

North Dakota Colonial and Semi-colonial Waterbird Inventory 2014 - 2015

Final Report

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Bird 
Conservancy
of the Rockies

Connecting People, Birds and Land

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Bird Conservancy of the Rockies
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The Bird Conservancy of the Rockies

Connecting people, birds and land

Mission: Conserving birds and their habitats through science, education and land stewardship

Vision: Native bird populations are sustained in healthy ecosystems

Bird Conservancy of the Rockies conserves birds and their habitats through an integrated approach of science, education and land stewardship. Our work radiates from the Rockies to the Great Plains, Mexico and beyond. Our mission is advanced through sound science, achieved through empowering people, realized through stewardship and sustained through partnerships. Together, we are improving native bird populations, the land and the lives of people.

Core Values:

1. **Science** provides the foundation for effective bird conservation.
2. **Education** is critical to the success of bird conservation.
3. **Stewardship** of birds and their habitats is a shared responsibility.

Goals

1. Guide conservation action where it is needed most by conducting scientifically rigorous monitoring and research on birds and their habitats within the context of their full annual cycle.
2. Inspire conservation action in people by developing relationships through community outreach and science-based, experiential education programs.
3. Contribute to bird population viability and help sustain working lands by partnering with landowners and managers to enhance wildlife habitat.
4. Promote conservation and inform land management decisions by disseminating scientific knowledge and developing tools and recommendations.

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EXECUTIVE SUMMARY

Colonial and semi-colonial waterbirds prefer to breed in high-density groups in a relatively small number of locations, favoring predator-free habitats such as flooded timber, islands, and marsh reedbeds. However, this 'all eggs in one basket' breeding strategy makes these species vulnerable to natural or manmade catastrophic events that could wipe out a large portion of the breeding population. In addition, populations have been reduced because of land-use changes leading to wetland loss, bioaccumulation of toxins, and degradation of wintering habitat. Thus many of these species are the focus of conservation efforts throughout North America.

At least 25 species of colonial and semi-colonial waterbirds breed in North Dakota, including herons, night-herons, egrets, grebes, gulls, terns, ibis, American White Pelican, Double-crested Cormorant, and several shorebird species. Identifying and monitoring breeding colonies are the primary tools for tracking populations. Yet, no systematic inventories or monitoring of waterbird colonies are conducted in North Dakota, impeding the ability of conservationists to manage this vulnerable group of birds. Therefore, the objective of the North Dakota Colonial and Semi-Colonial Waterbird Inventory and Monitoring Project was to compile an up-to-date list or inventory of waterbird breeding sites.

To accomplish this, 441 sites were surveyed for breeding waterbirds during the summers of 2014 - 2015. Of these, 322 (73%) had confirmed breeding by waterbirds during at least one year, all but 13 were located East River. While conducting the surveys, field technicians also collected data on colonial waterbird breeding population size at each site. The majority of sites had fewer than 50 pairs or had just one breeding waterbird species. However, 32 sites were identified as being key sites for breeding waterbird colonies, defined as having more than 500 total breeding pairs or more than five breeding species.

Of 25 waterbird species targeted during surveys, breeding was confirmed for 21 species, individuals of the other four species were seen in appropriate habitat but breeding was not confirmed. American White Pelicans and Franklin's Gulls were the most abundant nesting colonial waterbirds in the state with at least 21,000 breeding pairs of each. Double-crested Cormorants were distributed in the greatest number of colonies (162) of any species. In West River, the most common breeding waterbirds were Great Blue Herons and Eared Grebes. The inventory and associated population information produced from this project will provide baseline data for future monitoring efforts, as well as contribute to regional and national waterbird conservation efforts.

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INTRODUCTION

North Dakota hosts at least 25 species of breeding colonial and semi-colonial waterbird species. Some of these species are locally rare or uncommon in North Dakota and therefore important from a state natural heritage perspective. Others are fairly common within the state but are important from a global perspective as they comprise core portions of the worldwide populations of these species (Beyersbergen *et al.* 2004). Colonial and semi-colonial waterbirds concentrate during the nesting season, in part due to their congregatory behavior, but also because of their specialized habitat requirements. Their colonial habits make them especially vulnerable to severe weather events, disturbance, pollution, changes in land use, and other factors that affect the availability and suitability of nesting and brood-rearing sites (Kushlan *et al.* 2002). As a result, these bird groups have become the focus of a variety of conservation and management efforts at a national and regional scale (Brown *et al.* 2001, Kushlan *et al.* 2002, Beyersbergen *et al.* 2004).

Collecting basic data on colony locations and subsequent monitoring of colony status are the two critical elements of an efficient and effective conservation strategy (Steinkamp *et al.* 2003). Except for annual surveys of Least Terns and Piping Plovers nesting along the Missouri River, no systematic state-wide inventories or monitoring efforts of colonial or semi-colonial waterbirds are conducted in North Dakota (Hagen *et al.* 2005), impeding the ability of conservationists to manage this vulnerable group of birds. Therefore, the purpose of the North Dakota Colonial and Semi-Colonial Waterbird Inventory Project was to compile an up-to-date list of North Dakota waterbird breeding sites. The inventory focused primarily on the largest and most important colony sites in the state, especially those with colonial and semi-colonial waterbird species on the state's list of Species of Conservation Priority, with a secondary emphasis on important sites for more common and widespread waterbird species in the state. At all sites targeted for inventory, population information was collected on all waterbirds using the sites. The resulting inventory and associated population information will provide baseline data for future monitoring efforts, as well as contribute to regional and national waterbird conservation efforts.

METHODS

SPECIES

Species targeted during this project included all colonial and semi-colonial waterbird species that breed in North Dakota (Appendix A). These included heron, night-heron, egret, grebe, gull, and tern species, White-faced Ibis, American White Pelican, Double-crested Cormorant, and three shorebird species. Scientific names of all species are listed in Appendix A.

SITE SELECTION FOR SURVEYS

We compiled a list of potential colonial waterbird breeding sites from historical records databases, primarily the North Dakota Natural Heritage and Fish and Game Department databases, and by soliciting information from federal, state, tribal and university biologists and private citizens. The final list contained 183 sites.

SITE SURVEYS

All historical sites with sufficiently detailed location data were visited at least once during the 2014 - 2015 field seasons. During each field season we added new sites that were encountered incidentally or reported by others. In addition, during April before leaf out, we conducted aerial surveys (Table 1). Aerial surveys provide an efficient means of searching for waterbird colonies (Henny *et al.* 1972, Rodgers *et al.* 1995, Kingsford *et al.* 2008). These surveys were conducted in a single-engine Piper Cub airplane flying 100-200 feet above the canopy at approximately 120 mph. Number of nests per colony was estimated during the flight. Most of these colonies were not visited again on the ground.

Table 1. Dates and routes of colonial waterbird and eagle nest aerial surveys in North Dakota during spring 2015.

Date	Area Surveyed
4/23/2015	Missouri River and lakes between Huff and the MT border, Yellowstone River, lower ~20 miles of Little Missouri River
4/24/2015	Devils Lake area
4/28/2015	Turtle Mountains

For each site targeted to be visited, locations of possible suitable habitat and access points were identified from the North Dakota Atlas and Gazetteer (DeLorme 2013), or directions from previous observers. If the entire wetland or wetlands could not be viewed from one location or from roads, observers walked or canoed to survey all appropriate habitat. Motorized fishing boats were used to survey Alice, Irvine, and Pelican Lakes in Benson County.

For each visited colony site, we recorded both site-specific and species-specific information. Site-specific information was collected, regardless of whether any waterbirds were present. At the site, we recorded land use within 1/3 mile of the colony centroid, observed or potential threats to the colony, wetland type (natural lake or pond, large impoundment, stock pond, river or creek, or marsh), and colony location (vegetated island, denuded island, peninsula, flooded trees, open water, mainland shoreline or riverbank, or within marsh vegetation). For each colonial waterbird species present, we tried to confirm breeding by noting any of the following behaviors: carrying nesting material, carrying food, adults sitting on or at nests, chicks visible in nests, and

for precocial species, precocial chicks accompanying adults. When nests were found, surveyors recorded the nesting substrate(s) - ground, tree, or marsh), and counted number of breeding pairs of each species, as described below.

At the end of the project, we classified all visited sites as active, non-active, unknown, or no evidence of breeding (Table 2).

Table 2. Definitions of status categories of surveyed sites.

Status Category	Definition
Active colony	Breeding confirmed (nest, prefledged chick) for at least one targeted species.
Non-active colony	Old nests present but not used by waterbirds in current season.
Unknown	Could not definitively determine status because of incomplete views, or species present and possibly breeding but breeding not confirmed.
No evidence of breeding	Determined that no waterbirds breed at site because of one of following reasons: habitat not suitable; no individuals of targeted species present; species present but behavior did not indicate breeding at that site plus no nests or prefledged chicks found.

BREEDING POPULATION COUNTS

If breeding was confirmed for a species at a site, counts of breeding populations were recorded on separate forms. Shorebirds were noted whenever encountered, but were not inventoried systematically because these species require specialized survey techniques. When possible, we counted from the colony perimeter using binoculars or spotting scopes. If we needed to enter, we limited time in the colony to less than 30 minutes and entered only under favorable weather conditions (not raining, air temperature between 70°–85° F). To count the breeding population, we used the protocol that would cause the least disturbance. Counting protocols followed those of Steinkamp *et al.* (2003), details below and in Appendix I. At most colonies, two observers counted simultaneously and their counts were averaged. If the two counts differed by more than 10%, both observers recounted. However, at very large multi-species colonies, only one observer counted a particular species or transect to minimize in-colony time and disturbance to nesting birds.

Total nest count. A total count of all active nests is the most accurate measurement of the number of breeding pairs in a colony (Steinkamp *et al.* 2003). Thus, active nests was the parameter we measured whenever possible. An active nest was any nest with attending adults, eggs, chicks, or fresh fecal matter. If the contents of a nest was not visible (e.g., nest high up in tree) and no adult was at the nest, we considered the nest

active if it was approximately the same size and condition as other active nests in the colony. Total nests counts were conducted at all colonies with tree-nesting species, i.e., those with any heron, egret, night-heron, or raptor species, or Double-crested Cormorants, as well as at colonies of open-water nesting Eared Grebes. We also counted all nests of ground-nesting gull and tern species in colonies with $< \sim 100$ nests and island-nesting shorebirds. We attempted to count all nests in marsh-nesting grebe and tern colonies, but in the cases of large colony size or dense vegetation, we counted broods (see below).

For colonies whose nests were in leafless trees, observers positioned themselves so that the entire colony could be counted from one spot to avoid double-counting nests and from outside the perimeter to avoid undue disturbance. Because many Great Blue Heron nests were in live cottonwood (*Populus deltoides*) trees, every effort was made to visit the colony in early spring before leaf-out so that the nests could be counted from outside the perimeter.

If ground nest colonies needed to be entered, each ground nest was marked with a small dot of spray paint as it was counted to avoid double-counting or missing nests. Pelican colonies were not entered because they are extremely sensitive to human presence (Evans and Knopf 1993); nests were counted from aerial photographs. In marshes, we traveled all open water channels to search for nests and watch for adult behavioral cues to nest locations.

Brood count. Two groups of target species had precocial young – grebes and shorebirds. The nests of these species usually were hard to find or access, and counting broods as they accompany their parents often is a more accurate parameter for assessing the size of the breeding population. Grebe broods were surveyed by systematically searching open water patches and channels. If shorebirds were present, we searched for chicks along shorelines and islands. In grebe colonies, we often found both nests and broods during the same visit. The counts of these two parameters were added together to obtain an estimate of the total breeding population. However, because Eared and Western grebes are extremely common, we only documented colonies of these species with greater than 50 adults, unless other colonial waterbird species were present.

Adult flush count. Number of adults was the parameter used as measure of breeding population size for Laridae species' colonies $> \sim 100$ nests and marsh colonies of reedbed-nesting herons, night-herons, egrets, or White-faced Ibis. To estimate the number of adults, colonies were approached until adults flushed off nests. Observers quickly counted the number of adults before birds begin to settle back down or fly away, using a rapid flock size estimation technique (Bibby et al. 1992). We assumed that every bird flushed was a breeding adult in that colony and that both parents were present. Thus the total number of flushed adults was divided by two to estimate the number of breeding pairs. These assumptions most likely are never true; limited studies have shown that the divisor is less than two (i.e., both parents of every nest are not present) but the exact number is highly variable, depending on site, species, and

nesting stage (Steinkamp et al. 2003). Because we lacked this information in surveyed colonies, we used the both-parents-present assumption to produce a more conservative estimate of number of breeding pairs. When flush counts were employed, breeding status was not considered confirmed unless we found at least one active nest or preflledged chick.

Perimeter counts of large ground-nesting colonies and flush counts of large adult aggregations tend to be less accurate because of large numbers counted in a short period of time (Steinkamp et al. 2003). Results from these counts are indicated in this report by the '~' symbol.

RESULTS and DISCUSSION

SITES

During the 2014-2015 field seasons, 441 sites were visited either by Bird Conservancy field technicians or by USFWS staff (Figure 1). Of the visited sites, 322 (73%) had confirmed breeding by at least one species, 8 (2%) had old nests in an inactive colony, 96 (22%) had no evidence of breeding by any of the targeted species, and at 15 (3%) sites, we could not determine or confirm whether any species were breeding.

