 and considerably more than currently under federal, state or other protection (Table 4). The majority of the habitat area needed for landbird populations is shrubland and savanna (mixed wooded openland).

Landbird cover types and focal species	
Deciduous forest	Whip-poor-will, Wood Thrush, Black-throated Blue Warbler, Cerulean Warbler
Evergreen forest	Olive-sided Flycatcher, Cape May Warbler, Connecticut Warbler
Forest generalist	Chimney Swift, Veery, Canada Warbler
Forested wetland	Prothonotary Warbler
Shrubland	American Woodcock, Willow Flycatcher, Blue-winged Warbler, Golden-winged Warbler
Grassland	Upland Sandpiper, Greater Prairie-Chicken, Henslow's Sparrow, Eastern Meadowlark
Savanna	Red-headed Woodpecker

Woodland.—Objectives developed for deciduous forest, forested wetland, shrubland, and other mixed forest were all driven by the needs of breeding landbirds. WI-23 encompasses about 8.1 million acres of woodland and an estimated 1.2 million acres are protected (Table 4). In general, WI-23 has abundant forest cover and is well above objective levels, but forest fragmentation is a concern because it can limit habitat quality of breeding forest birds. Much of WI-23 forest area is fragmented, having size and configuration that may limit daily survival and productivity of edge-sensitive species.

The habitat objective for shrubland birds (1.6 million acres) is considerably higher than what was available on the landscape (Table 4). 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 somewhat dynamic cover type.

Openland.—Grassland community types are poorly mapped by NLCD, making assessment difficult. The grassland-bird guild used for planning requires an estimated 432,250 acres of high quality habitat to maintain current populations, and the region contains an estimated 335,600 acres of grassland plus 3.5 million acres of pasture/hay (Table 4). Although the amount of grassland is inadequate to meet population maintenance objectives, some grassland birds may use pasture/hay to meet their breeding requirements. Changes in agricultural practices (i.e., early hay mowing), reforestation, recent conversion (grassland, pasture, and hay to urban), and fragmentation of large grasslands have been detrimental to breeding grassland birds across BCR 23.

Savanna (mixed wooded openland) maintenance objectives of 1.4 million acres (Table 4) are based on current habitat requirements of breeding savanna birds; another 1.4 million acres of savanna is needed to meet goal populations according to the 2007 JV Plan. This cover type is not mapped by NLCD so it is difficult to assess the landscape's capacity for supporting current and future populations of savanna birds. In addition, the savanna area objective will be reduced substantially in future JV planning based on new information regarding the focal species representing the savanna bird guild.

Table 4. 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 Wisconsin BCR 23. 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, Conservation and Recreation Lands Database, and National Conservation Easement Database.

Bird habitat categories	Habitat objective[a]		Land cover				
	Maintenance	Restoration	Cover type area on landscape	Conservation status (protected)			
				Federal	State	Other	Total
Woodland							
Deciduous forest	4,199	4,199	5,791,721	103,894	210,264	405,352	719,510
Evergreen forest	14,820	3,458	356,063	15,128	27,990	39,415	82,533
Forested wetland	741	247	1,442,435	67,709	129,196	98,797	295,702
Shrub/scrub	978,120	617,500	194,243	9,798	7,962	21,829	39,589
Other forest	177,840	90,896	279,024	8,350	15,573	38,545	62,468
Openland							
Grassland	432,250	432,250	335,643	30,095	14,470	26,739	71,304
Pasture/hay[b]	--	--	3,482,845	16,883	19,988	28,449	65,320
Savanna	1,399,749	1,399,749	na[c]		na		na
Total	3,007,719	2,548,299	11,881,974	260,857	425,443	650,126	1,336,426

[a]Upland 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).

[b]Bird habitat objectives were not established for this primary NLCD cover type providing openland value.

[c]na 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.

Management Implications

WI-23 is ecologically diverse and an extremely important area for bird conservation. Relative to the JV region, this area has high value for waterfowl, marsh birds, colonial waterbirds, openland birds, and forest-dependent species. The region is important for both breeding and migration, although landbird and waterbird objectives were not developed for the non-breeding period in the 2007 JV Implementation Plan.

The quantity of WI-23 wetland cover types and shallow-water expanses may be generally adequate to meet habitat objectives for JV focal species but the quality (high vs. low reproduction / survival) of these areas for wetland birds could not be determined. Spatial data were also inadequate to assess area of various emergent wetland types (hemi-marsh vs. wet meadow) and timing of wetland availability (recently wet vs. wet when image was taken). WI-23 partners should continue working toward protection and restoration of marsh and wet meadow communities while increasing quality. For example, wetland-bird habitat quality may be improved by implementing effective management of invasive plants such as Phragmites and hybrid cattail. *Phragmites australis*, currently one of the most problematic invasive wetland plants in WI-23, will require biological control at large scales, but inventory and treatment of small and newly colonized areas remains valuable during bio-control development. In addition, where capacity exists, management may be necessary to assure mudflat is available during shorebird migration periods. Open water area for foraging diving ducks appears adequate, but management may be required if potential high-value locations have excessive levels of human disturbance.

Breeding and migrating woodland birds dependent on mature forests currently have a substantial habitat base in WI-23. Modest declines in forest cover occurred in recent years but primarily outside of areas most important for woodland breeding birds. In the future, managers should carefully consider forest fragmentation trends and patch size as they evaluate cutting locations; large un-fragmented forest tracts are critical to viable populations of some breeding songbirds. Evaluating the influence of invasive species (buckthorn, emerald ash borer beetle) on forest composition and structure must also be considered in future management scenarios.

Lack of management, fire suppression, and herbivory cause low recruitment of hard mast tree species (e.g., oak and hickory) and higher composition of mesophytic species (e.g., red maple, sassafras, black cherry). Practices that restore and maintain diverse native tree species composition help assure a future of higher quality habitat for a diversity of forest-breeding birds. Likewise, composition, structure, and juxtaposition of woodlands are important during migration periods, including corridors for young-growth / shrubland species, especially along river systems. Whereas the shrub/scrub cover type increased by almost 4% between 2001 and 2006, the amount of this cover on the landscape is substantially less than needed to meet population goals for shrub and young-growth landbirds; breeding populations of these species have been in long-term decline across much of the JV region.

Grassland cover was relatively stable between 2001 and 2006. Future grassland abundance in WI-23 will be largely related to private land management activities (e.g., pasture/hay management, Conservation Reserve Program). Recent high commodity prices will likely prevent conversion of private agricultural lands to grassland or other native plant communities, at least in the near term. However, there are opportunities to promote grasslands in a working landscape through methods other than taking land out of agricultural production. For example, the value of pasture and hay cover for grassland birds may be increased through management practices (e.g., timing and or intensity of grazing/mowing), maintaining both ecological and economic benefits. In addition, some area of state and federally owned lands were also mapped as cultivated cropland, thus managers should seek opportunity to convert areas back to native cover, particularly grassland and wet meadow. Expanding “permanent” openings such as grasslands associated with right-of-ways (e.g., highways, utility corridors) and large emergent marsh/meadow wetland complexes can result in management efficiencies by providing larger openland areas/unit cost.

Savanna conservation represented the greatest protection and restoration objectives for a single cover type in WI-23. JV objectives for savanna will likely be reduced in future planning efforts based on new research findings regarding the focal species representing this bird guild (Red-headed Woodpecker). Moreover, current JV population and habitat objectives for openland species, those dependent on grassland and savanna, are probably beyond the capacity of WI-23’s agricultural and forest-dominated landscape.

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