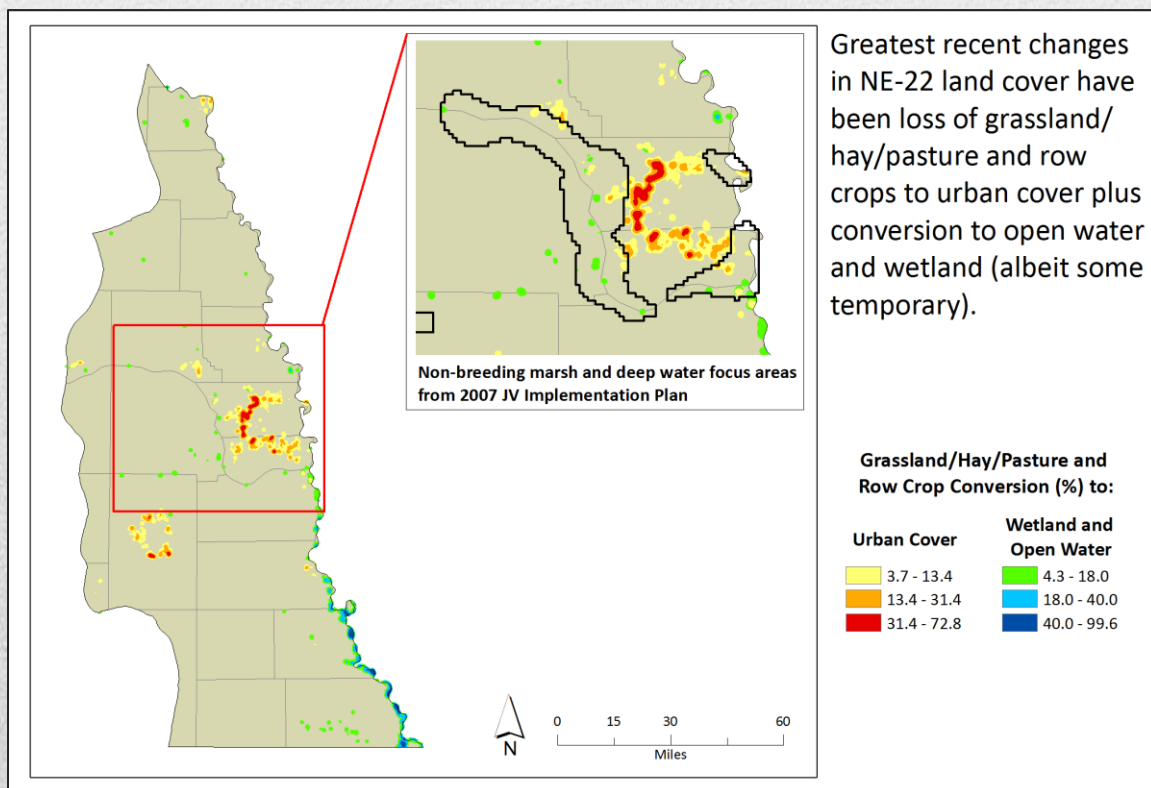




Nebraska BCR 22 – Assessment Summary

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 Nebraska BCR 22 (NE-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, 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 NE-22 assessment for more details.**



Primary cover-types

NE-22 contains extensive grassland/pasture (22%), urban cover (8%), and upland forest (6%), but its primary cover type is row crop agriculture (61%). Urban land (+23,600 ac) and wetland (+11,700 ac) expanded between 2001 and 2006, whereas area of row crop (-26,600 ac), grassland/hay/pasture (-8,500), and upland forest (-5,600 ac) declined. Gain in urban area was largely the result of conversion from 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 Nebraska Bird Conservation Region 22. Wetland and open water availability based on NWI, not NLCD. **Note: Bird "conservation objectives" represent high quality habitats (high recruitment/survival) for JV focal species whereas "cover type availability" reflects landscape cover types but not necessarily high quality habitats.**

