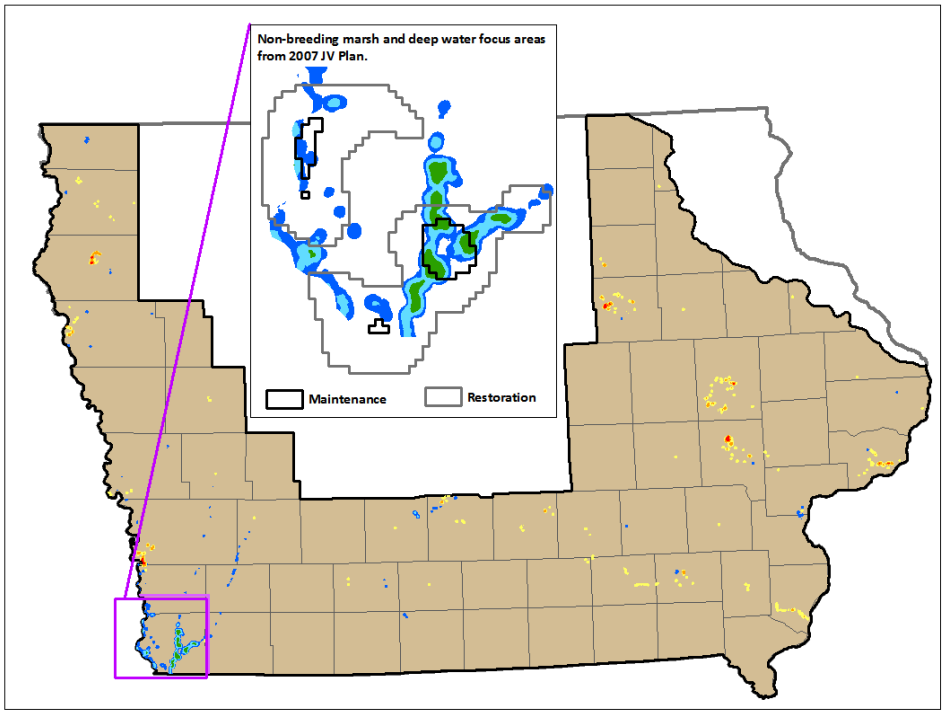
UPPER MISSISSIPPI RIVER & GREAT LAKES REGION
JOINT VENTURE
Delivering bird conservation through partnerships

Iowa BCR 22 – 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 Iowa BCR 22 (IA-22) "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, apparent trends in landscape cover types suggests 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 IA-22 assessment for more details.**



One of the greatest recent changes in IA-22 land cover has been loss of row crops to urban cover plus conversion to wetland and open water.

Row Crop conversion (%) to:

Urban Cover	Wetland and Open Water
1.8 - 5.1	4.3 - 18.4
5.1 - 13.3	18.4 - 42.3
13.3 - 99.6	42.3 - 99.6

N

0 20 40 80
Miles

Primary cover-types

IA-22 contains extensive grassland/hay/pasture (22%), upland forest (8%), and urban (7%), but its primary cover type is row crop (59%). The area of emergent wetland substantially increased between 2001 and 2006 (+30,000 ac), and urban land (+16,500 ac) also expanded. Total acreage of row crop (-28,000), grassland/pasture (-17,000 ac), and upland forest (-6,800 ac) declined during this period.

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 Iowa Bird Conservation Region 22. 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 (%)
Openland and woodland			
Grassland	679,250	1,137,758	-1.1
Savanna	7,821,500	n/a	n/a
Deciduous forest	1,976	1,723,172	-0.4
Evergreen forest	0	13,134	-2.5
Shrubland	6,916	58,142	-1.2
Other forest	0	27,466	-0.5
Marsh, mudflat, and open water			
Emergent wetland	139,064[a]	129,068	27.8
Woody wetland	32,036[b]	273,896	0.0
Dry mudflat	91,096	12,826,020[c]	-0.2
Open water	16,887	276,060	3.0

[a] Includes habitat objectives for several 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 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

Openland:

- Grassland area exceeds JV bird habitat objectives, however this cover type has declined (-12,000 ac) and only a small portion is protected. Future grassland-bird habitat quantity and quality will be driven by private land management activities (e.g., Conservation Reserve Program, proper burning regimes).
- Savanna (mixed wooded openland) acreage could not be determined with NLCD spatial data; objectives for this cover type will likely be reduced in future JV planning due to new information.
- Significant area of state and federally owned lands are mapped as cultivated cropland (21,800 acres). Considering the dominance of agriculture on the landscape, managers should seek opportunity to convert these areas to native cover, particularly grassland and savanna, when conditions are suitable.

