

Breeding Birds of Lacreek National Wildlife Refuge: 2003

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Introduction

Lacreek National Wildlife Refuge (LNWR) was established in 1935 as a 3,790-hectare (9,362-acre) Migratory Waterfowl Refuge for migratory and breeding waterfowl and other wildlife in the shallow Lake Creek Valley of Bennett County in southwestern South Dakota. Over time, additions to the original refuge including the Brown Ranch (2,697 ha [6,662 acres]), Little White River Recreation Area (90 ha [223 acres]; co-managed with South Dakota Game, Fish and Parks), and the Emley inholding (65 ha [160 acres]) have created what is now a 6,643-hectare (16,407-acre) National Wildlife Refuge. As a part of the National Wildlife Refuge System, the mission of LNWR is to help "administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (U.S. Fish and Wildlife Service 1999).

As a result of the National Wildlife Refuge Improvement Act of 1997, each National Wildlife Refuge is required to create a Comprehensive Conservation Plan (CCP). The 15-year plan, geared towards ecosystem-based management of migratory and resident wildlife species, is suited to fit each individual refuge. In order to help provide baseline biological data needed to create a CCP for LNWR, Northern Prairie Wildlife Research Center, in coordination with the refuge, developed a study to survey the breeding birds throughout the refuge.

Methods

The refuge is characterized by mixed-grass prairie, Sandhills prairie, introduced grasses, sub-irrigated wet meadows, and impounded freshwater wetlands. We classified these habitats in two ways. 1) Based on the National Vegetation Classification System (NVCS) and refuge-specific requirements, habitats were classified into eight vegetative ecotypes, including dry mixed-grass prairie, dry plains shrubland, forested wetland, introduced grassland, mesic plains shrubland, provisional land use, restoration areas (areas of exotic grass being restored to native grasses), and wet meadow ecotypes. A grid of points 450 m apart was generated using TNTMIPS® (MIPS) geographical information system software to determine locations for point count surveys. This grid was overlaid with digital NVCS ecotype data supplied by LNWR and the Bureau of Reclamation. Each point was then classified according to ecotype (Tables 1, 2). The 59 points classified as provisional land use were later described according to the major habitat within the point count radius (Table 3). Three of the six points not given a ecotype classification by MIPS (other) were later determined to be exotic grass and the remaining three were Sandhills grass. 2) The habitat within each point count circle was

further broken down and classified by visual determination. See Table 4 for codes and descriptions of habitat classes used.

Table 1. Major ecotypes on Lacreek NWR and number of points in each at which bird surveys were conducted in 2003.

Ecotype	Number of points
Dry mixed-grass prairie (DMP)	71
Dry plains shrubland (DPS)	28
Introduced grassland (IG)	58
Restoration area (RA)	18
Mesic plains shrubland (MPS)	3
Wet meadow (WM)	81
Forested wetland (FW)	3
Provisional land use (PLU)	59
Other (O)	6
Total	327

Table 2. Total area (ha) of each ecotype surveyed on Lacreek NWR, 2003.

Ecotype	Area surveyed (ha)
Dry mixed-grass prairie (DMP)	222.9
Dry plains shrubland (DPS)	87.9
Introduced grassland (IG)	182.1
Restoration area (RA)	56.5
Mesic plains shrubland (MPS)	7.1
Wet meadow (WM)	207.2
Forested wetland (FW)	4.7
Provisional land use (PLU)	152.3
Other (O)	18.8
Total	939.5

Table 3. Descriptions of 59 point count locations classified as Provisional Land Use ecotype at Lacreek NWR.

Habitat	Number of points
Crop	5
Cattail	10
Exotic grass	26
Other emergent vegetation	4
Open water	4
Woodland	4
Wet meadow	2
Other	4
Total	59

Table 4. Habitat classes used to describe breeding bird habitat use at Lacreek NWR during point count surveys in 2003.

Habitat	
Classification	Description
Gn	Native grass
Ge	Exotic grass
Gs	Sandhills grass
Pd	Prairie dog colony
Wm	Wet meadow-areas with little to no standing water; vegetation generally was prairie cordgrass or sedges.
Ct	Cattail
Ev	Other emergent vegetation-generally areas with standing water; vegetation generally was bulrush; excludes cattail.
W	Open water
Wi	Willow-generally wetland-associated willow species
Wd	Woodland-shelterbelts or lone trees such as cottonwoods
St	Structures-buildings
Rd	Road-well-traveled gravel roads; this does not include two-track dirt roads.
Cr	Cropland-corn or alfalfa
Ot	Outside the refuge boundary-if heterogeneous, this was further described in the habitat description section of the data sheet.
X	Other-exposed soil such as mudflats, excavated holes or bare cultivated soil. This also included four points with dense sweet clover, three points with miscellaneous wooden structures (windmills, large posts), and one point each that contained bee boxes, a large pipe, and old cars.

Note: areas that were burned, grazed or hayed within the point count radius were indicated in the comments section of the data sheet.

Using Geographical Positioning System (GPS) units, we located grid points from Universal Transverse Mercator (UTM) coordinates, and then marked with pink surveyor flags. Point number and respective coordinates were on each flag. Points that fell just outside of the refuge boundary 25 m or less were reassigned coordinates just within the refuge boundary.