Habitat/cover types	Conservation objective	Cover type availability	Short-term land cover trend (%)
Openland and woodland			
Grassland	25,194	1,027,983	-0.7
Savanna	2,470,000	n/a	n/a
Deciduous forest	0	294,801	-1.9
Evergreen forest	0	1,314	-2.6
Shrubland	0	1,873	1.6
Other forest	0	1,515	1.2
Marsh, mudflat, and open water			
Emergent wetland	154,257 ^a	24,667	126.7
Woody wetland	10,271 ^b	21,853	-0.9
Dry mudflat	18,713	3,288,226 ^c	-0.8
Open water	8,568	62,579	5.9

^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 (<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 crops, which can provide some value to dry mudflat bird species.

Management Implications

Openland:

- Grassland availability is well above that needed to meet objectives in the 2007 JV Plan, but the quality of grassland for successful reproduction and survival is a growing concern.
- Savanna (mixed wooded openland) acreage could not be determined with NLCD spatial data, and objectives for this cover type will likely be reduced in future JV planning due to new information.
- Managers should seek opportunity on public lands to convert row crops to high quality grassland and savanna when conditions are suitable. However, significant grassland conservation for birds will most likely be achieved through private-land programs and working with the agricultural community.

Woodland:

- Forest cover was not emphasized when developing JV breeding landbird objectives for NE-22, thus upland forest objectives are not available in the 2007 JV Plan.
- Migration and wintering landbird objectives were not developed for the 2007 JV Plan, but the non-breeding period will be addressed in future planning. Meanwhile, maintaining forest-bird migration corridors, especially along river floodplains, should be considered in management planning.

Marsh, mudflat, and open water:

- Restoring and protecting marsh bird habitats is a priority as emergent wetland area is well below goal.
- In addition to marsh, partners should focus on expanding conservation of wet meadow and providing energy resources (e.g., moist-soil foods) where this practice is suitable and can be conducted efficiently.
- The area dry mudflat (represented by agricultural fields in spring) appears adequate to meet habitat objectives for JV focal species.
- Open water area is also sufficient, although water quality and associated waterfowl forage (e.g., aquatic plants, invertebrates) is a concern, especially the large rivers. Habitat quality for this cover type could not be assessed using available spatial data.