Woodland:

- Despite slight declines, forest cover exceeds current JV landbird breeding habitat objectives, however forest-bird migration corridors should be a management focus, especially along river floodplains.
- Although area of woody wetland exceeds current JV habitat objectives for shrub- and forest-wetland bird species, providing more complexes of marsh with associated shrub/forest remains a priority.

Marsh, mudflat, and open water:

- Current area of emergent wetland, open water, and mudflat cover types appear at or near levels adequate to meet the needs of JV wetland-bird focal species, however some of these mapped areas may be low quality habitats and most are unprotected.
- Gains in emergent wetland and open water between 2001 and 2006 were concentrated in southwestern IA-22, reflecting strategic targeting of conservation efforts associated with the Missouri River.
- Partners should continue to expand protection and restoration of high quality and diverse wetlands, including systems that provide energy resources (e.g., moist-soil foods) to migrating wetland birds where conditions are suitable.

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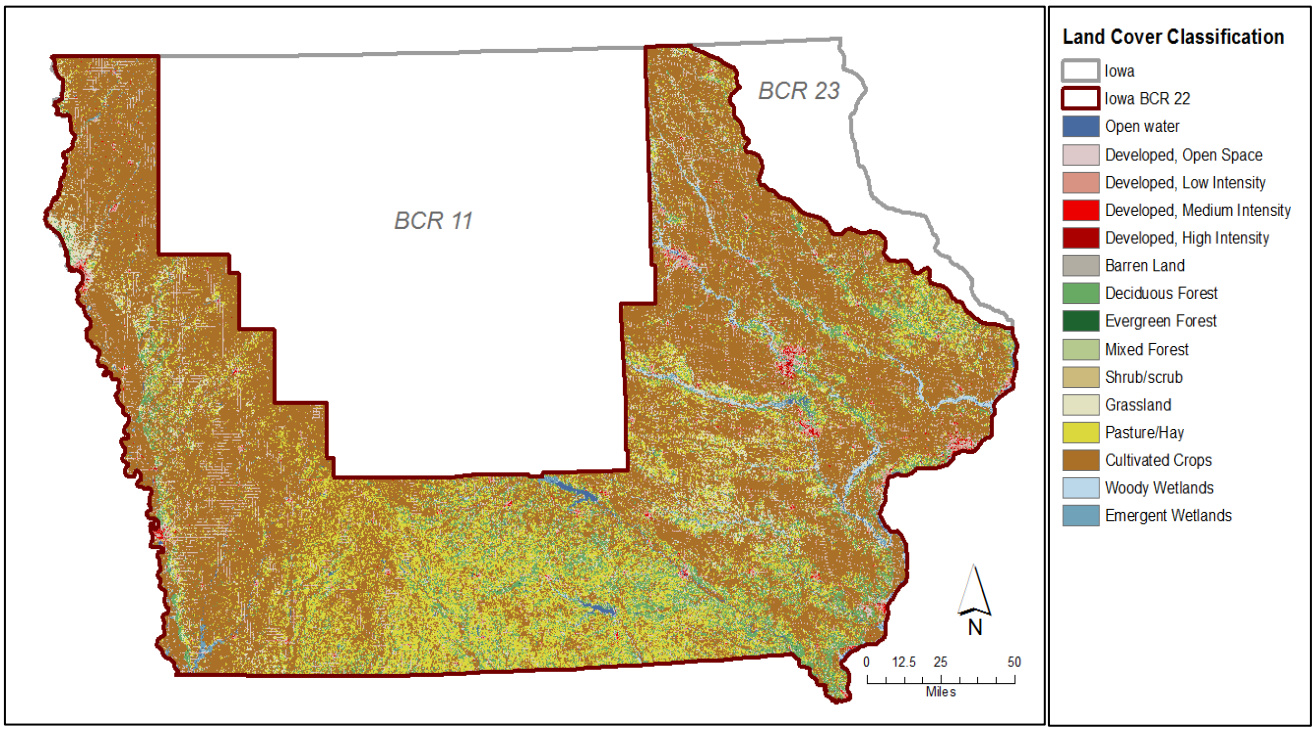
State by BCR Assessment