Selected distinct habitats including three prairie dog colonies (Cowboys, Big City, and Fantasy Island), a riparian area (Elm Creek), and a large block of planted trees in the Sandhills (Sandhills Trees) were chosen to conduct area searches. Area was determined by using a Digital Orthophoto Quadrangle and MIPS to delineate the areas searched (Table 5).

Table 5. Area (ha) of selected habitats where intensive surveys were conducted at Lacreek NWR, 2003.

Prairie Dog Colonies	Area (ha)
Cowboys	54.7
Big City	45.0
Fantasy Island	13.0
Lake 10	TBD
Wooded Areas	
Elm Creek	7.0
Sandhills Trees	7.1

*TBD= new site found during 2003 survey.

Point Counts

Three hundred and twenty-seven points were surveyed once between 17 May and 8 June (round one) and again between 6 June and 2 July (round two). We excluded points that were located in open water (35), one point located on a colonial waterbird nesting island, and one point that was on land but not accessible by foot. Birds were surveyed within a 100-m radius in open habitats with unrestricted visibility (grasslands). Restrictive habitats (woodlands and cattails) were surveyed within a 50-m radius. Locations of indicated breeding pairs were recorded in visually estimated 25-m intervals. Raptors were recorded in an unlimited distance category. Indicated breeding pairs were based upon the number of territorial males (singing, calling, or visually observed), observed pairs, and nests within the point count radius. Sex composition of Brown-headed Cowbirds observed was recorded and indicated breeding pairs were based upon the number of females. For polyandrous species (Wilson’s Phalarope) segregated pairs and lone females indicated breeding pairs. Pairs or lone individuals of Northern Harriers and Ring-necked Pheasants were used to indicate breeding pairs. For colonial-nesting sexually monomorphic species (e.g., swallows [Hirundinidae]), we determined indicated pairs by dividing the total number of birds observed by two and rounding up to the nearest integer. For sexually monomorphic raptor (Accipitridae) and owl (Strigidae) species, indicated pairs were based upon observed individuals or pairs. Indicated breeding waterfowl pairs were determined according to Hammond (1969).

Upon approaching the point count station, location and identification of birds flushed from within the point count circle were estimated (flush location) and recorded. Immediately

before surveying, a pre-marked flag was placed at the survey location and the habitat types within the point count circle were visually estimated (Table 4). Pairs were assigned to the habitat type in which they were first identified. Land management activities such as burning, grazing, or haying also were noted. Percent cloud cover within the air column over the point count circle, wind velocity and direction, and temperature were estimated and recorded. Birds were surveyed for a total of five minutes, divided into three-minute and two-minute segments. Observations of birds flying overhead were excluded except for those determined to be foraging (swallows and raptors) in the air column over the point count circle. Migrant and vagrant species were not included, but at times notes were made. Record was kept of any incidental biological observations (Appendix A).

Area Searches

In distinct habitats (Table 5), birds were surveyed using belt transects. Transects were positioned to begin 100 m from the edge of the area border and birds were surveyed 100 m on either side of the transect until the surveyor reached the end. Subsequent transects were placed 200 m away and parallel to the first transect until the entire area was surveyed. Starting and ending coordinates of each transect were marked with pink surveyor flags and GPS coordinates were collected. Survey start and stop times were recorded.

Playback Calls

Playback calls for secretive waterbirds were used at points where suitable habitat, such as cattails, other emergent vegetation, open water, or a combination of these habitats constituted approximately 20% or more of the point count circle. After completion of the 5-minute point count, an audio tape consisting of 10-20 seconds of calls, alternated three times with 5 seconds of silence, for a total of 30-60 seconds of calls per species, was broadcast using a handheld tape recorder. Species calls were played in the following order: Least Bittern, Sora, Virginia Rail, American Bittern, and Pied-billed Grebe, with 30 seconds of silence between species. A one-minute listening period followed the series of calls. Recorders were held at about 1-1.5 m height, kept at maximum volume and directed towards suitable habitat for selected species. Recorded observations include individuals responding or seen responding to playback calls during intervals between calls. Habitat use and location of each individual were estimated and recorded in 25-m intervals within the point count radius.

Survey Conditions

Surveys were conducted between one-half hour before sunrise and 1340 h. Visits to each station or area were alternated between early (before 0900 h) and late (after 0900 h) morning. No person served as the primary observer at any individual point or area twice. Birds were not surveyed in winds > 24 mph (Beaufort scale 5), steady rain, or any other condition determined by the observer to hinder visual and/or aural detectability.

Results and Discussion

Point Counts

Bird abundance by ecotype (Tables 6, 7): The maximum number of breeding pairs recorded at each point from the two surveys and densities were determined for each ecotype vegetation classification. Of the 60 species recorded in dry mixed grass prairie, Western Meadowlark (109.0 pairs/100 ha), Grasshopper Sparrow (39.5 pairs/100 ha), and Red-winged Blackbird (32.3 pairs/100 ha) were the most common species recorded.

Twenty-two species were recorded in dry plains shrubland, of which the Western Meadowlark (126 pairs/100 ha), Lark Sparrow (37.5 pairs/100 ha), and Mourning Dove (18.2 pairs/100 ha) were most common.

The most common of the 58 species recorded in introduced grasslands were Red-winged Blackbird (72.5 pairs/100 ha), Western Meadowlark (60.4 pairs/100 ha), Bobolinks (23.1 pairs/100 ha), and Cliff Swallows (23.1 pairs/100 ha).