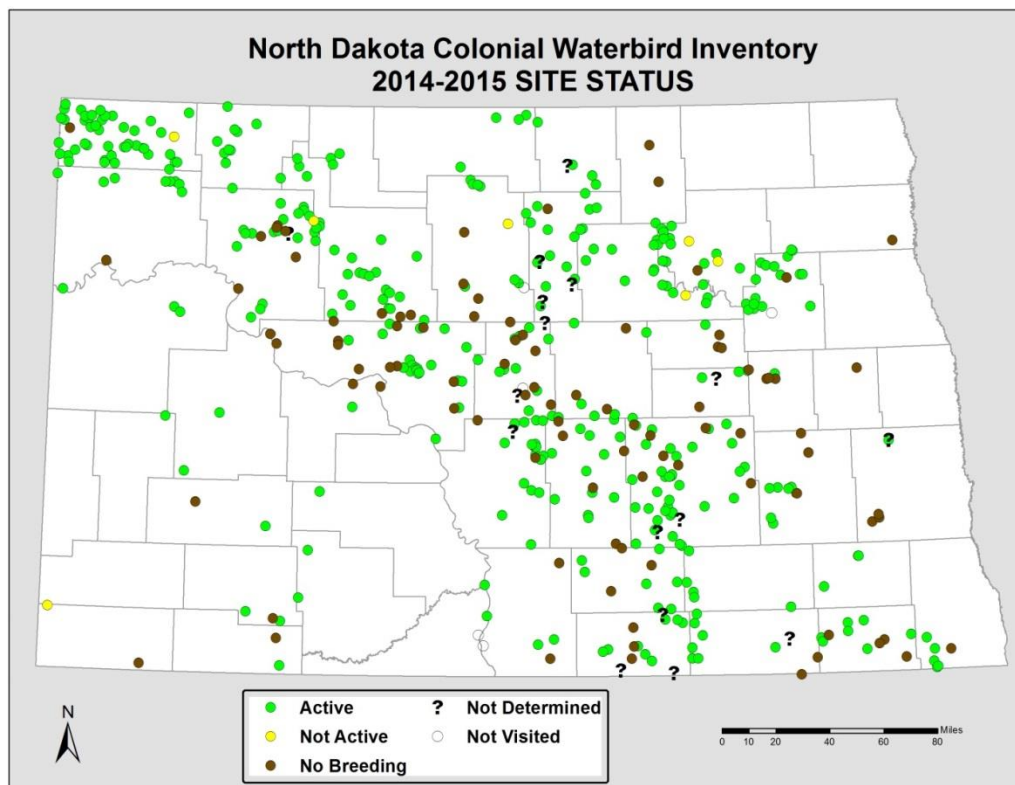


Figure 1. Status of colonial waterbird sites in North Dakota during 2014 and 2015.

Total number of waterbird species confirmed breeding at a site ranged from 1 to 13 species, while total number of nests of all species combined ranged from 1 to more than 17,300 nests per colony (Figures 2, 3). The majority of sites had fewer than 50 pairs or had just one breeding waterbird species (Figure 2).

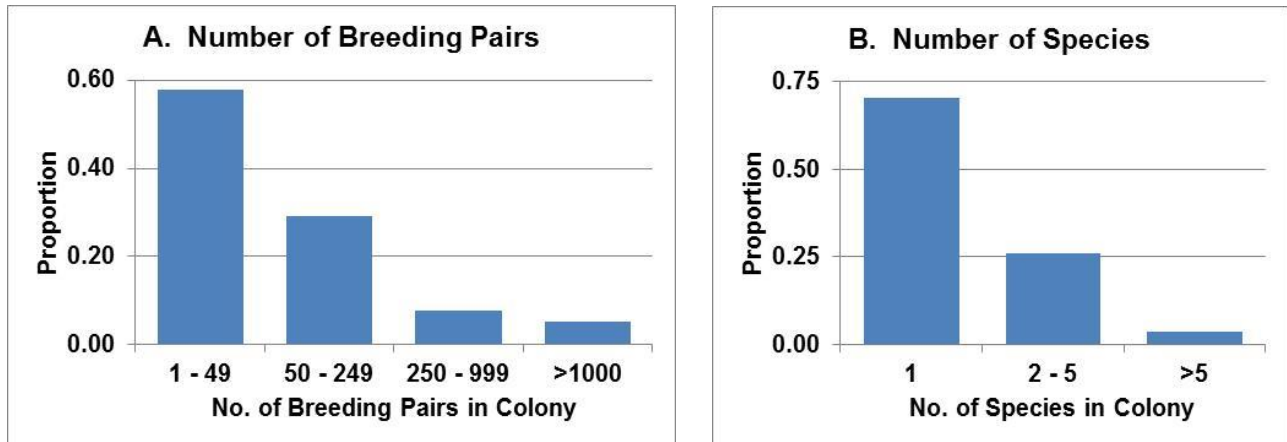


Figure 2. Frequency distributions of North Dakota colony sizes 2014 - 2015. Figure A: Proportion of all colonies out of total number of breeding pairs. Figure B: Proportion of all colonies per category out of total number of species.

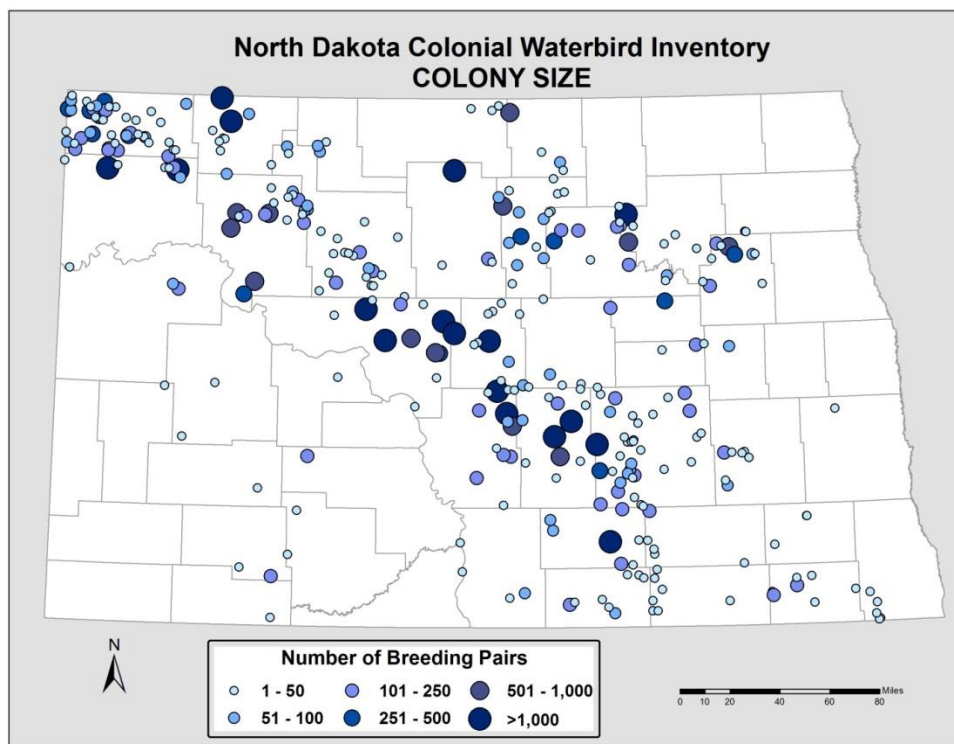


Figure 3. Mapped distribution of North Dakota's active breeding waterbird colonies by size during 2014 and 2015.

Thirty-two colonies had at least 500 breeding pairs or five confirmed breeding waterbird species (Figure 4, Appendix 2). The largest according to our counts, was Chase Lake, with over 17,000 pelican nests. At least five other colonial waterbird species breed at the lake, but these were not counted. Thus the Chase Lake colony total may be several hundred pairs higher than reported. Three large Franklin’s Gull colonies (Beaver Lake, Burke County WRA, and J. Clark Salyer NWR) also are likely much larger than our counts indicated. We documented 300 – 1,000 gulls up in the air at any one time at these colonies; however total number of breeding pairs probably were in the tens of thousands (Mark Clark, *pers. comm.*), making these three colonies the largest in the state. See the Species Accounts for American White Pelican and Franklin’s Gull for details on the difficulties of accurately determining colony sizes of these species.

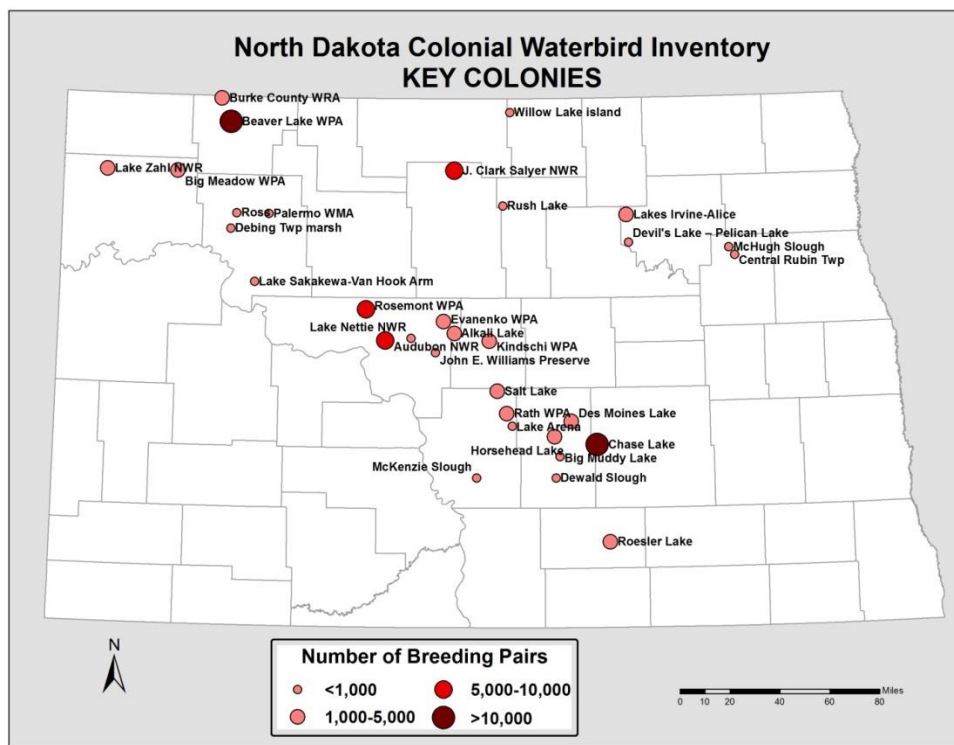


Figure 4. Distribution of North Dakota’s 2014-2015 key colonial waterbird sites, defined as at least 500 breeding pairs or at least five confirmed breeding species.

A key element in the conservation of waterbird colonies is ownership. Of the 32 key colonies, 16 were located on federal public land, six on state public land, seven on private land, and one on a TNC preserve. An additional two colonies were on private land that straddled federal public land. Although colonies on private land generally are just as ‘safe’ as those on public land, they can be more difficult to access, generally do not receive visits by biologists for other reasons, and are more vulnerable to land use changes. Thus special monitoring and outreach efforts may be needed for key colonies

on private land. In addition, many key multi-species colonies located on land managed by federal or state natural resource agencies, are managed for multiple-use, especially for boaters, anglers, and hunters. More information needs to be collected on the effects of human disturbance at these colonies, especially as Baker *et al.* (2015) felt that disturbance by boaters can play a role in nest and colony abandonment.

SPECIES

Of 25 waterbird species targeted during surveys, field staff confirmed breeding for 21 species (Table 3). Details for each species are presented in Appendix C. Although observed during surveys, Glossy Ibis, Clark's Grebe, Marbled Godwit, and Wilson's Phalarope were not confirmed breeding during the field surveys. The most unusual record was the documentation of breeding by Tricolored Heron, the first breeding record since 1978 and second breeding record in North Dakota.

American White Pelican and Franklin's Gull were the most numerous breeding species, with almost 21,800 pelican pairs and almost 20,700 Franklin's Gull pairs (Table 3). The number of Franklin's Gull breeding pairs in the state may be an order of magnitude too low because of difficulties in assessing colony size. In addition, the known total breeding population of Double-crested Cormorant, Ring-billed Gull, and Eared Grebe were each greater than 10,000 pairs. Double-crested Cormorants occurred in the greatest number of colonies (162 known colonies), followed by Eared Grebe (92 colonies), Western Grebe (75 colonies), and Great Blue Heron (55 colonies).

Table 3. Summary of breeding by colonial waterbirds in 2014 and 2015. Some species were not counted at some colonies, as noted in the footnotes. See individual species accounts in Appendix C for explanation and caveats on totals. Species in bold are state Species of Conservation Priority.