Iowa 22 – Eastern Tallgrass Prairie

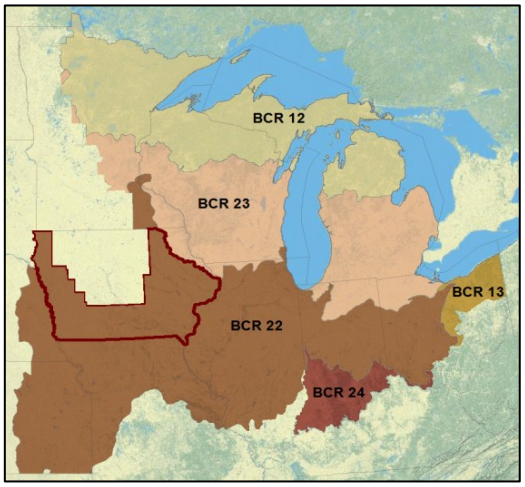
This document was developed to serve as a "stepped-down" version of the 2007 Joint Venture (JV) Implementation Plan with focus on Iowa BCR 22, the Eastern Tallgrass Prairie portion of Iowa. It includes lists of bird species used for JV regional planning (i.e., focal species) that represent land cover types, or bird habitat associations, important to bird guilds occurring in IA-22. 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 IA-22 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 included the non-breeding period (migration/winter). The following JV focal species represent bird guilds requiring specific cover types found in IA-22 (species within guild may be more common in IA-22 than focal species, see 2007 JV Plan).

Landbirds	Shorebirds	Waterbirds
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	**Waterfowl**
Willow Flycatcher	Dunlin	Wood Duck
Veery	Wilson's Snipe	Blue-winged Teal
Wood Thrush	American Woodcock	Mallard
Blue-winged Warbler		Canvasback
Cerulean Warbler		Lesser Scaup
Prothonotary Warbler		
Louisiana Waterthrush		
Kentucky Warbler		
Henslow's Sparrow		
Eastern Meadowlark		



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., IA-22). 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 IA-22 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 recent 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 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 IA-22 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 Iowa BCR 22 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	196,286	202,087	3.0	5,801
Urban	1,564,149	1,580,665	1.1	16,516
Barren	9,240	9,055	-2.0	-185
Upland Forest	1,773,492	1,766,697	-0.4	-6,795
Shrub/Scrub	58,828	58,142	-1.2	-686
Grassland/Hay/Pasture	4,820,594	4,803,578	-0.4	-17,016
Grassland	1,149,999	1,137,758	-1.1	-12,241
Row Crops	12,854,036	12,826,020	-0.2	-28,015
Wetlands	403,875	434,256	7.5	30,381
Emergent Wetlands	109,151	139,491	27.8	30,340
Woody Wetlands	294,725	294,765	0.0	41
Total	21,680,500	21,680,500		

IA-22 is dominated by open lands, with large amounts of hay, pasture, and grassland but its primary cover type is row crop agriculture (Table 1).[1] Row crop area declined slightly between 2001 and 2006, accounting for a 28,000 acre loss. Likewise, grassland, hay, and pasture declined by nearly 17,000 acres with grassland incurring the greatest area loss. Conversely, urban cover increased by 16,500 acres, roughly the area of Iowa City, and there was a 30,000 acre increase in emergent wetland. Gains in urban cover came primarily from land previously in agriculture and grassland (Figure 1, Table 2), representing permanent habitat loss for some bird species. Whereas row crop conversion to urban cover occurred near metropolitan areas, gains in wetland and open water were more concentrated in southeastern IA-22 (Figure 2). Area of upland forest and woody wetland were relatively stable between 2001 and 2006.

[1] To evaluate landscape change, we compared satellite imagery (NLCD) of IA-22 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.