State by BCR Assessment

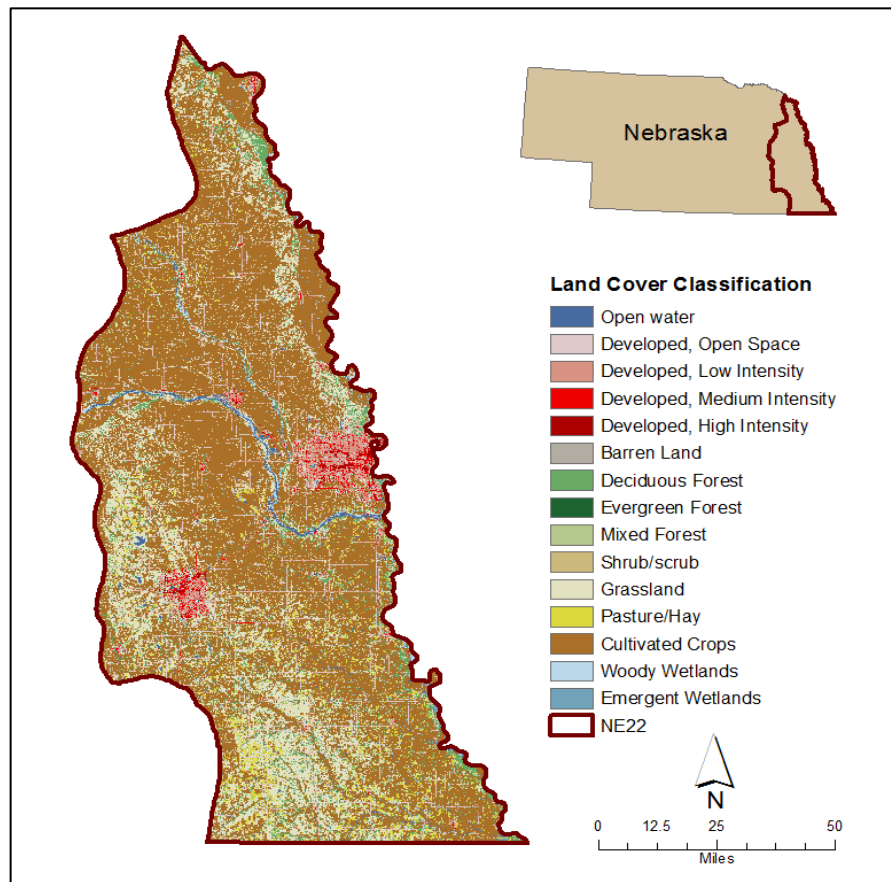
Nebraska 22 – Eastern Tallgrass Prairie

This document was developed to serve as a “stepped-down” version of the 2007 [Joint Venture \(JV\) Implementation Plan](#) with focus on Nebraska BCR 22, the Eastern Tallgrass Prairie portion of Nebraska. 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 NE-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

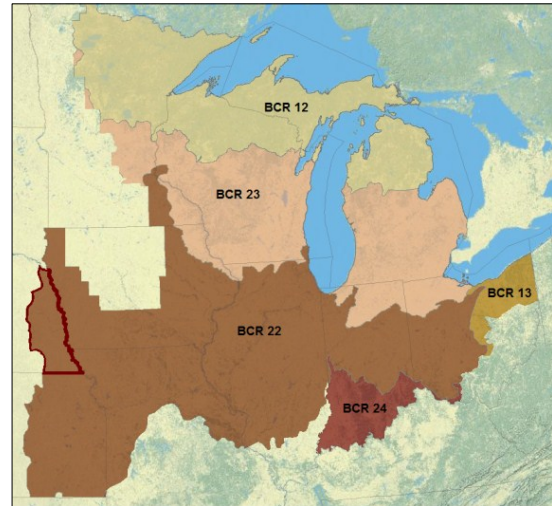
analyses are based on quantities (acres) calculated from the 2001 and 2006 [National Land Cover Database \(NLCD\)](#). Although area estimates do not translate into high quality bird habitats, significant increases or decreases in specific cover types likely result in similar population trends for species associated with those cover types. Also included in this assessment are the amount and location of land currently under protection, primary modes of recent cover type conversion, and general management implications for NE-22 bird conservation partners.

Note: The Rainwater Basin JV may have higher resolution spatial data for NE-22.



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 and winter). The following JV focal species represent bird guilds requiring specific cover types found in NE-22 (species within guild may be more common than focal species, see 2007 JV Plan).

Landbird	Waterfowl
Whip-poor-will	Tundra Swan
Chimney Swift	Wood Duck
Red-headed Woodpecker	American Black Duck
Willow Flycatcher	Mallard
Wood Thrush	Blue-winged Teal
Eastern Meadowlark	Canvasback
Shorebird	Lesser Scaup
American Golden-Plover	Waterbird
Killdeer	Black-crowned Night-Heron
Upland Sandpiper	King Rail
Sanderling	Black Tern
Dunlin	
Short-billed Dowitcher	
Wilson's Phalarope	



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

Introduction

A primary goal of bird conservation 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., NE-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 goal populations 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 NE-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 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 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 NE-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 Nebraska 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.**

Cover Type	Year		% change	Acres gained/lost
	2001	2006		
Open Water	88,134	93,346	5.9	5,213
Urban	434,724	458,366	5.4	23,642
Barren	1,982	2,180	10.0	198
Upland Forest	303,740	298,115	-1.9	-5,625
Shrub/Scrub	1,844	1,873	1.6	29
Grassland/Hay/Pasture	1,239,076	1,230,549	-0.7	-8,527
Grassland	1,035,189	1,027,983	-0.7	-7,206
Row Crops	3,320,216	3,293,623	-0.8	-26,593
Wetlands	92,397	104,060	12.6	11,663
Emergent Wetlands	9,792	22,202	126.7	12,409
Woody Wetlands	82,605	81,858	-0.9	-747
Total	5,482,112	5,482,112		