Species	Number Active Colonies	Total Num. Breeding Pairs ^a	Mean Colony Size (Range)
American White Pelican	7	~21,794	3,113 (22 – 17,249)
Double-crested Cormorant	162	~14,179	87 (1-1,043)
Great Blue Heron	55	376 ^b	7 (1-39)
Great Egret	10	97 ^b	10 (5 – 24)
Snowy Egret	4	8 ^b	2 (1 – 3)
Cattle Egret	8	172 ^b	22 (1 – 53)
Tricolored Heron	1	1	N/A
Black-crowned Night-heron	11	441 ^b	41 (1 – 285)
White-faced Ibis	12	~134	11 (2 – 59)
Ring-billed Gull	27	~18,410	682 (1 – 3,944)
California Gull	13	~2,720 ^b	209 (1 – 986)
Unidentified Gull	8	~1,472	184 (23 – 430)

Species	Number Active Colonies	Total Num. Breeding Pairs ^a	Mean Colony Size (Range)
Franklin's Gull	8	~20,690	2,586 (17 – 10,000)
Black Tern	18	107	6 (1 – 20)
Common Tern	6	1,543	257 (3 – 500)
Forster's Tern	11	164	15 (2 – 51)
Caspian Tern	3	36	12 (4 – 12)
Horned Grebe	6	6	1 (N/A)
Eared Grebe	93	~10,925	117 (1 – 636)
Western Grebe	75	~2,556	34 (1 – 270)
American Avocet	9	48	6 (1 – 30)
Willet	1	1	NA

^a Numbers of breeding pairs are minimum counts and possibly quite inaccurate for ground and marsh-nesting colonies.

^b Confirmed breeding at Chase Lake colony but no counts of number of breeding pairs were done

Most breeding pairs of most species were found in key waterbird colonies (Figure 5). However, half of all cormorant pairs, and most Great Blue Heron, grebe, and Black Tern pairs were found breeding in other, smaller colonies.

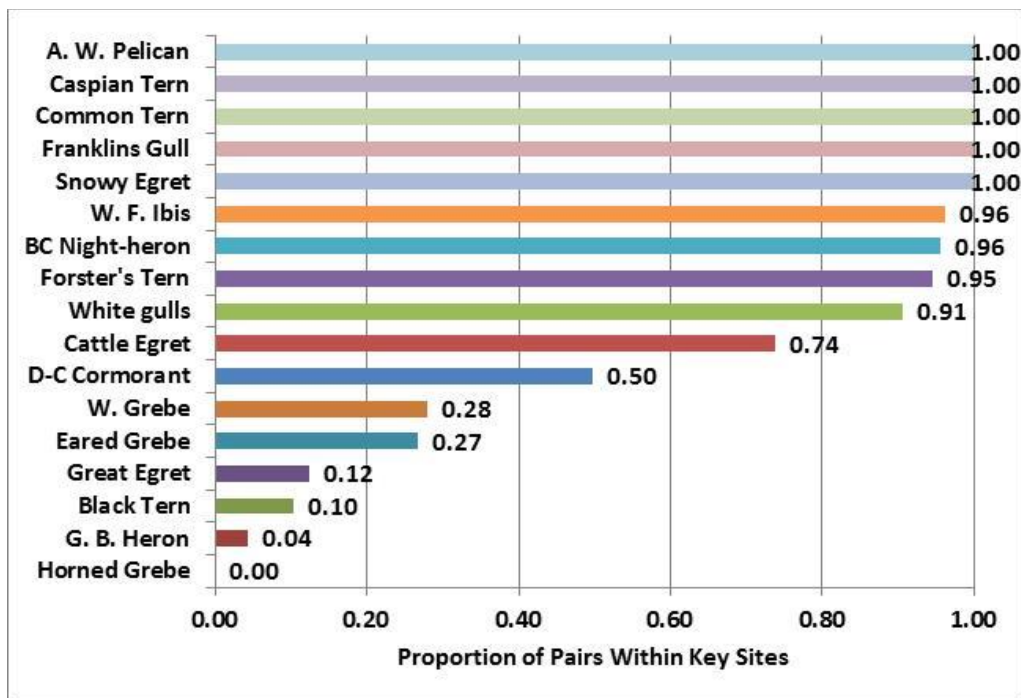


Figure 5. Proportion of breeding pairs per species found within North Dakota’s 32 key waterbird colonies in 2014 and 2015.

THREATS

Because each site visit generally lasted 10 minutes to an hour, field technicians did not directly observe threats to colonies related to human activities. Surveyors did document a variety of potential threats at 48 sites. At 17 sites, natural processes, primarily floods, drying wetlands, and disintegration of very old nesting trees, threatened the near-term existence of the colony. At another seven sites, observers found dead birds or destroyed nests. Two of these were intentional – one a case of poachers shooting grebes (shotgun casings and dead grebes found at site) and one a case of gull control (all nests/eggs destroyed and smashed). The remainder appeared to be natural causes of death, although the large numbers of dead birds and chicks at three sites suggested disease outbreaks. At 10 colonies, birds were nesting next to roads, highways, and rest stops but appeared not to be disturbed by the traffic. Similarly, the presence of oil pads and other energy infrastructure within 1/2 mile did not appear to disturb nesting birds at four colonies. Field technicians reported several instances of noisy human activities, including a crop duster flying over, “noise” cannons within a colony to (unsuccessfully) discourage nesting, construction next to the wetland (2 sites), and boaters. Nesting waterbirds did not appear to react to these activities during the site visit; however because we did not revisit most sites at a later date, we cannot be sure there was not a negative effect later in the breeding season (Carney and Sydeman 1999). Thus it is advisable, in future surveys, to have a second late-season visit to determine if colonies succeed. However if they do not succeed, often it can be difficult to ascertain the cause of abandonment or colony failure (Baker *et al.* 2015). This requires research specifically targeted for this question. Finally, three sites were in areas of increasing urban development or infrastructure and future surveys will be needed to determine the impacts on colony persistence.

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APPENDIX A. List of target species

Target species for the North Dakota colonial and semi-colonial waterbird inventory project and associated survey technique used to survey for each species. Species in bold are state Species of Conservation Priority (Hagen *et al.* 2005).

Common Name	Scientific Name	Species Code	Survey Technique
American White Pelican	<i>Pelecanus erythrorhynchos</i>	AWPE	Total Nest Count
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	DCCO	Total Nest Count
Great Blue Heron	<i>Ardea herodias</i>	GBHE	Total Nest Count
Great Egret	<i>Ardea alba</i>	GREG	Total Nest Count
Snowy Egret	<i>Egretta thula</i>	SNEG	Total Nest Count/
Cattle Egret	<i>Bubulcus ibis</i>	CAEG	Total Nest Count
Tricolored Heron	<i>Egretta tricolor</i>	TRHE	Total Nest Count
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	BCNH	Total Nest Count
White-faced Ibis	<i>Plegadis chihi</i>	WFIB	Adult Flush Count
Glossy Ibis	<i>Plegadis falcinellus</i>	GLIB	Adult Flush Count
American Avocet	<i>Recurvirostra americana</i>	AMAV	Total Nest Count, Adult Flush Count
Marbled Godwit	<i>Limosa fedoa</i>	MAGO	Adult Flush Count
Willet	<i>Tringa semipalmata</i>	WILL	Adult Flush Count
Wilson's Phalarope	<i>Phalaropus tricolor</i>	WIPH	Adult Flush Count
Franklin's Gull	<i>Leucophaeus pipixcan</i>	FRGU	Adult Flush Count
Ring-billed Gull	<i>Larus delawarensis</i>	RBGU	Total Nest Count
California Gull	<i>Larus californicus</i>	CAGU	Total Nest Count
Caspian Tern	<i>Hydroprogne caspia</i>	CATE	Adult Flush Count
Common Tern	<i>Sterna hirundo</i>	COTE	Adult Flush Count
Forster's Tern	<i>Sterna forsteri</i>	FOTE	Adult Flush Count
Black Tern	<i>Chlidonias niger</i>	BLTE	Adult Flush Count
Horned Grebe	<i>Podiceps auritus</i>	HOGR	Total Nest Count, Brood Count
Eared Grebe	<i>Podiceps nigricollis</i>	EAGR	Total Nest Count, Brood Count
Clark's Grebe	<i>Aechmophorus clarkii</i>	CLGR	Total Nest Count, Brood Count
Western Grebe	<i>Aechmophorus occidentalis</i>	WEGR	Total Nest Count/ Brood Count

APPENDIX B. Key Colonial Waterbird breeding sites

Sites in North Dakota with ≥ 500 breeding pairs of colonial waterbirds or ≥ 5 confirmed breeding colonial waterbird species during 2014 and 2015. Species are listed in order of decreasing abundance; species in bold are those of special conservation priority (Hagen *et al.* 2005). Species codes are in Appendix A. See footnotes and individual species accounts (Appendix C) for count details and caveats.

Site	County	Total Number Breeding Pairs ¹	Total Number Species	Total Number Sub-Colonies	Species Confirmed Breeding
Chase Lake ²	Stutsman	~17,276+	7	2	AWPE , BCNH, CAEG, GREG, SNEG, CAGU, GBHE
Beaver Lake WPA ³	Burke	~14,009	4	2	FRGU , WFIB, BCNH, EAGR
Rosemont WPA	McLean	6,048	7	1	RBGU, CAGU, DCCO, BCNH, GREG, AMAV, GBHE
J. Clark Salyer NWR	McHenry	~5,545	8	6	FRGU , EAGR, RBGU, DCCO, WFIB, CAEG, BLTE , BCNH
Audubon NWR	McLean	5,542	4	9	RBGU, DCCO, COTE, CAGU
Evanenko WPA	McLean	2,747	4	2	AWPE , DCCO, WEGR, RBGU ⁴
Horsehead Lake	Kidder	2,193	7	4	RBGU, DCCO, WEGR, EAGR, CAGU, FOTE, WFIB,
Burke County WRA ³	Burke	~2,095	4	2	FRGU , EAGR, WFIB, BCNH
Lake Zahl NWR	Williams	~1,971	9	12	RBGU, CAGU, DCCO, EAGR, FRGU , WEGR, WFIB, FOTE, BCNH
Roesler Lake	Logan	~1,960	3	2	AWPE , RBGU, DCCO
Rath WPA	Burleigh	1,368	6	5	RBGU, DCCO, CAGU, COTE, WEGR, AMAV
Kindschi WPA	Sheridan	1,322	3 or 4	1	DCCO, white gulls, AWPE
Alkali Lake	Sheridan	1,294	7	1	RBGU, DCCO, BCNH, CAEG, COTE, GREG, GBHE
Big Meadow WPA	Williams	1,265	6	23	RBGU, CAGU, COTE, DCCO, WEGR, FOTE,
Salt Lake	Burleigh	1,150	2	3	RBGU, DCCO
Lakes Irvine-Alice	Ramsey	~1,114	6	5	RBGU, DCCO, FRGU , CATE, FOTE, GBHE
Des Moines Lake	Kidder	~1,025	4	1	DCCO, RBGU, CAGU, CATE,
Lake Nettie NWR	McLean	985	5	unknown	RBGU, CAGU, WEGR, EAGR, DCCO
Palermo WMA	Mountrail	890	3	2	CAGU, RBGU, DCCO
Lake Sakakewa-Van Hook Arm	Mountrail	~868	4 or 5	3	white gulls, AWPE , DCCO, GBHE
Rush Lake	Pierce	~822	9	1	EAGR, BCNH, RBGU, CAEG, FOTE, FRGU , WFIB, BLTE , SNEG
John E. Williams Preserve ⁵	McLean	789	13	5	DCCO, RBGU, EAGR, COTE, BCNH, CAEG, CATE, WFIB, FOTE, WEGR, SNEG, CAGU, AMAV

Site	County	Total Number Breeding Pairs ¹	Total Number Species	Total Number Sub-Colonies	Species Confirmed Breeding
McHugh Slough	Nelson	~757	6	1	AWPE , RBGU, WEGR, DCCO, FOTE, EAGR
Devil's Lake: Pelican Lake	Ramsey	~751	2	3	RBGU, DCCO
Willow Lake islands	Rolette	~655	2	1	AWPE , DCCO
Ross	Mountrail	636	1	2	EAGR
Lake Arena	Burleigh	596	4	2	RBGU, DCCO, CAGU, SNEG
Big Muddy Lake	Kidder	570	3	1	COTE, RBGU, AMAV
Debing Twp marsh	Mountrail	551	2	1	EAGR, BLTE
Central Rubin Twp	Nelson	~283	5	1	EAGR, FRGU , WEGR, FOTE, WFIB
McKenzie Slough	Burleigh	~131	5	1	WFIB, FOTE, CAEG, WEGR, EAGR
Dewald Slough	Kidder	~49	5	2	FRGU , CAEG, BCNH, WFIB, TRHE

¹Numbers of breeding pairs are minimum counts and possibly much higher for ground and marsh-nesting colonies.

² Refuge staff did not count nests of any species except pelicans, and did not provide information on breeding Larid or grebe species. Thus, actual numbers are greater than those reported here.

³Only FRGU up in the air were counted, and these numbers likely are extremely low (M. Clark, *pers. comm*).