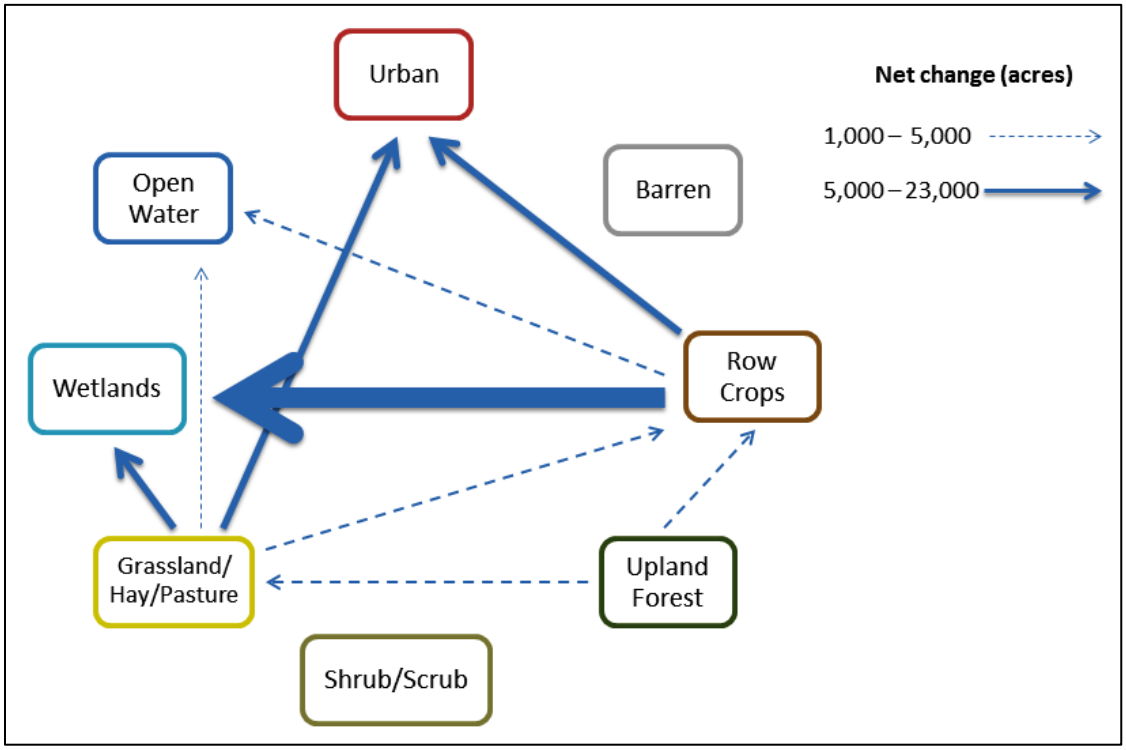


Figure 1. Net change of general land cover types (>1,000 acres converted) in Iowa BCR 22 between 2001 and 2006 (NLCD). Arrows point in the direction of change between two cover types and line thickness increases in proportion to amount of net change. "Wetlands" include woody and emergent herbaceous wetland, whereas "upland forest" represents upland (non-wetland) forest cover.

Table 2. Conversion (acres) of primary land cover types in Iowa BCR 22 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, 2,058 acres of open water converted to wetland and 2,320 acres of wetland converted to open water, for a net change among these two cover types of -262 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	192,728	145	69	191	0	230	543	2,058
	Urban	0	1,561,592	0	0	0	0	0	0
	Barren	137	168	8,605	10	0	33	163	108
	Upland Forest	530	958	178	1,763,403	128	2,543	2,270	583
	Shrub/Scrub	18	21	13	114	57,261	673	615	17
	Grassland/Hay/Pasture	1,811	7,575	0	48	507	4,790,945	3,284	8,544
	Row Crops	4,212	7,182	6	40	151	252	12,798,149	23,031
	Wetland	2,320	440	169	1	0	1,051	29	399,205