Of the 41 species recorded in restoration areas, American White Pelican (67.3 pairs/100ha), Western Meadowlark (60.2 pairs/100 ha), and Red-winged Blackbird (40.7 pairs/100 ha) were most common.

Of the 65 species recorded in wet meadows, the top species recorded were Red-winged Blackbird (126.8 pairs/100 ha), Common Yellowthroat (84.5 pairs/100 ha), Yellow Warbler (70.4 pairs/100 ha), and Mourning Dove (70.4 pairs/100 ha) were the most common species of the 25 recorded in mesic plains shrubland.

Red-winged Blackbird (119.0 pairs/100 ha), Common Yellowthroat (50.2 pairs/100 ha), and Marsh Wren (47.8 pairs/100 ha) were the most common in the wet meadow ecotype.

Of the 22 species that were recorded in forested wetlands, several species were common including Red-winged Blackbird (170.0 pairs/100 ha), Tree Swallow (106.0 pairs/100 ha), Willow Flycatchers (106.0 pairs/100 ha), Common Yellowthroat (63.8 pairs/100 ha), Double-crested Cormorant (63.8 pairs/100 ha), Mallard (63.8 pairs/100 ha), and Bobolink (63.8 pairs/100 ha).

The provisional land use areas had the highest species richness (69) with Red-winged Blackbird (102.0 pairs/100 ha), Cliff Swallow (75.5 pairs/100 ha), American White Pelican (55.2 pairs/100 ha), and Western Meadowlark (51.2 pairs/100 ha) being the most common.

A total of 19 species were recorded in the "other" ecotype. Western Meadowlark (85.1 pairs/100 ha), Red-winged Blackbird (21.3 pairs/100 ha), American Goldfinch (21.3 pairs/ha), and Canada Goose (21.3 pairs/ha) were the most common species.

Bird Abundance by Habitat Class: The maximum number of breeding pairs recorded at each point from the two surveys was determined for habitat classes. For discussion purposes,

habitat classes were grouped into grasslands (exotic, native, Sandhills, and prairie dog towns), wetlands (wet meadow, cattail, other emergent vegetation, open water, and willow), woodlands, human-influenced habitats (structure, road, crop, and out), and other.

The Western Meadowlark, Bobolink, and Red-winged Blackbird were the most commonly recorded species of the 105 bird species observed in grassland habitats (Table 8). Exotic grasslands had the highest species richness of the grassland habitats, with 53 species observed. Of the fifteen species observed in prairie dog colonies, Burrowing Owl and Western Meadowlark were the most common species recorded. Of the four grassland habitat types, the Lark Sparrow was recorded only in Sandhills grasslands.

Of the 62 species observed in wetland habitats, the Red-winged Blackbird, Common Yellowthroat, and Marsh Wren were the three most common (Table 9). The Yellow Warbler was consistently one of the top three highest counts in three wetland habitats (wet meadows, open water, and willow). Common Snipe, Red-winged Blackbird, and Yellow Warbler were the most common species in wet meadows while the Yellow Warbler, the American White Pelican, and the Cliff Swallow were the three dominant species found in open water habitat. Red-winged Blackbird, Yellow Warbler, and Common Yellowthroat were the three dominant species in willow habitat.

Yellow Warbler and the Mourning Dove had the two highest densities of breeding pairs in the woodlands while Common Nighthawk, Common Yellowthroat, and Eastern Kingbird tied for third highest with 22 breeding bird pairs each. A total of 38 species were observed in these habitats (Table 10).

Of the 24 species observed in human-influenced habitats, the Western Meadowlark, Red-winged Blackbird, and Marbled Godwit were the most common (Table 11). Killdeer and Canada Goose were the most common species in other types of habitat (Table 12).

Area Searches

The maximum number of breeding pairs (Tables 13, 14) and densities (Table 15) were determined for the wooded areas and prairie dog colonies. In wooded habitats 35 species were recorded. Species commonly recorded in the Sandhills riparian area were Mourning Doves (84.5 pairs/100 ha), Common Grackles (84.5 pairs/100 ha), and Red-winged Blackbirds (71.4 pairs/100 ha). The most common species recorded in Elm Creek were Common Grackles (328.6 pairs/100 ha), Mourning Doves (385.7 pairs/100 ha), and Eastern Kingbird (271.4 pairs/100 ha).

The smallest colony, Fantasy Island (13.0 ha) was non-existent in the 2003 field season. Instead, another prairie dog colony found by Lake 10 was called Lake 10. We recommend for Lake 10 to be measured to determine hectares. The following bird counts were recorded at Lake 10 including Western Meadowlark 5, Grasshopper Sparrow 4, Sharp-tailed Grouse 1, Willet 1, and Marbled Godwit 1. Of the 20 species observed on prairie dog colonies, Western Meadowlarks, Burrowing Owls, and Yellow-headed Blackbirds were the most common species recorded. Western Meadowlarks were consistently found in all three prairie dog

towns. Cowboys, the largest prairie dog colony (54.7 ha), had a high density of Western Meadowlarks (23.8 pairs/100 ha) and Burrowing (20.1 pairs/100 ha). Of all three prairie dog towns, Big City had the highest density of Western Meadowlarks (31.1 pairs/100 ha). A total of 94 species were recorded on the refuge. Western Meadowlarks and Red-winged Blackbirds were the most common species breeding at Lacreek NWR.