⁴No counts provided by refuge staff for gulls, just a note that they were 'nesting'

⁵White gull nests were destroyed before the survey; numbers are counts of destroyed nests

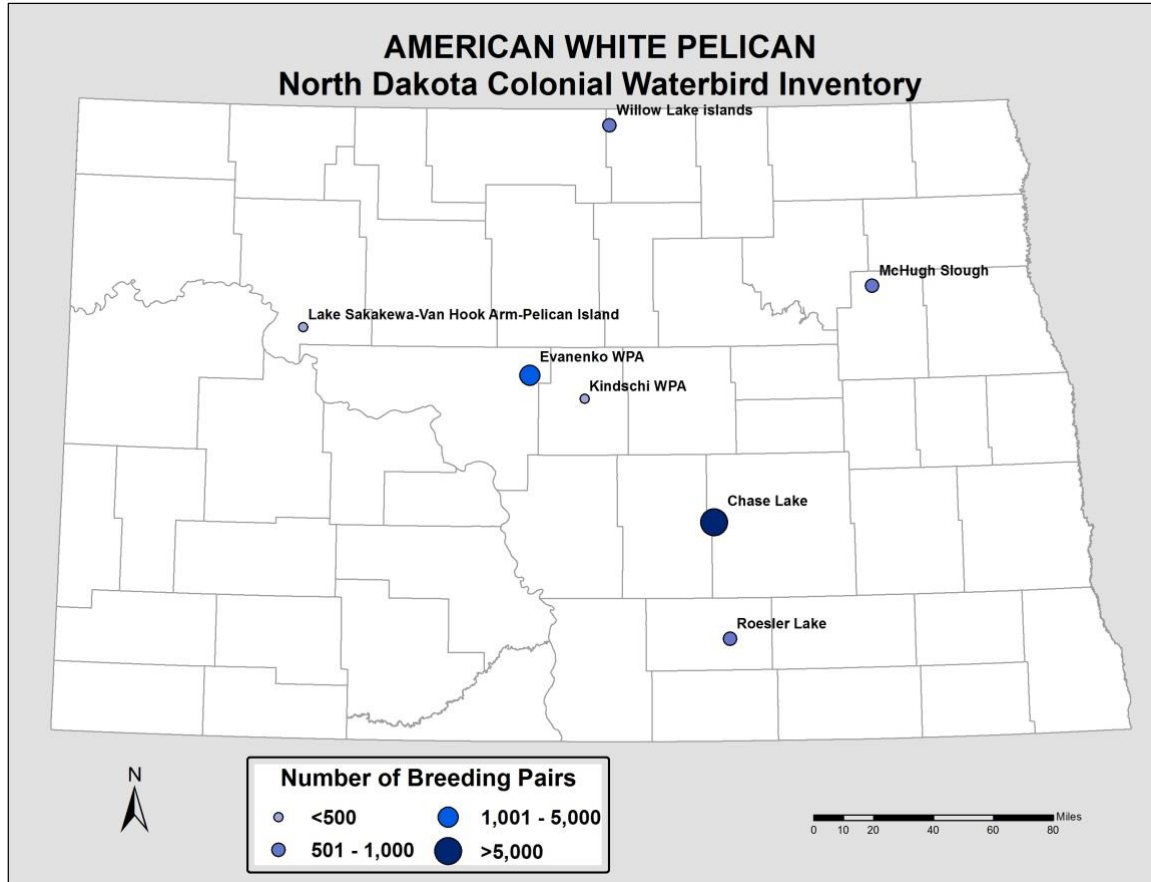
APPENDIX C. Species Accounts

Explanation of Species maps, figures, and tables.

Maps. Maps present the location of all known colonies that were active in at least one year of the survey. Colony size is the number of breeding pairs of that species recorded during the survey. If more than one observer counted, the number is the average of the observer counts.

Tables and Charts. For species found in more than five locations, a table provides a list of counties with the highest number of known colonies of that species. A second table lists colonies with the highest breeding population for each species if this information does not fit on the map. When a nests were found on a variety of substrates, pie charts show the percentage of all colonies with nests using each substrate, and percentage of all nests found on each substrate category.

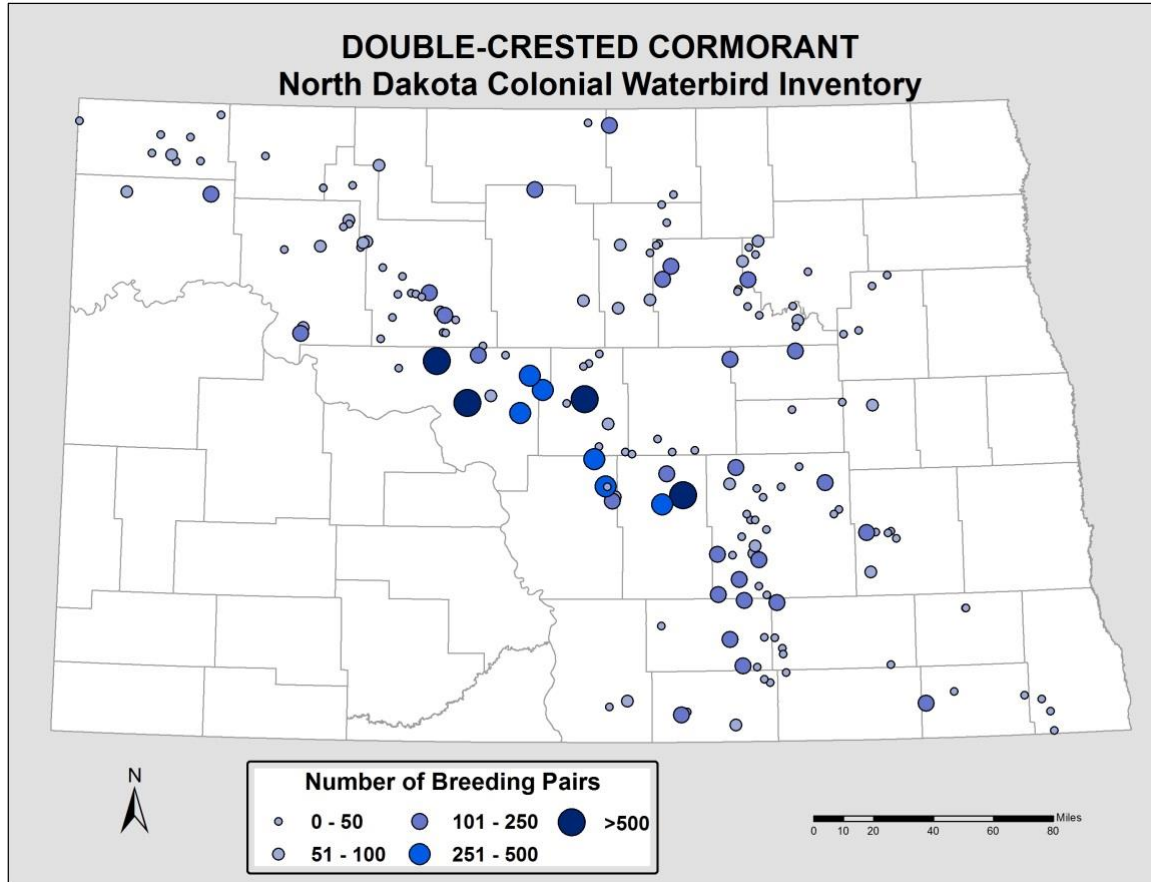
AMERICAN WHITE PELICAN



The American White Pelican is a Level I Species of Conservation Priority (Hagen *et al.* 2005) because a large proportion (79% in 2014-2015) of the state's population breeds in just one colony – Chase Lake. In addition, they nest in high densities, making them susceptible to single detrimental events (weather, predators) and disease outbreaks. With the exception of Kindschi WPA, high numbers of breeding pelicans were the reason for the classification of the other six colonies as key waterbird colonies. In most cases, the pelican colonies also included nesting cormorants, gulls, and terns. Unlike cormorants, pelicans never were found to nest on artificial waterfowl-nesting islands, with the exception of the very small pelican colony at Kindschi WPA.

Because pelicans are extremely sensitive to researcher activities, surveyors did not enter pelican colonies to count nests. All counts were of adults. For Chase Lake and Evanenko WPA, number of adults sitting on nests were counted from aerial photographs. The Van Hook Arm colony was estimated during an aerial survey. For all other colonies, number of adults were counted from a distance.

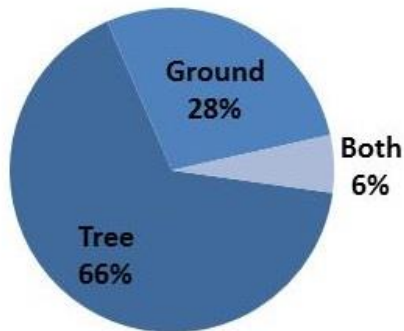
DOUBLE-CRESTED CORMORANT



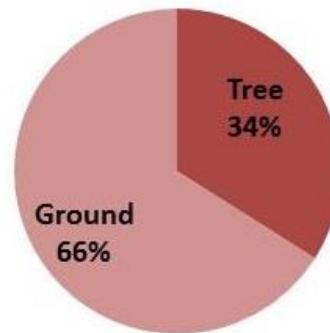
The Double-crested Cormorant was found nesting in the greatest number of colonies and in more than half (56%) of all counties, the most of any colonial waterbird species (see table on next page). This inventory documented almost 14,200 pairs nesting in the state. The actual number likely was higher because surveyors did not enter some island colonies to avoid undue disturbance and instead, estimated breeding numbers from a distance. Larger cormorant colonies were mixed-species – 48% of cormorant colonies were mixed-species but 74% of all cormorant pairs were in mixed-species colonies. About 50% of all cormorant pairs were nesting within key colonial waterbird sites. In North Dakota, cormorants nest both on the ground or in trees. This inventory found that ground colonies are larger but fewer in number; most cormorants in the state nest in trees in numerous relatively small colonies (see pie charts on next page). Many of the ground-nesting cormorants were utilizing artificial islands built in many wetlands to enhance waterfowl nesting success.

Cormorant colonies are vulnerable to two kinds of threats. In many tree colonies, surveyors noted that the birds were nesting in extremely old dead trees that will soon fall down. On islands, cormorants nest in high densities with each other and other ground-nesting species, especially gulls. In these crowded conditions, they are susceptible to disease outbreaks, which surveyors documented in two colonies – Big Mallard Marsh and Pelican Lake (north Devils Lake).

**Nest Substrate
Proportion of Colonies**



**Nest Substrate
Proportion of Nests**



Number of Double-crested Cormorant colonies & breeding pairs 2014-2015 by county

County	Number Colonies	Number Breedg Pairs	Average Colony Size
McLean	8	2,992	374
Sheridan	9	1,596	177
Stutsman	24	1,416	59
Kidder	3	1,295	432
Burleigh	3	867	289
Ward	17	774	46
Benson	12	650	54
Mountrail	9	529	59
Logan	6	513	86
Sargeant	4	421	105
Ramsey	7	420	60
Barnes	6	350	58
Lamoure	4	311	78
Emmons	2	275	138
McHenry	2	258	129
Pierce	6	251	42

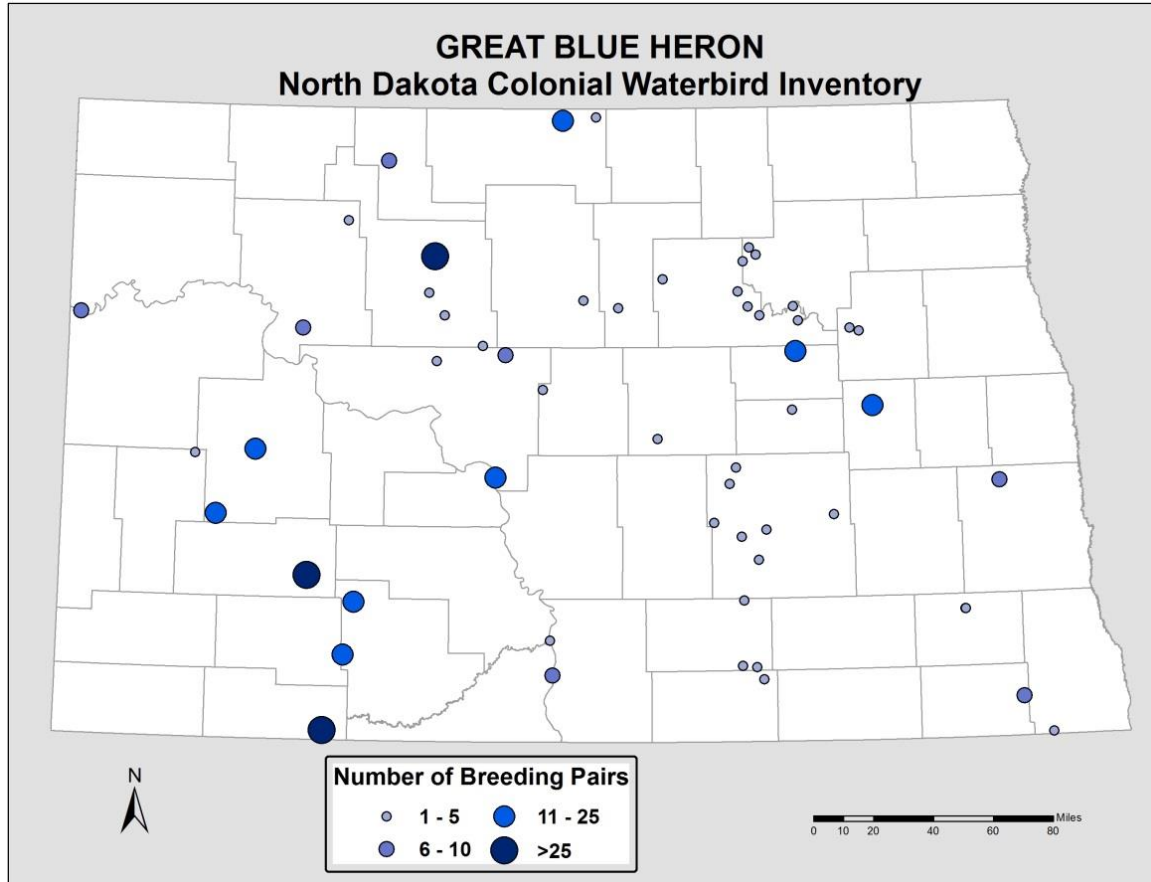
County	Number Colonies	Number Breedg Pairs	Average Colony Size
Divide	8	243	30
Wells	5	238	48
Williams	2	213	107
Eddy	1	178	178
Rolette	2	131	66
McIntosh	4	117	29
Griggs	1	70	70
Renville	1	65	65
Nelson	3	56	19
Ransom	2	45	23
Burke	2	44	22
Richland	2	28	14
Foster	2	24	12
Bottineau	1	7	---
Dickey	1	1	---