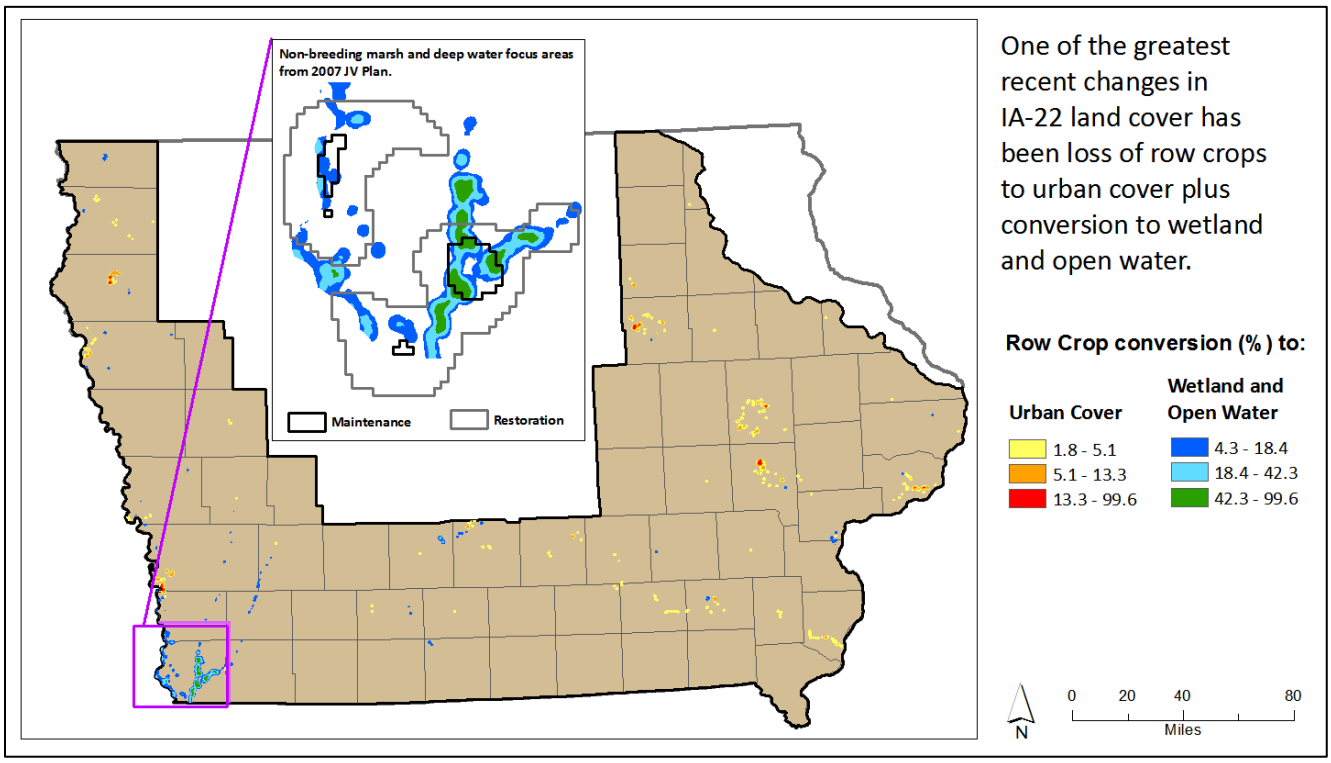


Figure 2. Conversion (percent total area converted within 1 km circular radius) from row crop cover to urban or wetland and open water in Iowa BCR 22, 2001 to 2006 (NLCD). For the inset map, black lines reflect areas with greater emphasis on habitat maintenance/protection and grey lines reflect areas with greater emphasis on habitat restoration for marsh and deep water wetland birds during the non-breeding period (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 reflect 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 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.

Objectives presented here represent the total of IA-22 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 IA-22 protected land configuration and ownership composition (Figure 3). In December 2013, 1.53 million acres were enrolled in the Conservation Reserve Program (CRP) in Iowa with roughly 702,000 acres scheduled to expire by 2018. We were unable to

partition total Iowa CRP acreage to the IA-22 portion of the state or assess the land cover composition of CRP lands due to privacy protections in the U.S. Farm Bill.