Playback Calls

Playback tapes were used at 74 points per round for marsh and water bird surveys. Birds responded to the playback calls at 44.6% (33/74) of the points. A total of 111 response calls were emitted from birds associated with the playback tape (American Bittern 40 calls, Pied-billed Grebe 30 calls, Virginia Rail 26 calls, Sora 10 calls, and Least Bittern 5 calls). responded most to the American Bittern playback call 39.6% (44/111 calls), which also corresponds to the largest number of breeding pairs of the five call back species recorded during the 2003 survey (35 breeding pairs) followed by Pied-billed Grebe which emitted 30 (25 breeding pairs) (Figure 1). On two occasions, a Sora was spotted, which responded strongly to the Sora playback tape. American Bitterns emitted the most response calls to conspecific calls (18/111 calls) and nonconspecific bird calls (22/111). Playback calls elicited responses from all 5 species on the tape. The playback tape may be an effective survey technique for eliciting responses from elusive species (e.g. least bittern, Virginia Rail, and Sora). In the 2003 survey, no Least Bittern breeding pairs were recorded. However, 5 Least Bitterns at different survey points responded to American Bittern and Pied-billed Grebe playback calls. In 2003 only three breeding pairs of Sora was recorded, however, during the marsh bird playback survey, Soras' emitted a total of 10 calls.

Nests

A total of 21 nests in different stages (e.g. depredated to nests with nestlings) were found on the refuge incidental to the surveys. The most common species whose nests were found included Mallard, Mourning Dove, and Red-winged Blackbird.

Acknowledgments

Thanks to Sarah Mackey for collecting much of the data and attending to final details, to Betty R. Euliss for much assistance throughout the study, and to Silka Finkbeiner for initial assistance. Sincere appreciation goes to the staff at Lacreek NWR for their comments on the bird life at the refuge, allowing us access to modern office amenities, and most of all their hospitality.

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Table 6. Counts of breeding birds according to ecotype recorded during point count surveys at Lacreek NWR in 2003.

Species	Vegetative ecotype ¹									Total
	DMP	DPS	IG	RA	MPS	WM	FW	PLU	O	
AGWT	0	0	1	0	0	1	0	0	0	2
AMAV	0	0	0	0	0	1	0	8	0	9
AMBI	3	0	13	1	1	7	1	9	0	35
AMCO	0	0	0	0	0	0	0	0	0	0
AMCR	1	0	0	4	0	0	0	5	0	10
AMGO	1	0	4	0	1	1	0	3	4	14
MAKE	0	0	0	0	1	0	0	1	0	2
AMRO	2	0	0	1	1	3	0	8	1	16
AWPE	5	0	10	38	0	1	0	84	0	138
BANS	1	0	2	0	0	1	0	0	0	4
BAOW	0	0	1	0	0	0	0	0	0	1
BARS	3	1	4	4	0	7	0	1	0	20
BASA	0	0	0	0	0	0	0	10	0	10
BCNH	0	0	0	0	0	1	0	0	0	1
BEKI	1	0	0	0	0	0	0	0	0	1
BEVI	2	0	1	0	2	3	0	6	0	14
BHCB	0	0	0	0	0	0	0	1	0	1
BHCO/F	11	8	4	3	1	9	2	1	3	42
BLJA	0	0	0	0	0	0	0	1	0	1
BLTE	1	1	2	0	0	16	0	5	0	25
BOBO	15	0	42	9	0	64	3	39	0	172
BRTH	0	0	3	1	0	0	0	5	0	9
BUOW	7	0	3	1	0	0	0	0	0	11
BWTE	1	0	11	4	1	27	1	14	0	59
CAGO	6	0	10	0	0	2	0	16	4	38
CEDW	0	0	0	0	1	0	0	1	0	2
CHSP	2	1	0	0	0	0	0	0	0	3
CLSW	3	0	42	10	0	27	2	115	0	199
COGR	7	0	1	2	2	26	1	10	0	49
CONI	2	1	1	0	0	1	0	0	0	5
COSN	6	0	25	3	2	23	0	7	0	66
COTE	0	0	0	0	0	2	0	2	0	4
COYE	14	0	40	6	6	104	3	42	0	215
DCCO	0	0	1	0	1	6	3	3	3	17
DICK	0	0	0	1	0	1	0	0	0	2
EABL	0	0	0	0	0	0	0	0	0	0
EAKI	14	0	23	9	0	31	0	13	1	91

Table 6 (continued). Counts of breeding birds according to ecotype recorded during point count survey at Lacreek NWR in 2003.