Colonies with at least 200 pairs of breeding Double-crested Cormorant, 2014-2015

Site	County	Total Pairs
Audubon NWR	McLean	1043
Kindschi WPA	Sheridan	1000
Rosemont WPA	McLean	823
Des Moines Lake	Kidder	607
Horsehead Lake	Kidder	475
John E. Williams Prsv	McLean	470
Alkali Lake	Sheridan	389
Evanenko WPA	McLean	368
Rath WPA	Burleigh	350

Site	County	Total Pairs
Salt Lake	Burleigh	252
Alfred Lake	LaMoure	250
Devils Lk - Pelican Lk	Ramsey	225
Long Alkaline Lake	Kidder	213
Roesler Lake	Logan	210
Lake Arena	Burleigh	200
Southwest of Forman	Sargent	200
Hoggarth dam	Stutsman	200

GREAT BLUE HERON



The Great Blue Heron was found nesting in more than half (53%) of all counties, the most of any colonial waterbird species (see table on next page). This species was the most common breeding colonial waterbird in West River. Most colonies had few herons – the median colony size was 3 nests and the largest colony was just 39 nests. Two-thirds of Great Blue Heron colonies were mixed-species colonies but only 35% of heron nests were in mixed-species colonies. This indicates that larger heron colonies were single species.

A South Dakota study found that herons were harassed by cormorants when the two species nested together, resulting in lower heron reproductive success than in single-species colonies (Baker 2010). If this occurs in North Dakota, conservation of heron colonies will need to focus on single-species heron rookeries. In addition, only 4% of all heron pairs were nesting at key colonial waterbird sites, which generally are mixed-species colonies.

All Great Blue Heron colonies documented during this inventory were tree colonies with two unusual exceptions. In one colony, herons built their nests on the scaffolding of towers holding high-tension electrical wires above the Missouri River. In another colony, Great Blue Herons were nesting on the ground on an island.

Number of Great Blue Heron colonies and breeding pairs 2014-2015, by county

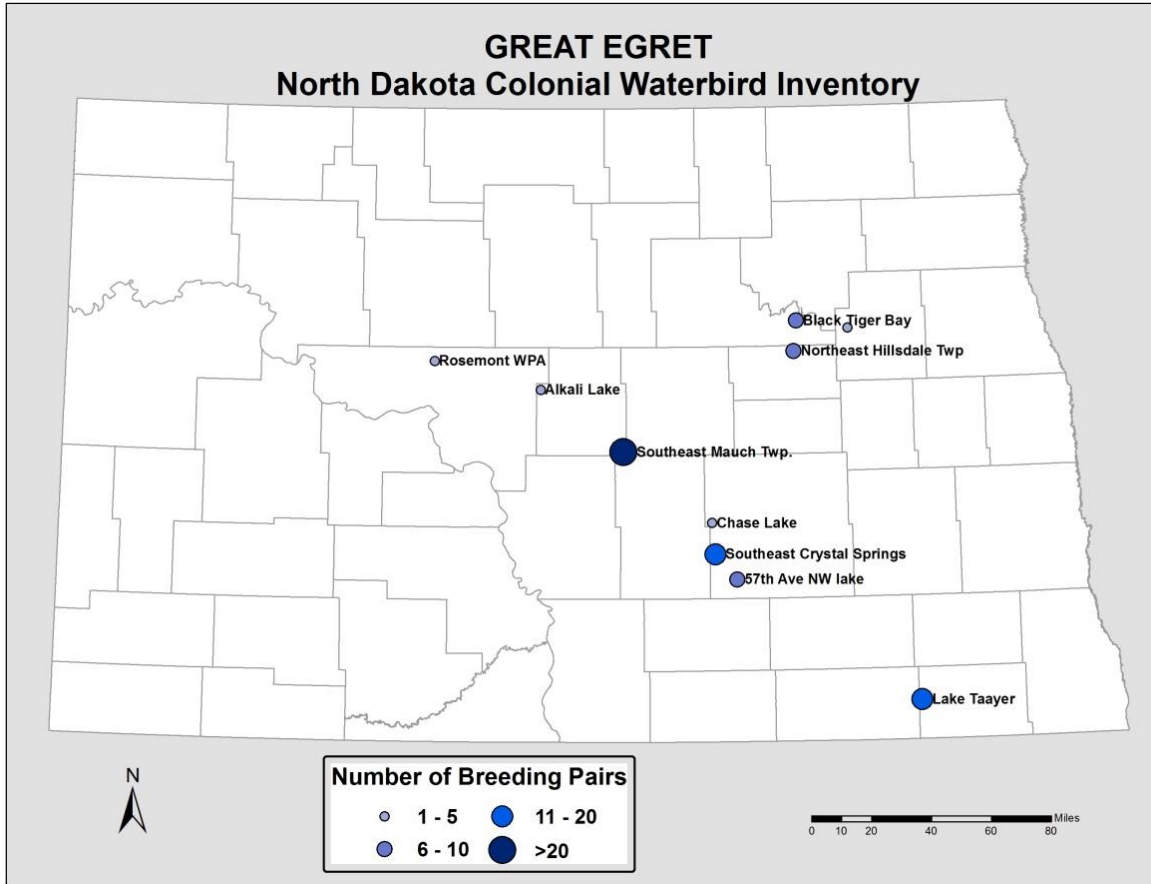
County	Number Colonies	Number Breeding Pairs	Average Colony Size
Ward	4	42	10.5
Adams	1	39	39
Grant	2	39	20
Dunn	2	37	19
McLean	3	26	9
Stark	1	26	26
Eddy	1	18	18
Griggs	1	14	14
Emmons	2	13	7
Benson	7	12	2
Bottineau	2	12	6
Mountrail	1	11	11
Stutsman	7	11	2
McKenzie	1	10	---
Cass	1	9	---

County	Number Colonies	Number Breeding Pairs	Average Colony Size
Renville	1	9	---
Sargent	1	7	---
Logan	3	6	2
McHenry	1	5	---
Nelson	1	5	---
Pierce	1	5	---
Ransom	2	5	3
McIntosh	1	4	---
Ramsey	1	3	---
Richland	1	3	---
Foster	1	2	---
Wells	1	2	---
Billings	1	1	---
Sheridan	1	1	---

Colonies with at least 10 pairs of breeding Great Blue Herons, 2014-2015

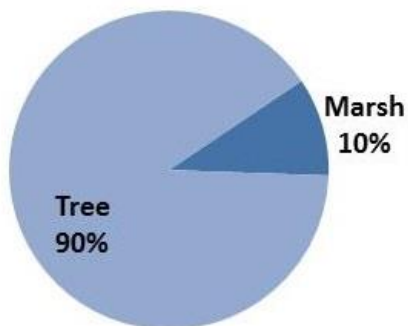
Site	County	Total Pairs
North Lemmon drainage	Adams	39
Souris River - Burlington	Ward	34
Heart River at Hwy 8	Stark	26
Upstream Lake Tschida	Grant	25
Spring Creek at 27th St SW	Dunn	19
Lake Ilo NWR	Dunn	18
Northeast Hillsdale Twp	Eddy	18
Cannonball River oxbow	Grant	14
Lake Jessie	Griggs	14
Painted Woods WMA	McLean	14
Strawberry Lake area	Bottineau	11
Lewis and Clark WMA	McKenzie	10
Otis WPA	McLean	10
Lake Sakakewa-Van Hook Arm	Mountrail	10

GREAT EGRET

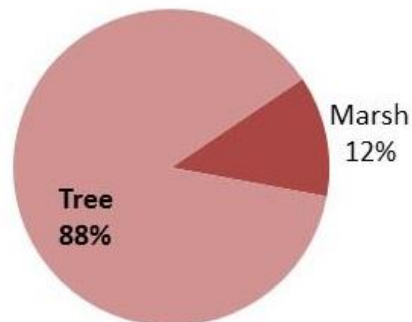


This inventory found about 97 pairs of breeding Great Egrets in 10 colonies. However, Great Egret nests were not counted at the Chase Lake, Southeast Mauch Twp., or Stump Lake colonies, each of which could have had tens of pairs. Just 30% of Great Egret colonies and 12% of pairs were found in key waterbird colonies, suggesting that this species, if necessary, would need additional conservation actions besides those done at key sites. Most Great Egret colonies and nests were in trees.

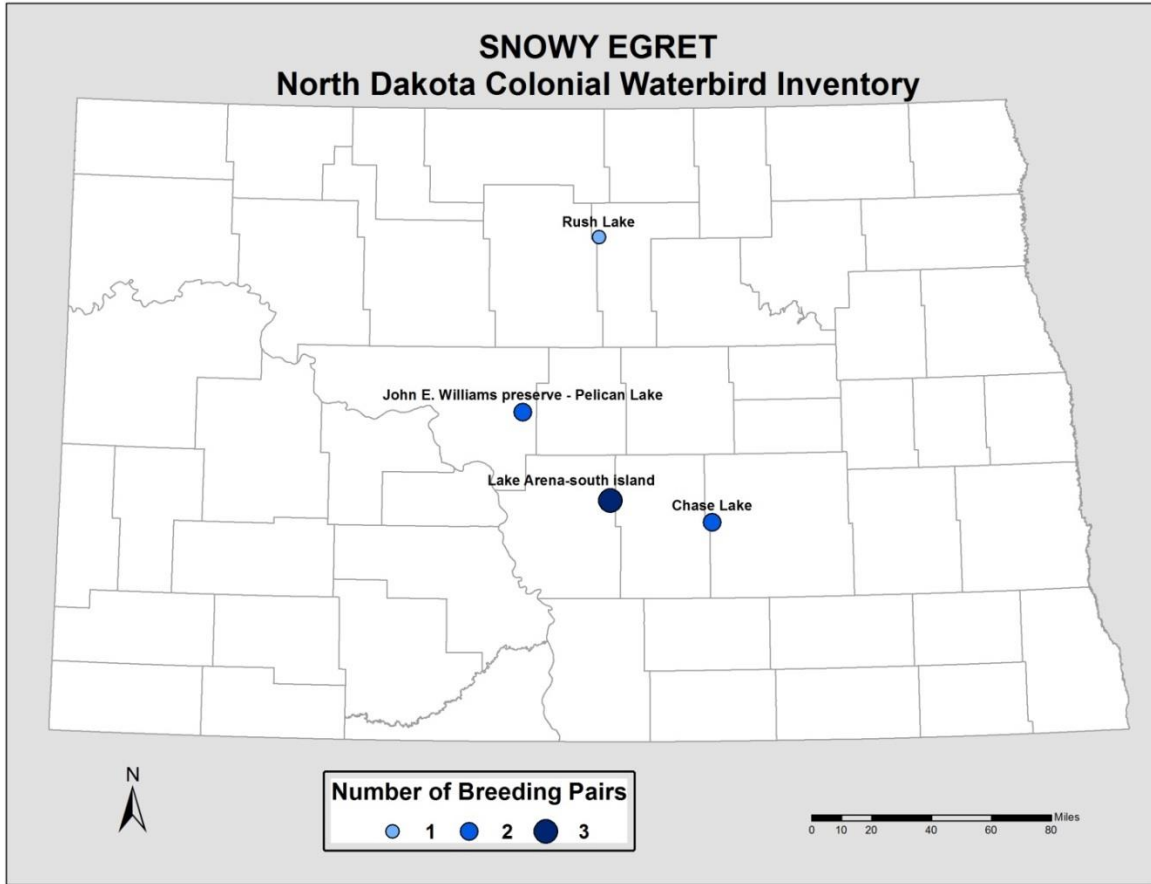
Nest Substrate
Proportion of Colonies



Nest Substrate
Proportion of Nests

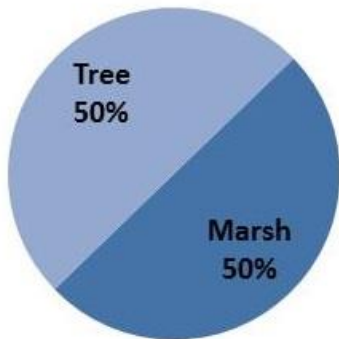


SNOWY EGRET

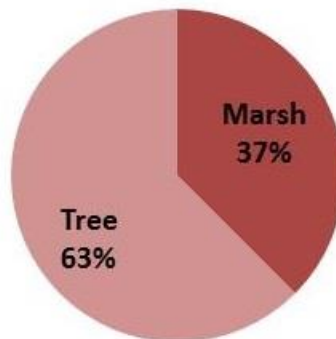


Snowy Egret is the rarest of the three egret species that breed in North Dakota, with just eight pairs found in four colonies. All known Snowy Egret nests were in mixed-species, key waterbird colonies. Two colonies were tree colonies and two were marsh colonies. Number of nests is not known for Chase Lake, where proportionally the species was the fewest of the tree-nesters.