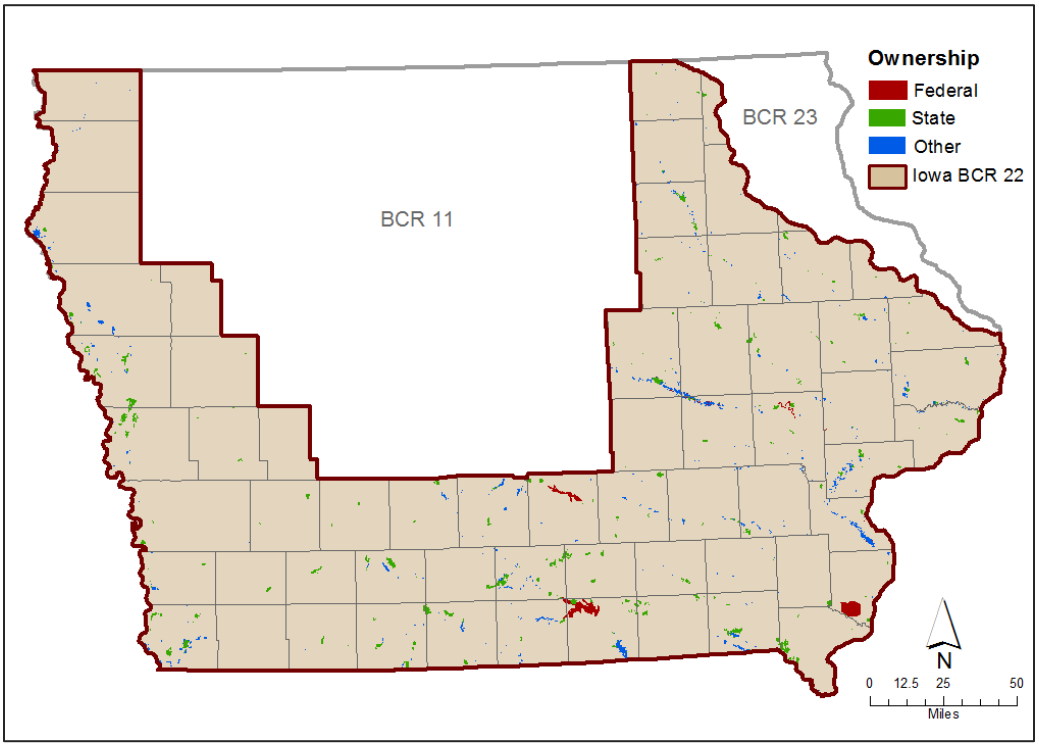


Figure 3. Location of federal, state, or other conservation lands in Iowa Bird Conservation Region 22. "Other" ownership category includes private land with temporary and permanent easements, conservancy land, and county, township and city owned land. Total land area conserved (excluding CRP lands) is 338,900 acres, including 181,000 acres of woodland/grassland and 102,600 acres of agriculture, open water, and marsh wetlands.

Openland and Woodland

Landbird cover types and focal species	
Deciduous forest	Whip-poor-will, Wood Thrush, Louisiana Waterthrush, Kentucky Warbler
Forest generalist	Chimney Swift
Shrubland	Willow Flycatcher, Blue-winged Warbler
Grassland	Upland Sandpiper, Eastern Meadowlark
Savanna	Red-headed Woodpecker

The estimated amount of openland/grassland and woodland needed in high quality habitat to maintain current landbird populations is 4.26 million acres (Table 3) with the majority (92%) of that habitat area being savanna (mixed wooded openland). The 2007 JV Plan also calls for habitat restoration of the same acreage to achieve landbird population goals (i.e., doubling some populations based on Partners In Flight continental plan). Obviously this level of bird habitat conservation is unachievable in a productive agricultural landscape, and openland habitat goals are far greater than the area currently protected (Table 3) even when including CRP lands.

Openland.—The grassland-bird guild used for JV planning requires 679,000 acres of habitat in IA-22, and the region contains an estimated 1.14 million acres of grassland plus 3.67 million acres of pasture/hay (Table 3). The amount of grassland appears adequate to meet objectives, however changes in agricultural practices (i.e., early hay mowing), recent conversions from grassland/pasture/hay to row crops, and fragmentation of large grasslands have likely been detrimental to breeding grassland birds.

Savanna maintenance and restoration objectives (7.82 million acres total; Table 3) are based on the breeding habitat requirements of birds occupying savanna (e.g., Red-headed Woodpecker). Although evidence suggests the area of savanna is declining, this cover type is not mapped by NLCD and assessing the landscape's capacity to

support 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.

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 Iowa BCR 22. 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
Openland							
Grassland	339,625	339,625	1,137,758	3,842	19,207	26,388	49,437
Pasture/hay[b]	--	--	3,665,820	3,499	12,103	9,926	25,528
Savanna	3,910,751	3,910,751	na[c]	na	na	na	na
Woodland							
Deciduous forest	1,235	741	1,723,172	12,867	64,381	8,664	85,912
Evergreen forest	0	0	13,134	217	1,226	168	1,611
Forested wetland	0	0	253,621	1,908	13,890	2	15,800
Shrub/scrub	4,940	1,976	58,142	245	746	376	1,367
Other forest	0	0	27,466	455	682	193	1,330
Total	4,256,551	4,253,093	6,879,113	23,033	112,235	45,717	180,985

[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 cover type area could not be estimated due to resolution limitations of spatial data.