NE-22 is dominated by row crop agriculture, but it also supports large amounts of grassland/pasture, urban, and upland forest (Table 1).¹ Row crop area declined between 2001 and 2006, accounting for a 26,600 acre loss, and grassland/pasture declined by 8,500 acres. Conversely, urban cover increased by 23,600 acres, and there was a 12,400 acre increase in emergent wetland. Gains in urban cover came primarily from land previously in agriculture and grassland cover types (Figure 1, Table 2), representing permanent habitat loss for some bird species. The 127% increase in emergent wetland was a positive change for wetland birds, but much of this new wetland area may be temporary as it was associated with frequently flooded areas of the Missouri River (Table 2, Figure 2). Land cover types that were largely stable in area between 2001 and 2006 were shrub/scrub, woody wetland, and upland forest.

¹ To evaluate landscape change, we compared satellite imagery (NLCD) of NE-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.

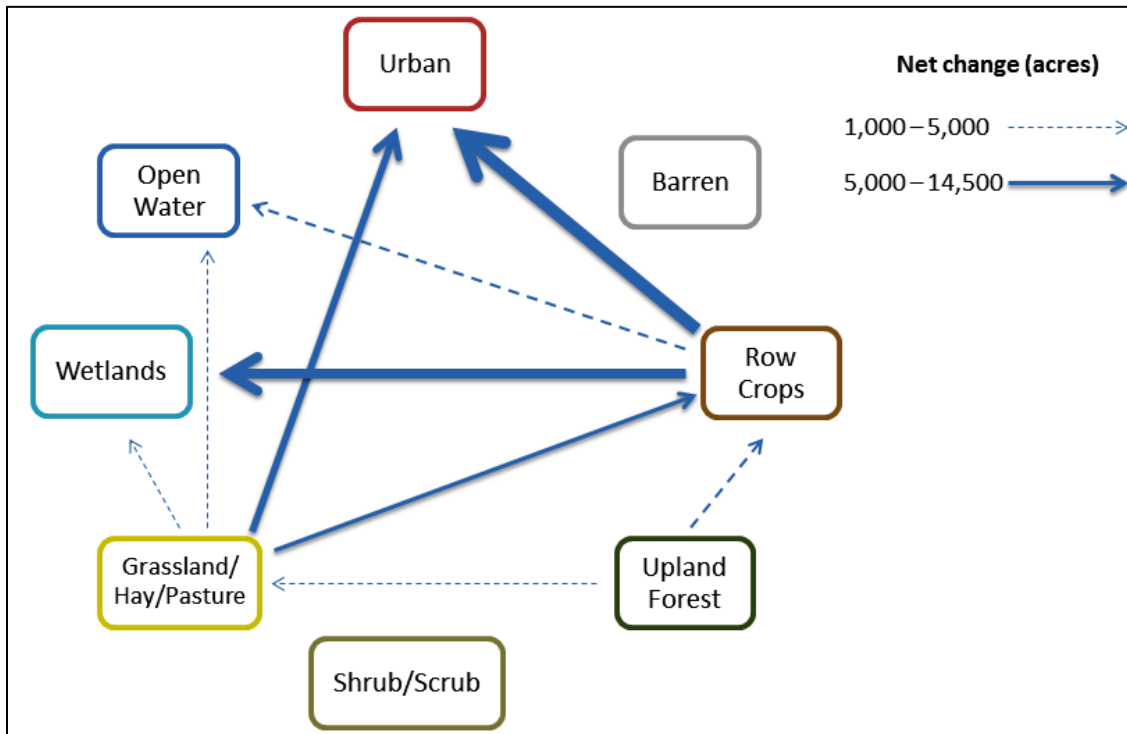


Figure 1. Net change of general land cover types (>1,000 acres converted) in Nebraska BCR 22 between 2001 and 2006 (NLCD). Arrows point in the direction of change between two cover types and line thickness increases in proportion to amount of net change. “Wetlands” include woody and emergent herbaceous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