Species	Vegetative ecotype ¹									Total
	DMP	DPS	IG	RA	MPS	WM	FW	PLU	O	
EAME	8	0	15	2	0	29	1	8	1	64
EUST	0	0	0	0	0	0	0	1	0	1
FISP	2	0	1	0	0	0	0	0	0	3
FOTE	2	1	1	0	0	7	2	2	0	15
FRGO	0	0	0	0	0	0	0	4	0	4
GADW	0	0	0	0	0	0	0	0	0	0
GBHE	0	1	0	3	0	7	0	9	1	21
GHOW	0	0	1	0	0	2	0	0	0	3
GRCA	0	0	0	0	1	0	0	0	0	1
GREG	1	0	0	0	0	0	0	0	0	1
GRSP	88	7	15	14	0	18	0	11	1	154
GTGR	0	0	0	0	0	0	0	1	0	1
HAWO	0	0	0	1	2	0	0	0	0	3
HOFI	0	0	0	1	0	0	0	0	0	1
HOLA	1	5	0	3	0	0	0	2	0	11
HOWR	1	0	0	0	4	1	0	7	0	13
KILL	5	6	7	7	1	8	2	42	3	81
LARB	0	0	0	0	0	0	0	0	0	0
LASP	37	33	4	0	0	4	0	1	2	81
LBCU	10	1	0	0	0	0	0	0	0	11
LEFL	0	0	0	0	1	0	0	2	0	3
LOSH	1	0	5	4	0	2	0	2	0	14
MAGO	2	0	5	4	0	6	1	21	0	39
MALL	0	0	6	0	0	15	3	16	0	40
MAWR	0	0	24	3	0	99	0	25	0	151
MODO	25	16	11	7	5	24	2	24	1	115
NOFL	2	0	5	2	1	4	0	6	2	22
NOHA	8	2	4	1	0	14	0	8	1	38
NOPI	0	0	0	0	0	0	0	3	0	3
NOSH	0	0	1	0	0	5	0	0	0	6
NRWS	2	0	1	0	0	1	0	0	0	4
NSHO	0	0	1	0	0	0	0	2	0	3
OROR	3	0	5	0	2	12	0	3	0	25
PBGR	1	0	5	0	0	15	0	4	0	25
REDH	0	0	0	0	0	0	0	0	0	0
RHWO	0	0	1	0	0	3	0	1	0	5
RPHE	12	3	14	4	1	20	0	22	0	76
RTHA	1	0	0	0	0	0	0	0	0	.1

Table 6 (continued). Counts of breeding birds according to ecotype recorded during point count survey at Lacreek NWR in 2003.

Species	Vegetative ecotype ¹									Total
	DMP	DPS	IG	RA	MPS	WM	FW	PLU	O	
RUDO	0	0	0	0	0	0	0	1	0	1
RWBL	72	7	132	23	9	247	8	155	4	657
SASP	0	0	0	0	0	0	0	1	0	1
SAVS	0	0	0	0	0	6	0	1	0	7
SEWR	1	2	1	0	0	3	0	5	0	12
SNEG	0	0	0	0	0	1	0	0	0	1
SORA	1	0	1	0	0	1	0	0	0	3
SOSP	1	0	0	0	0	1	0	1	1	4
STGR	6	1	2	0	0	0	0	1	0	10
SWHA	0	0	0	1	0	0	0	1	0	2
SWSP	1	0	1	1	2	18	0	1	0	24
SWTH	0	0	0	0	0	0	0	0	0	0
TRES	4	0	11	7	2	13	5	8	0	50
TUVU	0	0	0	0	0	0	0	0	0	0
UPSA	31	11	9	5	0	17	1	3	0	77
VESP	2	2	0	0	0	0	0	0	0	4
VIRA	0	0	2	0	0	2	0	0	0	4
WAVI	0	0	1	0	0	2	0	1	0	4
WEKI	12	0	4	8	0	6	1	2	2	35
WEME	244	111	110	34	2	86	2	78	16	683
WIFC	0	0	0	0	0	0	0	1	0	1
WIFL	0	0	0	0	0	5	5	6	0	16
WILL	6	6	4	1	0	6	1	15	0	39
WIPH	1	0	0	2	0	5	0	0	0	8
WITU	1	0	1	0	0	0	0	0	0	2
WOTH	0	0	0	0	0	1	0	0	0	1
WRSP	0	0	0	0	0	1	0	1	0	2
YBCU	0	0	0	0	0	0	0	0	0	0
YHBL	3		38	7	0	59	0	56	0	163
YSFL	0	0	0	0	0	0	0	0	0	0
YWAR	3	0	12	3	5	29	2	19	2	75
Total	709	227	705	245	58	1170	52	985	53	4,204
Number of species	60	22	58	41	25	65	22	69	19	

1 DMP=Dry mixed prairie; DPS=Dry plains shrubland; IG=Introduced grassland; RA=Restoration area; MPS= Mesic plains shrubland; WM=Wet meadow; FW=Forested wetland; PLU=Provisional Land use; O=other.

Table 7. Breeding pair densities (per 100 ha) by ecotype at Lacreek NWR in July 2003.