Woodland.—Objectives developed for deciduous forest, forested wetland, shrubland, and other mixed forest were all driven by the needs of breeding landbirds. IA-22 encompasses about 2,075,000 acres of woodland and 106,000 acres are protected (Table 3). Forest cover is above objective levels for breeding landbirds and it is especially abundant along river floodplains and hilly areas, but forest fragmentation is a concern because it can limit habitat quality for breeding forest birds. For example, 2,000 acres of contiguous mature forest is required to meet habitat needs for some JV focal species using this cover type. IA-22 forests are largely fragmented, having size and configuration that may limit daily survival and productivity of species sensitive to forest fragmentation.

Habitat objectives for shrubland birds (6,900 acres) were also substantially lower than the estimated area of shrubland available in IA-22 (Table 3). However, shrubland cover types are poorly mapped and estimates based on remote sensing (i.e., NLCD) are not sufficient for accurate 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.

Marsh, Mudflat, and Open Water

Wetland and open water cover types and focal species	
Wet meadow w/ open water	Blue-winged Teal
Semi-permanent/hemi-marsh	Mallard, King Rail, American Black Duck
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 mudlfat	American Golden-Plover, Killdeer
Open water	Canvasback, Lesser Scaup
Beach	Sanderling

The estimated area of high quality habitat needed in IA-22 to maintain current populations of birds dependent on marsh, mudflat/shallows, and open water is about 198,000 acres (Table 4)[2]. This area, plus an additional 81,000 acres of restored high quality wetland, 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 IA-22. The overall 279,000-acre wetland bird habitat objective represents about 1.2% of the area in IA-22.

Marsh.—Habitat objectives were developed in the JV Plan for breeding wetland bird groups dependent on four marsh categories and totaling 164,700 acres: wet meadow with open water and shallow semi-permanent marsh (129,700 ac), deep-water marsh (40 ac), and marsh with associated shrub or forest (32,000 ac). However, some wetland categories were combined for this analysis (Table 4) due to resolution limitations of NWI and NLCD spatial data. Results suggest a total 149,300 acres of marsh/shrub wetlands are available, of which 10% are protected (Table 4). Thus, JV conservation objectives for marsh cover types, driven largely by the needs of breeding waterfowl, are similar but slightly greater than the area of marsh/shrub wetland currently available.

Habitat objectives for the non-breeding period were also substantial for semi-permanent marsh and deep-water marsh, reflecting the habitat needs of migrating waterfowl. Although semi-permanent marsh available during the breeding season will also accommodate shallow-marsh birds during the non-breeding period, the deep water marsh objective (3,000 ac) for IA-22 is primarily important during the non-breeding period (Table 4). We were unable to determine the quality of existing marsh cover types for breeding and migrating wetland birds based on NWI spatial data. Moreover, NWI and NLCD wetland data were not in agreement; local-scale planning for wetland protection / restoration in IA-22 should use these spatial data cautiously.

Mudflat and Shallows.—Objectives for wet mudflat, shallow (<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 about 6,400 acres of high quality wet mudflat and shallow-water habitat for wetland birds (Table 4). However, assessments of these cover types are difficult using remotely sensed data and are not adequately identified by NWI. These cover types are also very 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., spring agricultural fields provide value to some shorebirds), includes 50,700 acres of protected land; 21,800 acres of state and federal lands are apparently in agriculture (Table 4).

Open Water and Beach.—Open water objectives total an estimated 16,900 acres of quality diving duck 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 open-water areas.

[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 IA-22 to maintain current populations of birds dependent on dry mudflat is 37,371 acres, as the breeding objective (37,371 ac) is greater than the non-breeding objective (282 ac) (See Table 4).

Beach bird-habitat objectives, driven largely by the needs of migrating shorebirds, total about 160 acres. Beach cover appears adequate to meet objectives and is found largely along major river corridors.

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 Iowa BCR 22. 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 Land Cover 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, and National Conservation Easement Database.