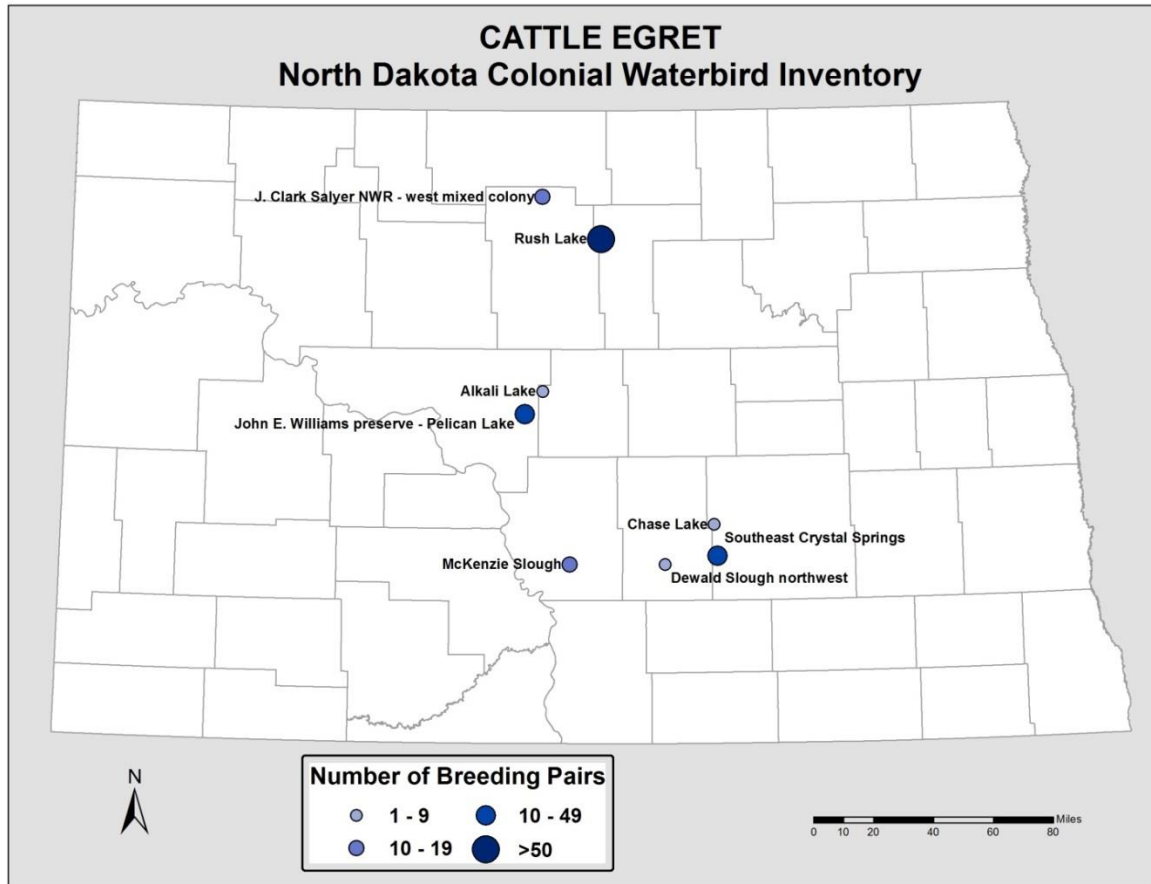
Nest Substrate
Proportion of Colonies



Nest Substrate
Proportion of Nests

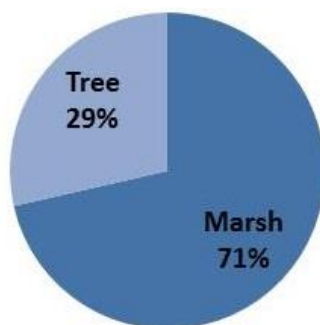


CATTLE EGRET

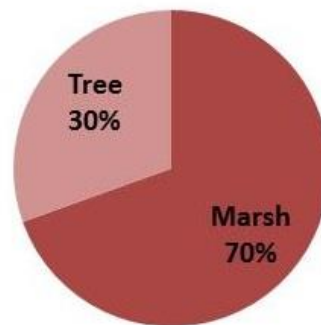


Eastern North Dakota currently is the northern limit of the Cattle Egret's normal breeding range. During this survey, Cattle Egret were documented breeding in eight colonies. No counts were done at Chase Lake, where this species was the second highest proportion of breeders in the tree colony and could number in the tens or even hundreds of nests. All recorded breeding pairs were in mixed-species colonies, while 88% of the colonies and 74% of the pairs were breeding in key waterbird sites.

Nest Substrate
Proportion of Colonies



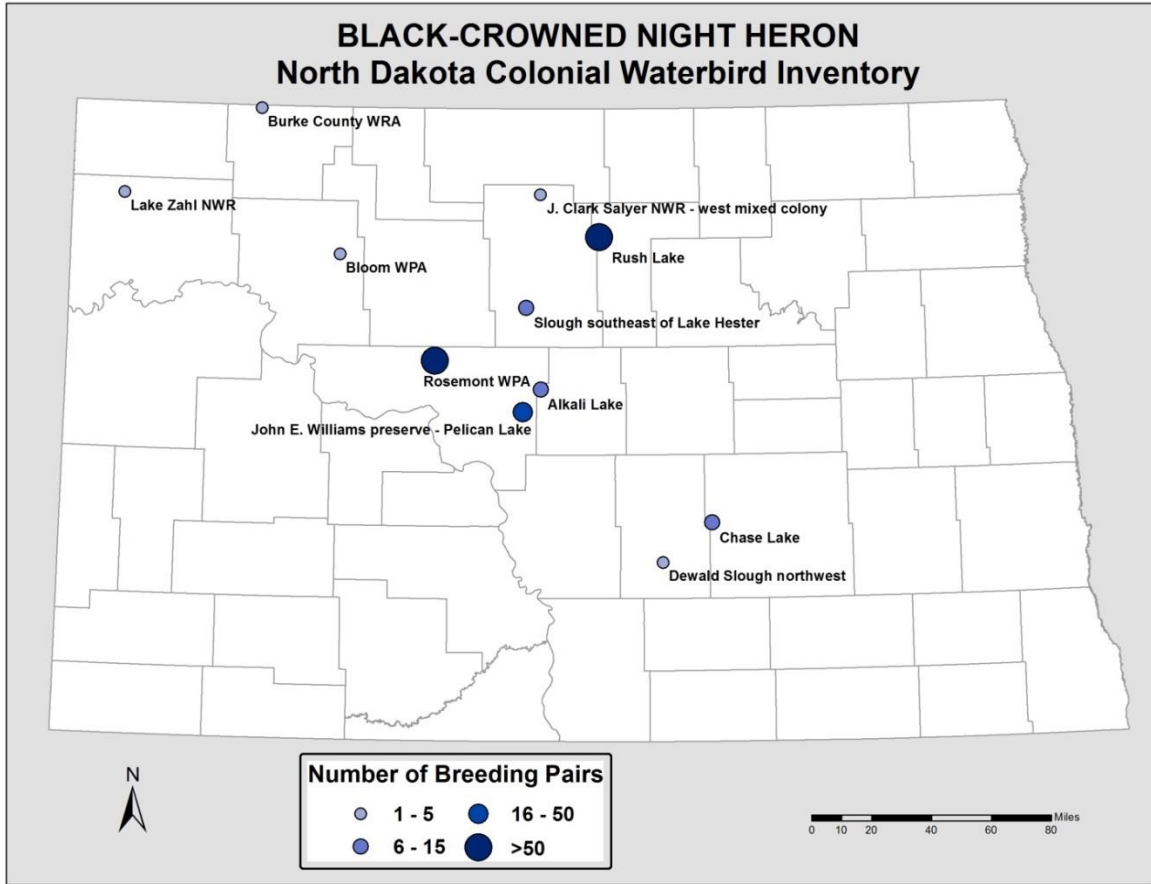
Nest Substrate
Proportion of Nests



TRICOLORED HERON

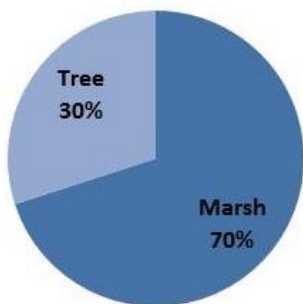
In June 2015, a single Tricolored Heron repeatedly carried nesting material into the northwest corner marsh of Dewald Slough, Kidder County. The bird was seen on at least four occasions by field staff and birders between May 24 and June 21, 2015, but we were not able to ascertain whether this bird was mated with another species or whether the nest was successful. First documented in the state in 1976, there has been one previous breeding record – a failed breeding attempt at Tewaukon National Wildlife Refuge in 1978. The U.S. portion of this heron's breeding distribution is Florida and the Gulf Coast. Inland breeding is uncommon, but there are breeding records in Kansas and South Dakota (Meeks *et al.* 1996, Frederick 2013).

BLACK-CROWNED NIGHT-HERON

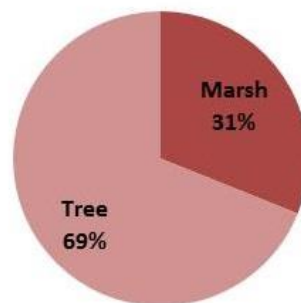


Eleven Black-crowned Night-heron colonies were discovered; 10 of these were at key waterbird sites. Night-herons possibly were nesting at another 16 sites. The count total of 44 pairs probably is quite low because daytime adult counts of this crepuscular species are biased low and the species is easily overlooked entirely. In addition, no nest counts were done at Chase Lake, where this species was the highest proportion of breeders in the tree colony and could number in the tens or hundreds of nests. Most colonies were marsh colonies but most nests were in trees, i.e., tree colonies were more uncommon but larger.

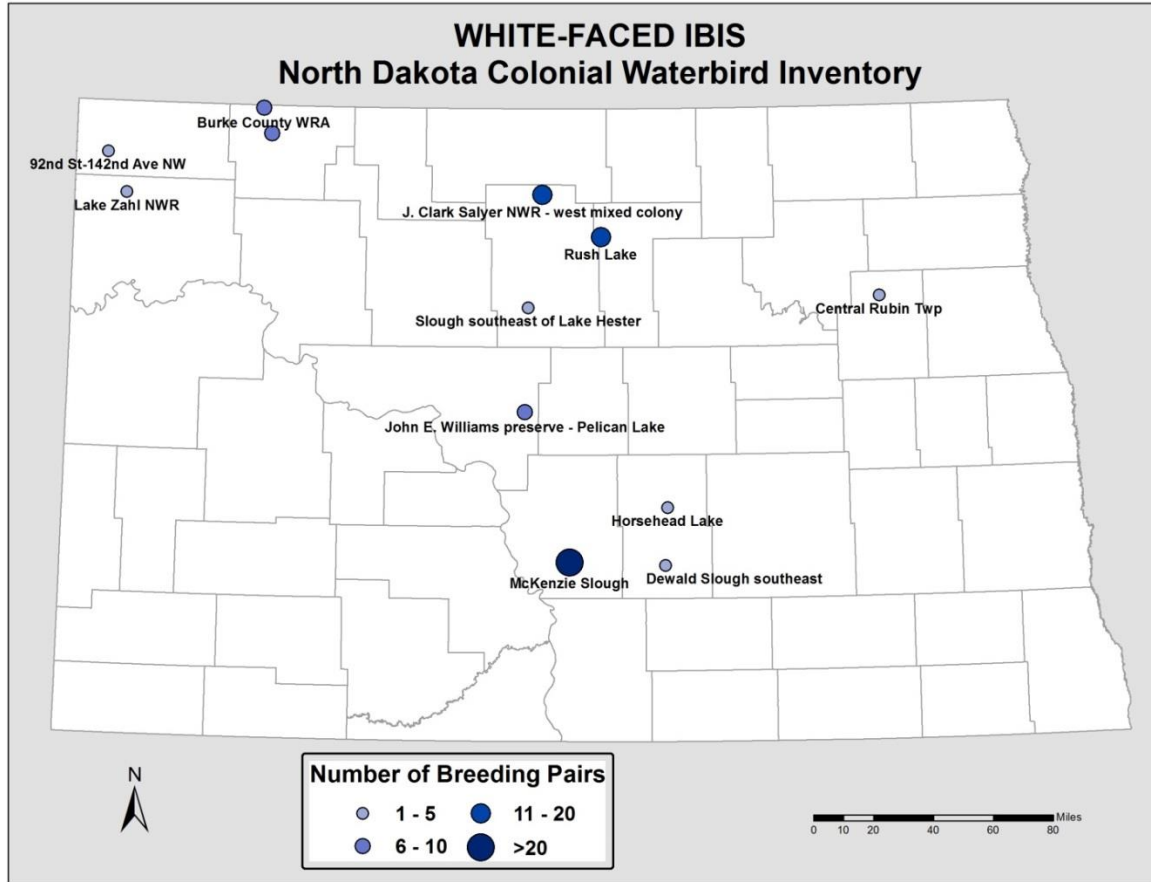
**Nest Substrate
Proportion of Colonies**