Table 2. Conversion (acres) of primary land cover types in Nebraska 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) converted to other cover types by 2006 (horizontal axis). For example, between 2001 and 2006, 76 acres of open water converted to wetland and 1,032 acres of wetland converted to open water, for a net change among these two cover types of -956 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	Wetland
2001	Open Water	87,096	179	409	0	3	61	165	76
	Urban	2	434,006	0	0	0	0	0	6
	Barren	73	87	1,692	7	0	31	72	17
	Upland Forest	137	524	37	297,587	35	1,655	3,123	145
	Shrub/Scrub	1	6	0	3	1,768	6	56	1
	Grassland/Hay/Pasture	1,311	7,864	1	2	40	1,226,407	2	1,422
	Row Crops	3,543	14,444	2	26	24	250	3,284,817	11,682
	Wetland	1,032	506	36	2	0	127	3	90,539

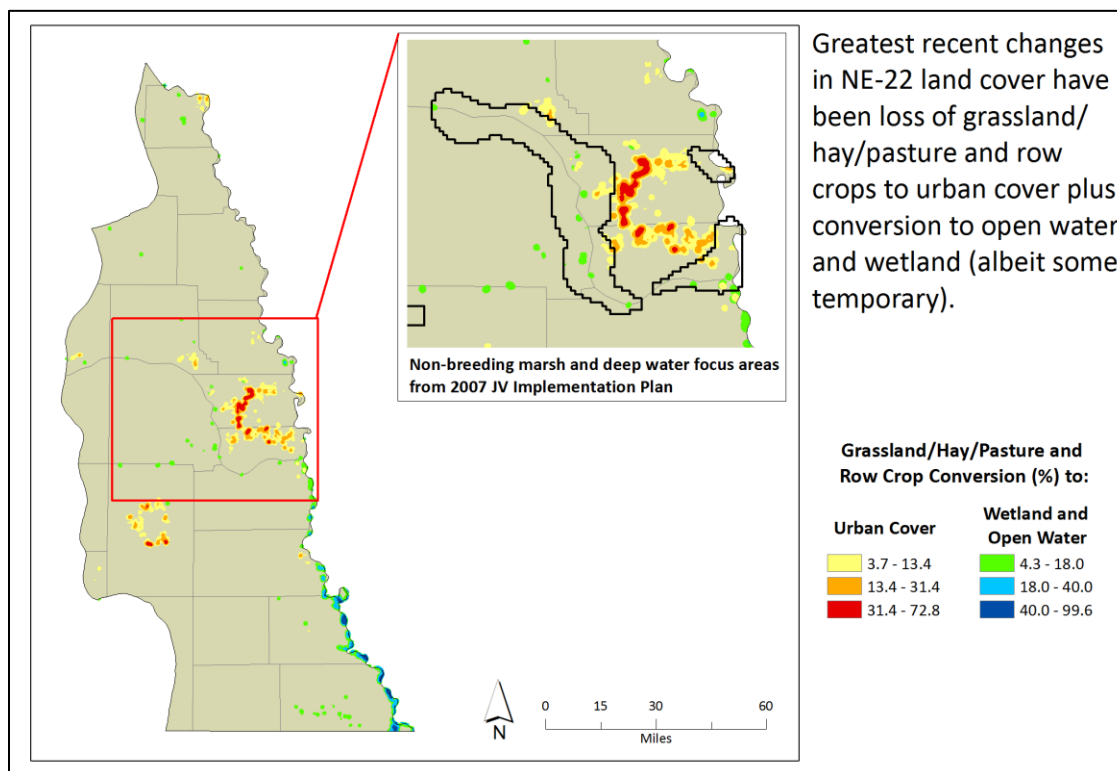


Figure 2. Conversion (percent total area converted within 1 km circular radius) from grassland/hay/pasture and row crops to urban or wetland and open water in Nebraska BCR 22, 2001 to 2006 (NLCD). Inset map reflects areas with greater habitat maintenance/protection and restoration/enhancement emphasis for non-breeding marsh and deep water birds (Figure 8a, 2007 JV Implementation Plan).