Bird habitat categories	Habitat objective				Land cover				
	Maintenance		Restoration		Cover type area on landscape	Conservation status (protected)			
	B	N	B	N		Federal	State	Other	Total
Marsh									
Deep-water marsh	27	2,996	12	0	190	0	42	0	42
Shallow semi-permanent marsh[a]	111,656	94,670	18,004	988	128,878[b]	2,202	10,438	42	12,682
Marsh with shrub/forest	26,696	0	5,340	0	20,275	235	1,821	17	2,073
Mudflat and shallows									
Wet mudflat/shallows[c]	0	5,004	0	1,392	na[d]	na	na	na	na
Dry mudflat	37,371	282	53,725	165	12,826,020[e]	7,094	14,683	28,953	50,730
Open water and beach									
Extensive open water	0	14,027	0	2,860	276,061[f]	20,193	16,435	138	36,766
Beach	0	42	0	114	9,550[f]	99	99	94	292
Total	175,750	117,021	77,081	5,519	13,260,974	29,823	43,518	29,244	102,585

[a]Bird habitat objectives for "shallow semi-permanent marsh"also 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 (<2 in)," and "moderate water depth (2-8 in)" open flats in the 2007 JV Plan.

[d]na indicates cover type area 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 cover type 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 shoreline with little vegetation (NLCD).

Management Implications

IA-22 is dominated by agriculture, but large portions remain ecologically diverse. The area is unique within the JV region for its value to breeding grassland and savanna birds, migrating marsh birds, and migrating and wintering waterfowl. Slight declines in forest cover occurred in recent years, yet IA-22 has considerable amounts of woodland, with substantial public ownership. Migration and wintering habitat objectives for landbirds were not developed for the 2007 JV Implementation Plan, but the non-breeding period for landbirds will be addressed when the JV Plan is next updated, particularly conservation of migration habitat for grassland and forest birds traversing IA-22. Until then, maintaining quality landbird migration pathways, especially along rivers and north-south corridors, should be considered in management planning.

The amount of available grassland appears to exceed what is needed to meet habitat objectives for JV grassland focal species. However, grassland area declined modestly between 2001 and 2006, and only a small portion of existing grassland is protected under conservation ownership. Grassland quality for birds has been declining across BCR 22 due to plant species composition (e.g., tall fescue), fragmentation, agricultural use trends (e.g., un-prescribed cattle stocking rates), and a lack of prescribed burning regimes that emulate natural cycles. Because permanent protection (public ownership) of vast grassland and savanna tracts is unfeasible, IA-22 partners must continue seeking opportunities to promote 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. New initiatives on private ranch lands in parts of BCR 22 have found success by promoting and supporting a balance between short-term and long-term economic viability through maintaining healthy native-grass prairies.

Because a significant area of state and federally owned lands are mapped as row crop (21,800 acres), managers should seek opportunity to convert areas back to native cover, particularly grassland, when conditions are suitable. In addition, connecting "permanent" openings such as grasslands associated with right-of-ways (e.g., highway / utility corridors), perpetual grassland/pasture easements, and large marsh complexes can result in management efficiencies by providing larger openland areas/unit cost. The 2007 JV Implementation Plan includes significant habitat objectives for savanna bird species dependent on savanna in IA-22. We could not assess the abundance or quality of this cover type given the spatial data available, but savanna area is likely far below objective levels. However, the JV objective for this cover type is expected to be reduced substantially in the future due to new information. In the meantime, IA-22 partners should continue to investigate ways to evaluate habitat objectives and conservation targeting for savanna birds.

In general, the area of open water and dry mudflat appears adequate to meet habitat objectives for JV focal species, and the area of marsh cover is nearing objectives set in the 2007 JV Plan. However, the area of wet mudflat and shallows providing forage to migrating wetland birds could not be determined using existing spatial data. Spatial data were also inadequate to 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). Due to altered hydrology in much of the region, some management actions may be necessary to assure mudflat and shallow wetlands are available during shorebird and duck migration periods. IA-22 partners should also continue restoration and protection of marsh and wet meadow providing quality wetland-bird habitat, while implementing effective inventory and control of non-desirable plants (e.g., invasive species) that can reduce habitat quality. Open water area for foraging diving ducks appears adequate, but management may be required if potential high-value locations have low water quality or excessive levels of human disturbance.

Finally, conversion of row crop agriculture to grassland, savanna, marsh, and other native cover types can serve purposes beyond bird habitat restoration. For example, IA-22 is a primary contributor to hypoxia in the Gulf of Mexico due to nutrient loading of river systems in this agriculturally dominated landscape. Targeting both bird habitat conservation and reduced nutrient loading of tributaries of the Mississippi River should be a priority where possible.

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