Vegetative ecotype¹

Species	DMP	DPS	IG	RA	MPS	WM	FW	PLU	O
AGWT	0	0	0.55	0	0	0.48	0	0	0
AMAV	0	0	0	0	0	0.48	0	5.25	0
AMBI	1.35	0	7.14	1.77	14.08	3.38	21.3	5.91	0
AMCO	0	0	0	0	0	0	0	0	0
AMCR	0.45	0	0	7.08	0	0	0	3.28	0
AMGO	0.45	0	2.2	0	14.08	0.48	0	1.97	21.3
AMKE	0	0	0	0	14.08	0	0	0.66	0
AMRO	0.9	0	0	1.77	14.08	1.45	0	5.25	5.32
AWPE	2.24	0	5.49	67.3	0	0.48	0	55.2	0
BANS	0.45	0	1.1	0	0	0.48	0	0	0
BAOW	0	0	0.55	0	0	0	0	0	0
BARS	1.35	1.14	2.2	7.08	0	3.38	0	0.66	0
BASA	0	0	0	0	0	0	0	6.57	0
BCNH	0	0	0	0	0	0.48	0	0	0
BEKI	0.45	0	0	0	0	0	0	0	0
BEVI	0.9	0	0.55	0	28.17	1.45	0	3.94	0
BHCB	0	0	0	0	0	0	0	0.66	0
BHCO/F	4.93	9.1	2.2	5.31	14.08	4.34	42.6	0.66	16
BLJA	0	0	0	0	0	0	0	0.66	0
BLTE	0.45	1.14	1.1	0	0	7.72	0	3.28	0
BOBO	6.73	0	23.1	15.9	0	30.9	63.8	25.6	0
BRTH	0	0	1.65	1.77	0	0	0	3.28	0
BUOW	3.14	0	1.65	1.77	0	0	0	0	0
BWTE	0.45	0	6.04	7.08	14.08	13	21.3	9.19	0
CAGO	2.69	0	5.49	0	0	0.97	0	10.5	21.3
CEDW	0	0	0	0	14.08	0	0	0.66	0
CHSP	0.9	1.14	0	0	0	0	0	0	0
CLSW	1.35	0	23.1	17.7	0	13	42.6	75.5	0
COGR	3.14	0	0.55	3.54	28.17	12.5	21.3	6.57	0
CONI	0.9	1.14	0.55	0	0	0.48	0	0	0
COSN	2.69	0	13.7	5.31	28.17	11.1	0	4.6	0
COTE	0	0	0	0	0	0.97	0	1.31	0
COYE	6.28	0	22	10.6	84.51	50.2	63.8	27.6	0
DCCO	0	0	0.55	0	14.08	2.9	63.8	1.97	16
DICK	0	0	0	1.77	0	0.48	0	0	0

Table 7 (continued). Breeding pair densities (per 100 ha) by ecotype at Lacreek NWR in 2003.

Vegetative ecotype¹

Species	DMP	DPS	IG	RA	MPS	WM	FW	PLU	O
EABL	0	0	0	0	0	0	0	0	0
EAKI	6.28	0	12.6	15.9	0	15	0	8.54	5.32
EAME	3.59	0	8.24	3.54	0	14	21.3	5.25	5.32
EUST	0	0	0	0	0	0	0	0.66	0
FISP	0.9	0	0.55	0	0	0	0	0	0
FOTE	0.9	1.14	0.55	0	0	3.38	42.6	1.31	0
FRGO	0	0	0	0	0	0	0	2.63	0
GADW	0	0	0	0	0	0	0	0	0
GBHE	0	1.14	0	5.31	0	3.38	0	0	5.32
GHOW	0	0	0.55	0	0	0.97	0	0	0
GRCA	0	0	0	0	14.08	0	0	0	0
GREG	0.45	0	0	0	0	0	0	0	0
GRSP	39.5	7.96	8.24	24.8	0	8.69	0	7.22	5.32
GTGR	0	0	0	0	0	0	0	0.66	0
HAWO	0	0	0	1.77	28.17	0	0	0	0
HOFI	0	0	0	1.77	0	0	0	0	0
HOLA	0.45	5.69	0	5.31	0	0	0	1.31	0
HOWR	0.45	0	0	0	56.34	0.48	0	4.6	0
KILL	2.24	6.83	3.84	12.4	14.08	3.86	42.6	27.6	16
LARB	0	0	0	0	0	0	0	0	0
LASP	16.6	37.5	2.2	0	0	1.93	0	0.66	10.6
LBCU	4.49	1.14	0	0	0	0	0	0	0
LEFL	0	0	0	0	14.08	0	0	1.31	0
LOSH	0.45	0	2.75	7.08	0	0.97	0	1.31	0
MAGO	0.9	0	2.75	7.08	0	2.9	21.3	13.8	0
MALL	0	0	3.29	0	0	7.24	63.8	10.5	0
MAWR	0	0	13.2	5.31	0	47.8	0	16.4	0
MODO	11.2	18.2	6.04	12.4	70.42	11.6	42.6	15.8	5.32
NOFL	0.9	0	2.75	3.54	14.08	1.93	0	3.94	10.6
NOHA	3.59	2.28	2.2	1.77	0	6.76	0	5.25	5.32
NOPI	0	0	0	0	0	0	0	1.97	0
NOSH	0	0	0.55	0	0	2.41	0	0	0
NRWS	0.9	0	0.55	0	0	0.48	0	0	0
NSHO	0	0	0.55	0	0	0	0	1.31	0
OROR	1.35	0	2.75	0	28.17	5.79	0	1.97	0
PBGR	0.45	0	2.75	0	0	7.24	0	2.63	-0

Table 7 (continued). Breeding pair densities (per 100 ha) by ecotype at Lacreek NWR in 2003.