**Nest Substrate
Proportion of Nests**



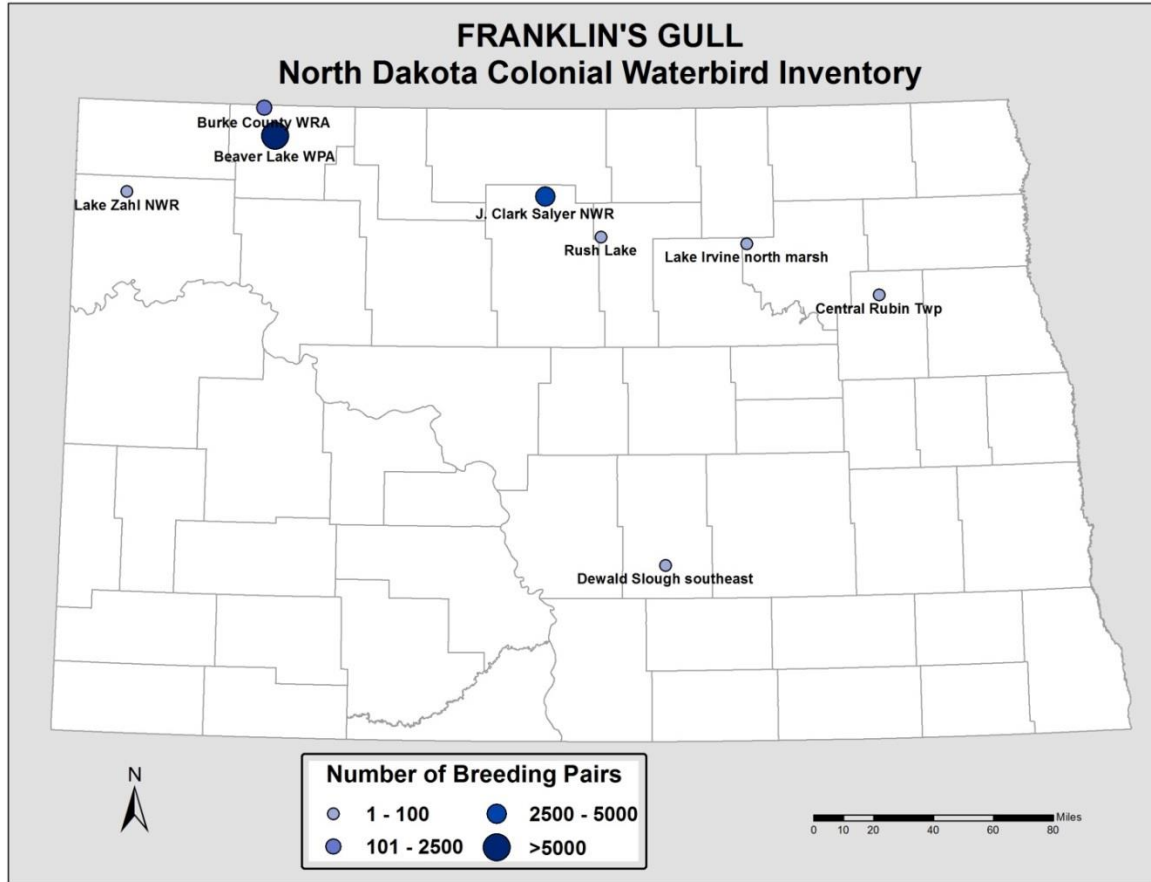
WHITE-FACED and GLOSSY IBIS



The White-faced Ibis is a relatively recent addition to North Dakota’s avifauna. They first nested in North Dakota in 1978. Shaffer *et al.* (2007) review the history of White-faced Ibis in North Dakota and concluded that by 2002, the species was a locally uncommon breeder East River. Our survey concurs with this assessment, documenting breeding in 11 colonies and a high probability of nesting in three others (Beaver Lake WPA, McHugh Slough, and Lake Irvine). All were in mixed-species marsh colonies with 83% of the colonies and 96% of known pairs in key colonial waterbird sites.

The Glossy Ibis, usually found in the southeastern U.S., is an even more recent arrival to the Dakotas. The first South Dakota observation was in 2000 at a marsh just 10 miles south of North Dakota, while the first SD confirmed breeding records were in 2012, in the same marsh. Thus it is not surprising that the species has now arrived in North Dakota. This survey found Glossy Ibis in a large marsh complex west of McHugh Slough (“Central Rubin Twp.”) but did not confirm breeding.

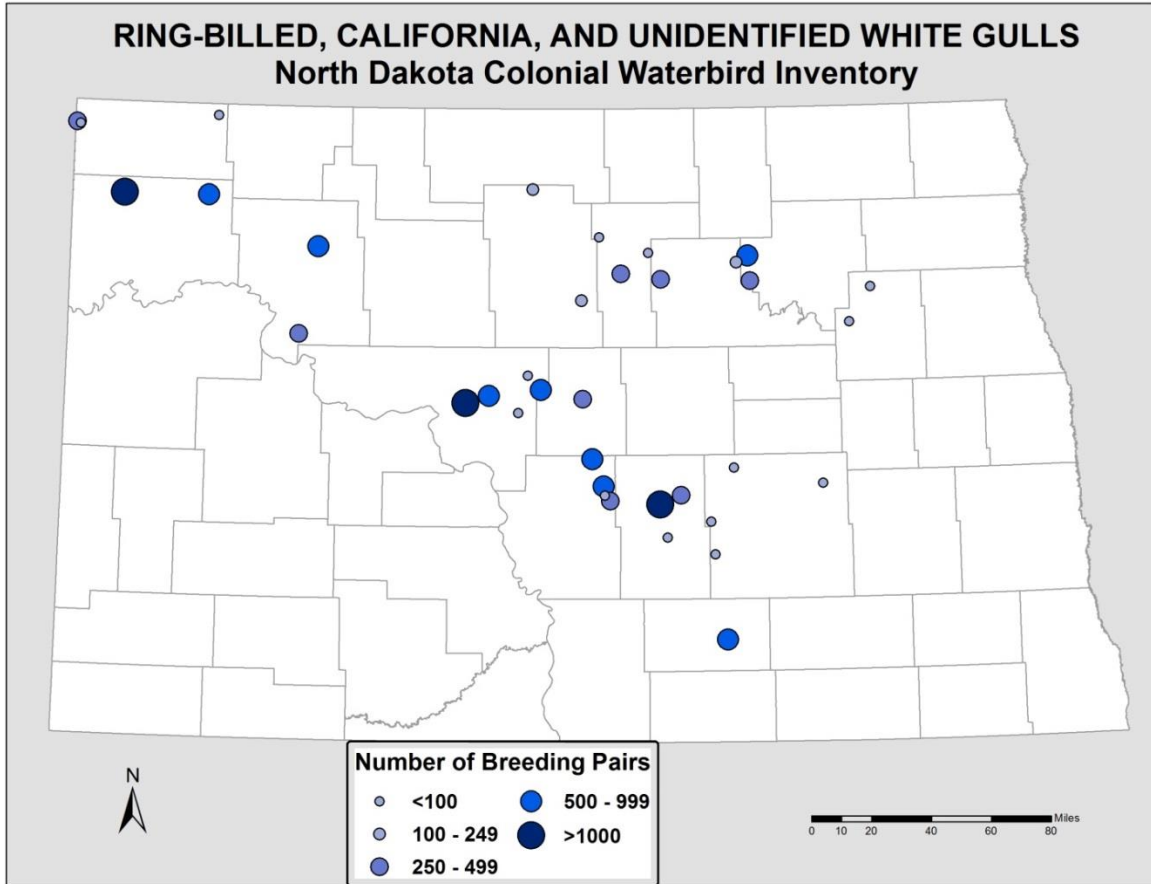
FRANKLIN'S GULL



A Level I Species of Conservation Priority in North Dakota, Franklin's Gulls typically breed in fewer than 25 colonies in the U.S. portion of their range (Burger and Gochfield 2009, Krmpotich 2012). This inventory confirmed Franklin's Gull breeding in eight colonies; all were nesting in marshes in key waterbird colony sites with other marsh-nesting waterbirds including White-faced Ibis, Black-crowned Night-herons, and Forster's Terns. This species readily shifts colony sites when a previous site becomes unsuitable. This was documented during the inventory. In 2014, J. Clark Salyer refuge had two large colonies. In 2015, after a drawdown of water, there were no nesting Franklin's Gulls on the refuge. This inventory also discovered a previously unknown colony – a large colony at Burke County WRA on the Canadian border.

Franklin's Gull colonies are the most difficult in which to assess population size. Nests cannot be directly counted without destroying the marsh vegetation in which they nest and nests are a bit too widely dispersed to successfully flush all adults. This survey counted maximum number of adults in the air at one time during their routine comings and goings from the colony. In some cases, the actual number of breeding pairs may be an order of magnitude higher. To date, there is no way to accurately count colony population size, particularly in large (>500 pairs) colonies (Mark Clark, *pers. commun.*).

RING-BILLED and CALIFORNIA GULLS



Of the two ‘white’ gull species, Ring-billed Gull was more numerous and widespread than California Gull. In some cases, surveyors were not able to identify the gull species because of the viewing distance or trying to avoid entering the colony and causing undue disturbance. Combined, ‘white’ gulls were recorded in 48 colonies with approximately 22,600 breeding pairs. This does not include the California Gull colony at Chase Lake which was not counted during this survey. Of all colonies, 63% are in key waterbird sites; 91% of all pairs were in key sites. Almost all breeding gulls were in mixed-species colonies with just 8% of colonies and 3% of pairs in single-species colonies. Ground nesters, these gulls have benefited greatly from the construction of artificial waterfowl-nesting islands.

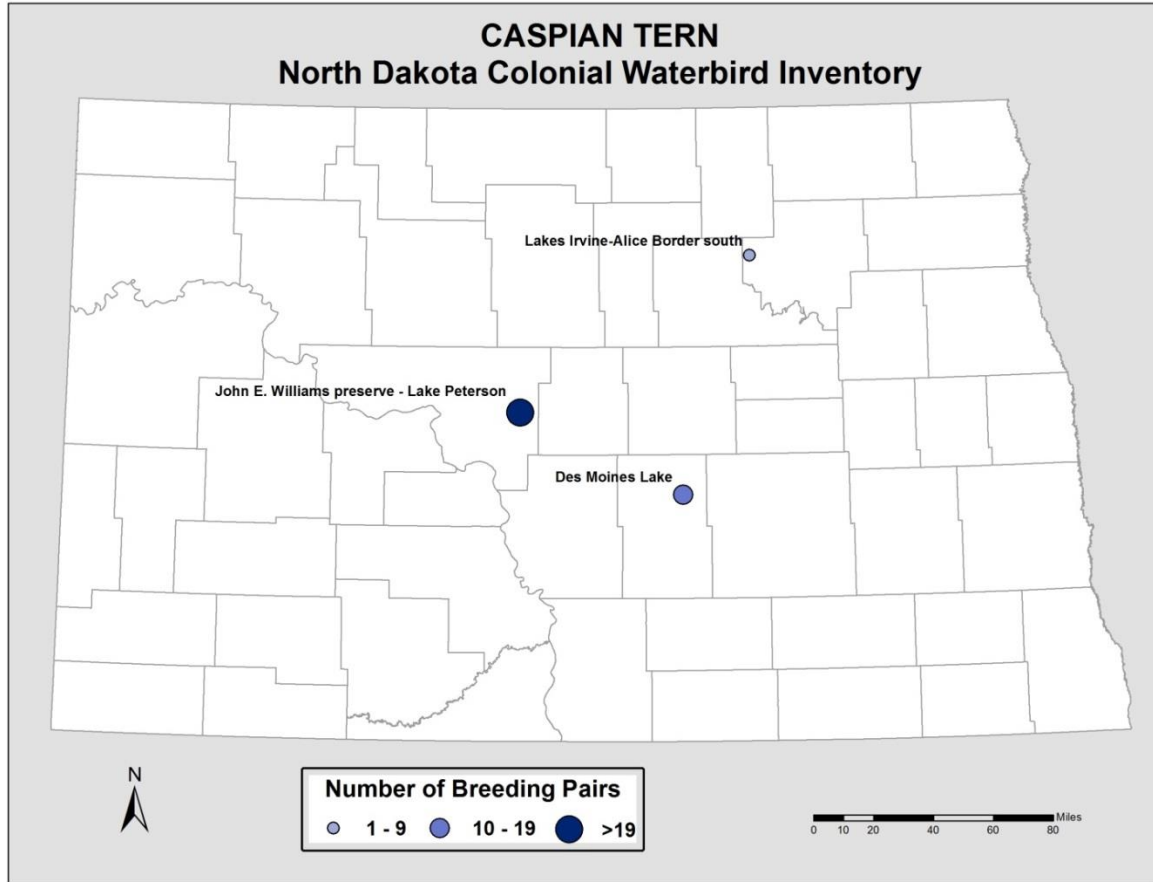
County	Number Colonies	Number Breeding Pairs	Average Colony Size
McLean	5	9,926	1,985
Williams	2	2,565	1,283
Burleigh	3	2,182	727
Kidder	4	1,721	430
Ramsey	2	1,422	711
Mountrail	2	1,230	615
Sheridan	2	1,184	592