Bird Habitat Objectives and Cover Type Availability

JV bird habitat conservation objectives fall under two categories: “maintain and protect” (here after 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 new habitat needed to achieve 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.

The area of cover types potentially providing bird habitat was estimated using the National Wetland Inventory (NWI) 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 NE-22 protected land configuration and ownership composition (Figure 3). In [December 2013](#), 848,000 acres were enrolled in the Conservation Reserve Program (CRP) in Nebraska with roughly 251,000 acres scheduled to expire by 2018. We were unable to partition total Nebraska CRP acreage to the NE-22 portion of the state or assess the land cover composition of CRP lands due to privacy protections in the U.S. Farm Bill.

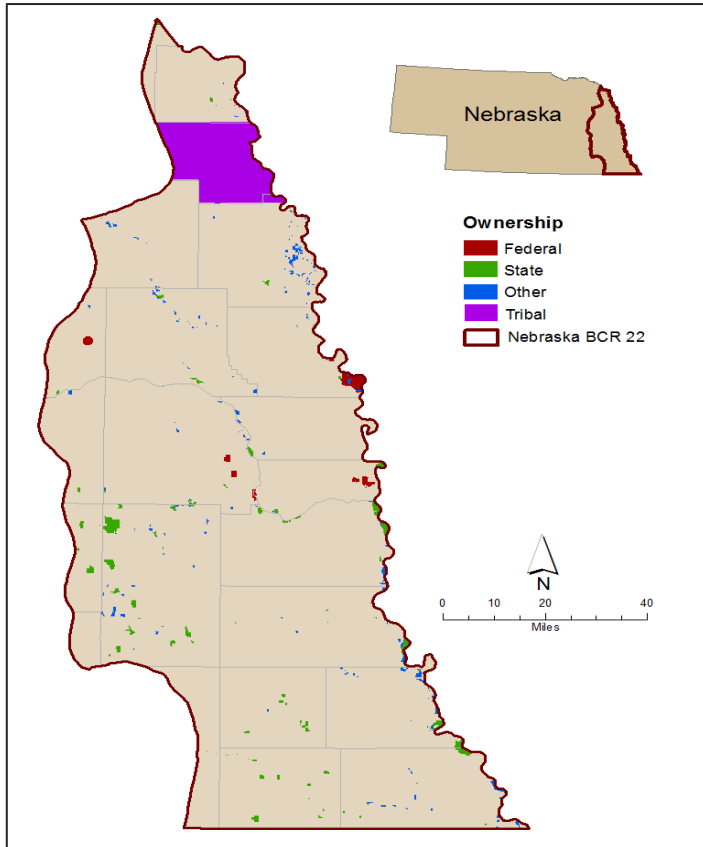


Figure 3. Location of federal, state, or other conservation lands in Nebraska Bird Conservation Region 22. “Other” ownership category includes private land with temporary and permanent easements, conservancy land, and county, township, and city owned land. The conservation lands spatial data suggests total area conserved (excluding CRP) is about 286,700 acres. However, much of this area is encompassed by the tribal land boundary in northern NE-22, which includes substantial private land holdings, particularly in row crop, grassland, and forest cover types.

Openland and Woodland

Landbird habitat objectives for cover types in NE-22 were established only for openlands: grassland and savanna (mixed wooded openland). Objectives for breeding savanna birds accounting for 99% of estimated bird habitat needs in upland communities and were based on crude calculations and limited information during JV Plan development. Initial estimates suggested the amount of savanna needed to maintain current

landbird populations was about 23% of the total area of NE-22. Moreover, the estimated habitat area needed to achieve goal populations of openland bird species is about twice that amount (Table 3). Obviously this level of habitat conservation is unachievable and far greater than the area currently protected even when including CRP lands. The savanna objective will be reduced substantially in future JV planning based on new information.