Species	Vegetative ecotype ¹								
	DMP	DPS	IG	RA	MPS	WM	FW	PLU	O
REDH	0	0	0	0	0	0	0	0	0
RHWO	0	0	0.55	0	0	1.45	0	0.66	0
RPHE	5.38	3.41	7.69	7.08	14.08	9.65	0	14.4	0
RTHA	0.45	0	0	0	0	0	0	0	0
RUDO	0	0	0	0	0	0	0	0.66	0
RWBL	32.3	7.96	72.5	40.7	126.8	119	170	102	21.3
SASP	0	0	0	0	0	0	0	0.66	0
SAVS	0	0	0	0	0	2.9	0	0.66	0
SEWR	0.45	2.28	0.55	0	0	1.45	0	3.28	0
SNEG	0	0	0	0	0	0.48	0	0	0
SORA	0.45	0	0.55	0	0	0.48	0	0	0
SOSP	0.45	0	0	0	0	0.48	0	0.66	5.32
STGR	2.69	1.14	1.1	0	0	0	0	0.66	0
SWHA	0	0	0	1.77	0	0	0	0.66	0
SWSP	0.45	0	0.55	1.77	28.17	8.69	0	0.66	0
SWTH	0	0	0	0	0	0	0	0	0
TRES	1.79	0	6.04	12.4	28.17	6.27	106	5.25	0
TUVU	0	0	0	0	0	0	0	0	0
UPSA	13.9	12.5	4.94	8.85	0	8.2	21.3	1.97	0
VESP	0.9	2.28	0	0	0	0	0	0	0
VIRA	0	0	1.1	0	0	0.97	0	0	0
WAVI	0	0	0.55	0	0	0.97	0	0.66	0
WEKI	5.38	0	2.2	14.2	0	2.9	21.3	1.31	10.6
WEME	109	126	60.4	60.2	28.17	41.5	42.6	51.2	85.1
WIFC	0	0	0	0	0	0	0	0.66	0
WIFL	0	0	0	0	0	2.41	106	3.94	0
WILL	2.69	6.83	2.2	1.77	0	2.9	21.3	9.85	0
WIPH	0.45	0	0	3.54	0	2.41	0	0	0
WITU	0.45	0	0.55	0	0	0	0	0	0
WODU	0	0	0	0	0	0	0	0	0
WOTH	0	0	0	0	0	0.48	0	0	0
WRSP	0	0	0	0	0	0.48	0	0.66	0
YBCU	0	0	0	0	0	0	0	0	0
YHBL	1.35	0	20.9	12.4	0	28.5	0	36.8	0
YSFL	0	0	0	0	0	0	0	0	0
YWAR	1.35	0	6.59	5.31	70.42	14	42.6	12.5	10.6

Table 8. Counts of indicated breeding bird recorded during point count surveys in grassland habitats at Lacreek NWR in 2003.

Species	Grassland Habitat Type				Total/species
	Native Grass	Exotic Grass	Sandhills Grass	PD Colony	
AMBI	0	0	0	0	0
AMCR	0	5	2	2	9
AMGO	1	7	1	0	9
AMKE	0	0	0	0	0
AMRO	0	3	0	0	3
AWPE	0	11	0	0	11
BANS	0	2	1	0	3
BARS	0	17	5	1	23
BHCO/F	0	19	16	0	35
BLTE	0	1	2	0	3
BOBO	0	168	0	1	169
BRTH	0	0	0	0	0
BUOW	0	2	0	9	11
BWTE	0	3	0	0	3
CAGO	0	13	0	2	15
CHSP	0	0	3	0	3
CLSW	0	106	1	0	107
COGR	0	8	0	7	15
CONI	0	1	2	0	3
COSN	0	24	3	0	27
COYE	0	7	6	0	13
DCCO	0	7	0	0	7
DICK	0	0	0	0	0
EAKI	0	44	6	0	50
EAME	0	57	1	0	58
FISP	0	0	3	0	3
FOTE	0	1	1	0	2
GHOW	0	0	0	0	0
GBHE	0	8	1	0	9
GRSP	0	52	90	1	143
HOLA	0	1	6	0	7
KILL	0	20	2	2	24

Table 8 (continued). Counts of indicated breeding bird recorded during point count surveys in grassland habitats at Lacreek NWR in 2003.

Species	Grassland Habitat Type				Total/Species
	Native Grass	Exotic Grass	Sandhills Grass	PD Colony	
LARB	0	0	0	0	0
LASP	0	0	82	0	82
LBCU	0	4	7	0	11
LOSH	0	5	0	1	6
MAGO	0	12	0	1	13
MALL	0	4	0	0	4
MODO	0	19	41	0	60
NOFL	0	3	0	1	4
NOHA	0	23	6	0	29
NOSH	0	2	0	0	2
NRWS	0	1	0	0	1
OROR	0	3	0	0	3
RHWO	0	2	0	0	2
RPHE	0	44	12	0	56
RTHA	0	2	0	0	2
RWBL	0	130	27	1	158
SASP	0	1	0	0	1
SAVS	0	8	0	0	8
SEWR	0	1	2	0	3
SOSP	0	0	2	0	2
STGR	0	5	6	0	11
SWHA	0	2	0	0	2
TRES	0	20	1	0	21
TUVU	0	2	0	0	2
UPSA	0	42	34	0	76
VESP	0	0	5	0	5
WEKI	0	19	5	0	24
WEME	0	252	362	10	624
WILL	0	9	5	1	15
WIPH	0	4	0	0	4
WITH	0	2	0	0	2
YHBL	0	14	1	5	20
YSFL	0	1	0	0	1
Total	1	680	226.5	20	2,019
Number species	1	53	36	15	105

Table 9. Counts of indicated breeding bird pairs recorded during point count surveys in wetland habitats at Lacreek NWR in 2003.

Species	Wetland Habitat Type					Total
	Wet Meadow	Cattail	Other Emergent Vegetation	Open Water	Willow	
AGWT	1	0	0	0	0	1
AMAV	3	2	2	3	0	10
AMBI	19	33	0	1	1	54
AMCO	0	0	1	0	0	1
AMRO	0	0	0	0	6	6
AWPE	7	43	0	96	0	146
BARS	2	1	0	0	0	3
BCNH	0	1	0	0	0	1
BEVI	0	0	0	0	6	6
BHCO/M	1	0	0	0	1	2
BLTE	3	4	0	15	0	22
BOBO	19	1	3	1	2	26
BWTE	11	11	4	26	0	52
CAGO	5	2	0	3	0	10
CLSW	17	4	3	48	20	92
COGR	4	0	0	0	4	8
COSN	30	3	4	0	5	42
COTE	0	1	2	1	0	4
COYE	13	91	28	4	21	157
DCCO	2	3	0	2	10	7
DICK	1	0	0	0	0	1
EAKI	2	3	0	0	10	15
EAME	3	0	0	0	0	3
FOTE	2	0	0	12	0	14
GBHE	1	2	2	6	0	11
GREG	4	0	0	0	0	4
GRSP	6	0	0	0	1	7
HOWR	0	0	0	0	1	5

Species	Wetland Habitat Type					Total
	Wet Meadow	Cattail	Other Emergent Vegetation	Open Water	Willow	
KILL	3	7	5	23	0	38
MAGO	1	1	0	3	0	5
MALL	4	1	4	25	2	36
MAWR	18	112	22	0	0	152
MODO	6	0	0	0	2	8
NOHA	10	2	0	0	0	12
NOPI	0	0	0	3	0	3
NRWS	1	0	0	1	0	2
NSHO	0	1	0	4	0	5
OROR	0	0	0	0	4	4
PBGR	1	13	4	7	0	25
RPHE	7	4	0	0	1	12
RUDU	0	0	0	1	0	1
RWBL	74	315	83	5	30	507
SASP	1	0	0	0	0	1
SEWR	1	3	0	0	0	4
SNEG	0	0	0	1	0	1
SORA	0	2	0	0	0	2
SOSP	0	0	0	0	1	1
SWSP	3	18	3	0	0	24
TRES	5	5	2	1	2	15
TUVU	0	0	0	0	1	1
UPSA	3	0	0	0	0	3
VIRA	0	0	1	0	0	1
WAVI	0	0	0	0	4	4
WEKI	1	0	0	0	0	1
WEME	20	1	2	0	1	24
WIFL	0	0	0	0	2	2

Wetland Habitat Type						
Species	Wet Meadow	Cattail	Other Emergent Vegetation	Open Water	Willow	Total
WILL	5	0	0	11	2	18
WIPH	0	0	1	1	0	2
WODU	0	0	0	1	0	1
WRSP	0	0	1	1	0	1
YHBL	2	97	17	0	20	136
YWAR	43	30	22	30	29	154
Total	365	817	216	336	189	1,923
Number species.	43	30	22	30	29	62

Table 10. Counts of breeding bird pairs recorded during point count surveys in woodland habitats at Lacreek NWR in 2003.

Habitat	
Species	Woodland
AMCR	6
AMGO	10
AMKE	2
AMRO	13
BAOR	1
BARS	2
BCCH	1
BEKI	1
BEVI	8
BHCO/F	2
BLJA	1
BRTH	7
CEWR	2
CLSW	7
COGR	3
CONI	22
COYE	22
EAKI	22
EAME	2
EUST	1
GHOW	3
HAWO	3
HOWR	13
LASP	1
LOSH	6
MAWR	1
MODO	52
NOFL	17
OROR	20
RHWO	1
RWBL	22
SOSP	1
TRES	21
WAVI	3
WEKI	9
WEME	17
WIFL	9
YWAR	63
Total	397
Number species	38

Table 11. Counts of breeding bird pairs recorded during point count surveys in human-influenced habitat at Lacreek NWR in 2003.

Human-influenced Habitat Type				
Species	Structures	Road	Crop	Total
AMGO	0	3	0	3
AMRO	0	1	0	1
BHCO/F	3	0	0	3
BOBO	0	0	1	1
CLSW	13	0	3	16
COGR	0	1	0	1
EAKI	2	0	1	3
EAME	0	1	0	1
GRSP	0	0	1	1
HOLA	0	0	4	4
KILL	1	7	3	11
LASP	0	1	0	1
LOSH	0	3	0	3
MAGO	1	0	17	18
RHWO	1	0	0	1
RPHE	0	1	4	5
RTHA	0	0	0	0
RWBL	13	0	17	30
STGR	0	0	0	0
UPSA	0	0	0	0
VESP	0	0	0	0
WEKI	1	0	0	1
WEME	15	2	9	26
YWAR	0	0	0	0
Total Number	50	20	60	130
Number species	9	9	10	24

Table 12. Counts of breeding bird pairs recorded at Lacreek NWR in 2003

Habitat type	
Species	Other ¹
AMAV	1
BWTE	2
CLSW	1
COYE	3
CAGO	9
DICK	1
FRGU	3
KILL	18
MAWR	1
RWBL	4
WEME	1
WILL	4
WIPH	1
YHBL	2
Total	51
Number species	62

¹ Exposed soil such as mudflats, excavated holes or bare cultivated soil. This includes four points that contained dense sweet clover, three points with miscellaneous wooden structures (windmills or large posts), and one point each containing a set of bee boxes, a large pipe, and a group of old cars.