Openland.—The grassland-bird guild used for JV planning requires an estimated 25,200 acres of high quality habitat, and NE-22 contains an estimated 1,028,000 acres of grassland plus 203,000 acres of pasture/hay based on the 2006 NLCD (Table 3). The amount of grassland appears adequate to meet JV objectives, however the quality of grassland could not be determined with spatial data. Changes in agricultural practices (e.g., early hay mowing, un-prescribed cattle stocking densities) and fragmentation of large grasslands has been detrimental to breeding grassland birds.

Savanna objectives (2.4 million acres maintenance and restoration combined; 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 was not possible with these spatial data.

Woodland.— The 2007 JV Plan did not emphasize breeding forest birds in NE-22, thus objectives for protection and restoration of additional woodland were not developed. Future JV planning will likely include objectives for NE-22 woodland cover types, especially as habitat planning for landbirds extends into the non-breeding period.

Landbird cover types and focal species	
Forest generalist	Chimney Swift
Grassland	Upland Sandpiper, Eastern Meadowlark
Savanna	Red-headed Woodpecker

Table 3. Upland bird habitat maintenance and restoration objectives (acres) by primary openland and woodland cover types and the estimated amount of each currently on the landscape in Nebraska 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 (note: "Other" conservation lands include designated tribal land in north NE-22; private holdings encompassed by the tribal boundary likely inflated protected area estimates in the Other category).

Bird habitat categories	Habitat objective ^a		Cover type area on landscape	Land cover			
	Maintenance	Restoration		Conservation status (protected)			
				Federal	State	Other	Total
Openland							
Grassland	12,597	12,597	1,027,983	904	13,307	47,758	61,969
Pasture/hay ^b	--	--	202,566	640	1,166	3,417	5,223
Savanna	1,235,000	1,235,000	na ^c	na	na	na	na
Woodland							
Deciduous forest	0	0	294,801	326	8,938	20,656	29,920
Evergreen forest	0	0	1,315	2	27	2	31
Forested wetland	0	0	15,523	274	914	329	1,517
Shrub/scrub	0	0	1,873	2	57	10	69
Other forest	0	0	1,515	0	69	2	71
Total	1,247,597	1,247,597	1,545,576	2,148	24,478	72,174	98,800

^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 providing some openland value.

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

Marsh, Mudflat, and Open Water

The estimated area of high quality habitat needed in NE-22 to maintain current populations of birds dependent on marsh, mudflat/shallows, and open water is about 173,900 acres (Table 4)². This area, plus an additional 18,000 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 NE-22. This total 191,900-acre wetland bird habitat objective represents about 3.5% of the area in NE-22.

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
Open water	Canvasback, Lesser Scaup
Beach	Sanderling

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 NE-22 to maintain current populations of birds dependent on shallow semi-permanent marsh is 146,520 acres, as the non-breeding objective (146,520 ac) is greater than the breeding objective (17,962 ac) (See Table 4).

Marsh.—Habitat objectives were developed in the JV Plan for breeding and non-breeding wetland birds dependent on four marsh categories and totaling about 163,000 acres if we assume habitat areas provide value to birds during multiple seasons (i.e., shallow marsh used by migrating waterfowl can also be used by breeding waterfowl). JV categories of marsh conservation planning were wet meadow with open water, shallow semi-permanent marsh, marsh with associated shrub or forest, and deep-water marsh. 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 of 31,000 acres of marsh wetland available in NE-22 of which 13% are protected (Table 4). Thus, JV conservation objectives for marsh cover types, driven largely by the habitat needs of nonbreeding waterfowl, are significantly greater than the area of marsh wetland currently existing on the landscape.

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 Nebraska 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 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, and National Conservation Easement Database (note: "Other" conservation lands include designated tribal land in north NE-22; private holdings encompassed by the tribal boundary likely inflat protected area estimates in the Other category).

Bird habitat categories	Habitat objective				Cover type area on landscape	Land cover			
	Maintenance		Restoration			Conservation status (protected)			
	B	N	B	N		Federal	State	Other	Total
Marsh									
Deep-water marsh	5	2,149	2	0	1,500	7	35	22	64
Shallow semi-permanent marsh ^a	17,962	146,520	4,271	282	23,166 ^b	121	2,142	1,053	3,316
Marsh with shrub/ forest	8,559	0	1,712	0	6,328	151	368	205	724
Mudflat and shallows									
Wet mudflat/ shallows ^c	0	1,028	0	287	na ^d	na	na	na	na
Dry mudflat ^e	7,677	57	11,036	35	3,288,226	8,397	4,028	132,023	144,448
Open water and beach									
Extensive open water	0	7,941	0	627	62,579 ^f	1,124	6,064	1,441	8,629
Beach	0	10	0	22	2,177	2	12	5	19
Total	34,203	157,705	17,021	1,253	3,383,976	9,802	12,649	134,749	157,200

^aBird habitat objectives for "shallow semi-permanent marsh" also include objectives set 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 in NWI.

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

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

^eDry mudflat/agriculture was a bird habitat category used in the 2007 JV Plan and row crop (NLCD) was the cover type measured on the landscape.

^fCover 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-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 1,300 acres of high quality wet mudflat and shallow-water bird habitat (Table 4). However, assessing the area of shallow 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 in spring provide value to some shorebirds), is

far greater than objectives in the JV Plan. About 144,000 acres of NE-22 row crops are on protected land based on available spatial data; an estimated 12,400 acres of state and federal lands are in row crop (Table 4).

Open Water and Beach.—Objectives for extensive open-water areas are based on the habitat needs of migrating and wintering diving ducks. This group requires an estimated 8,600 acres of high quality foraging and resting habitat when populations are at goal levels. Whereas the region has adequate open water areas to meet JV objectives (Table 4), low water quality and associated low food availability may negatively influence waterfowl use of some locations. Some species of shorebirds and terns depend on beach. Beach objectives total 32 acres and beach area appears adequate to meet the needs of JV focal species. However, future JV planning should consider populations of piping plovers and least terns (not currently a JV focal species) occurring on large river sandbars in NE-22.

Management Implications

NE-22 is dominated by agriculture, but portions of the region remain valuable to breeding and non-breeding birds especially those dependent on grassland, savanna, marsh, and open water. Although not addressed in the 2007 JV Plan, landbird habitat during the non-breeding period is important, especially for grassland and forest birds traversing NE-22 during migration. Maintaining quality migration pathways along rivers and north-south corridors may be a high priority for non-breeding landbird conservation. Both the breeding and non-breeding period of the life cycle for landbirds occupying NE-22 will be addressed when the JV Plan is next updated.

The current area of grassland appears adequate to meet habitat objectives for JV focal species in NE-22; however, the quality (reflected in high recruitment and survival) of these potential bird-habitat areas could not be assessed with remotely sensed data and only a small portion of the existing grassland is protected through public ownership or perpetual conservation easement. 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 is unfeasible, NE-22 natural resource managers should continue seeking opportunities to promote bird conservation on private lands within the agricultural community. New initiatives on private land in 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.

The areas of open water and mudflat appear adequate to meet JV objectives for these communities, although the capacity of these wet mudflat and shallows to provide forage to migrating wetland birds could not be determined using existing spatial information. 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). Based on their floodplain locations, at least some of the recent gains in emergent wetland and open water between 2001 and 2006 may have been temporary due to a period of high precipitation, and the amount of shallow semi-permanent marsh remains well below JV objectives. NE-22 partners should continue restoration and protection of emergent marsh and wet meadow as a high conservation priority. Because of the region's importance to migrating waterfowl, practices to provide forage (e.g., moist soil management), especially during spring, will help meet waterfowl objectives.

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