County	Number Colonies	Number Breeding Pairs	Average Colony Size
Logan	1	750	750
Benson	2	488	244
Pierce	3	432	144
Divide	3	401	134
McHenry	2	356	178
Nelson	2	200	100
Stutsman	4	149	37

Colonies with at least 250 pairs of breeding “white” gulls (combined Ring-billed Gull, California Gull, and unidentified *Larus* species), 2014-2015

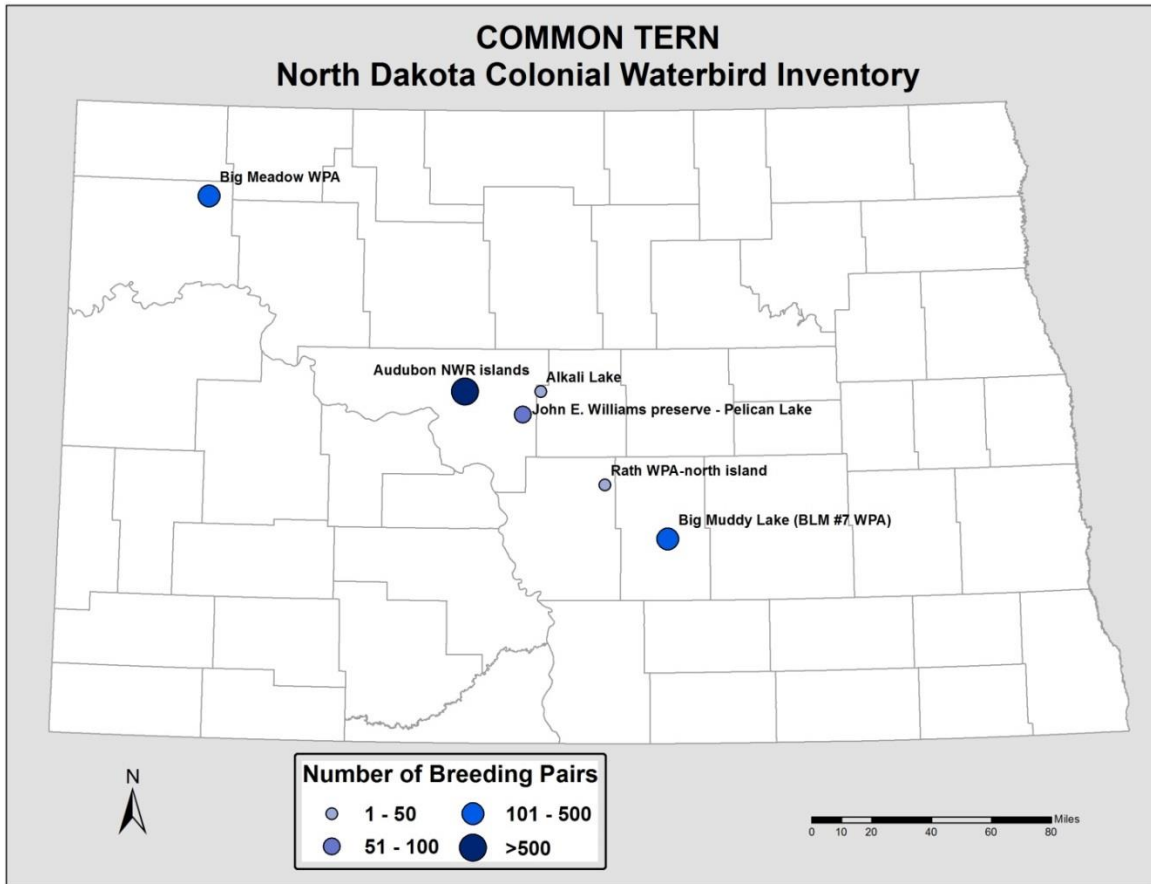
Site	County	Total Pairs
Rosemont WPA	McLean	4,930
Audubon NWR	McLean	3807
Lake Zuhl NWR	Williams	1,802
Horsehead Lake	Kidder	1,215
Rath WPA	Burleigh	943
Lakes Irvine-Alice	Ramsey	937
Salt Lake	Burleigh	898
Alkali Lake	Sheridan	884
Palermo WMA	Mountrail	800
Lake Nettie NWR	McLean	784
Big Meadow WPA	Williams	763
Roesler Lake	Logan	750
Pelican Lake (N. Devils Lake)	Ramsey	485
Lake Sakakewa-west Van Hook Arm	Mountrail	430
Des Moines Lake	Kidder	405
Lake Arena	Burleigh	341
Central Tuscarora Twp	Pierce	313
Kindschi WPA	Sheridan	300
Round Lake	Divide	300
Southeast of Fillmore	Benson	270

CASPIAN TERN



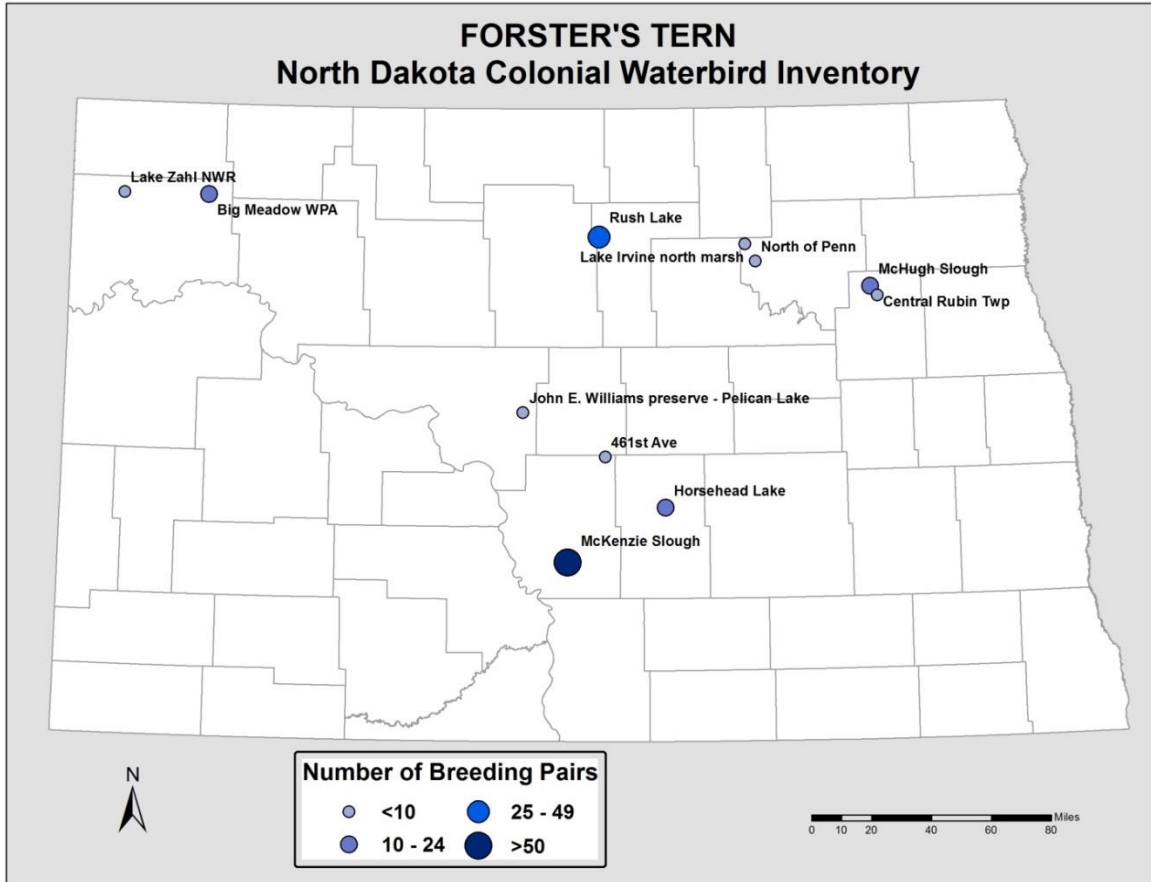
Thirty-six pairs of Caspian Tern were found nesting at three sites during 2014-2015. All were in mixed-species colonies, all at key waterbird sites, and all reported nests were on the ground. In North America, this tern breeds along both coasts and in scattered locations in the Northern Great Plains and Intermountain West. In North Dakota, Caspian Terns first were documented nesting in 1977 at Lake Williams, McLean County (Herman *et al.* 1977).

COMMON TERN



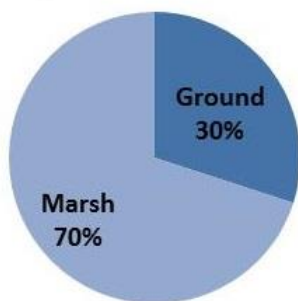
A ground-nesting species, the Common Tern was documented breeding at six sites -- all at key waterbird sites and all in mixed-species colonies. North Dakota is at the extreme south end of the species' inland North American breeding distribution, which extends north and east through central and eastern Canada, the Great Lakes states and the East Coast.

FORSTER'S TERN

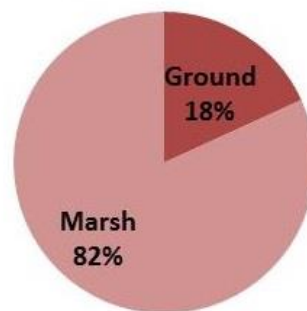


Forster's Terns were documented breeding in 11 colonies in the state; 82% of Forster's Tern colonies and 95% of pairs were breeding in key waterbird colonies. This species tends to nest in smaller numbers; average colony size was 15 pairs. Because of this, it is highly likely that some small colonies were overlooked. A "marsh" tern, 70% of colonies and 85% of all nests were in marsh vegetation.

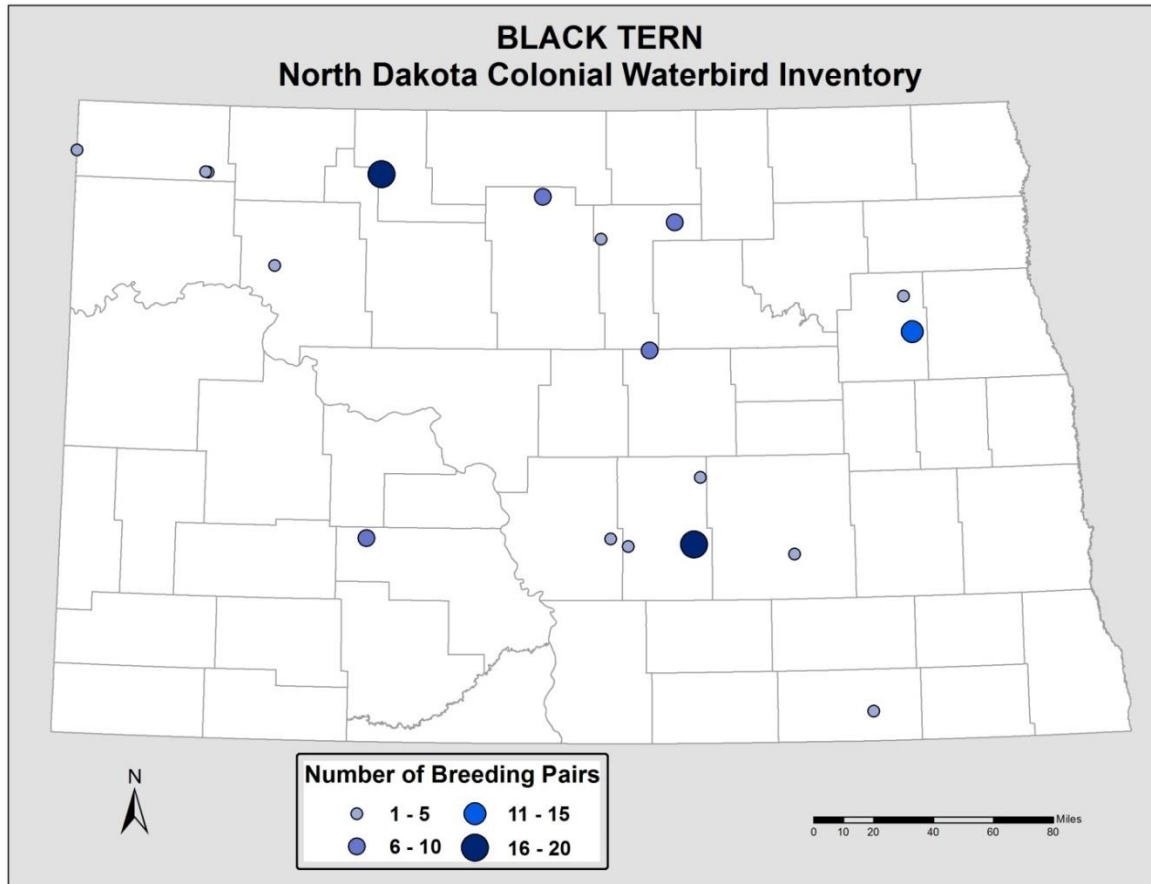
**Nest Substrate
Proportion of Colonies**



**Nest Substrate
Proportion of Nests**



BLACK TERN

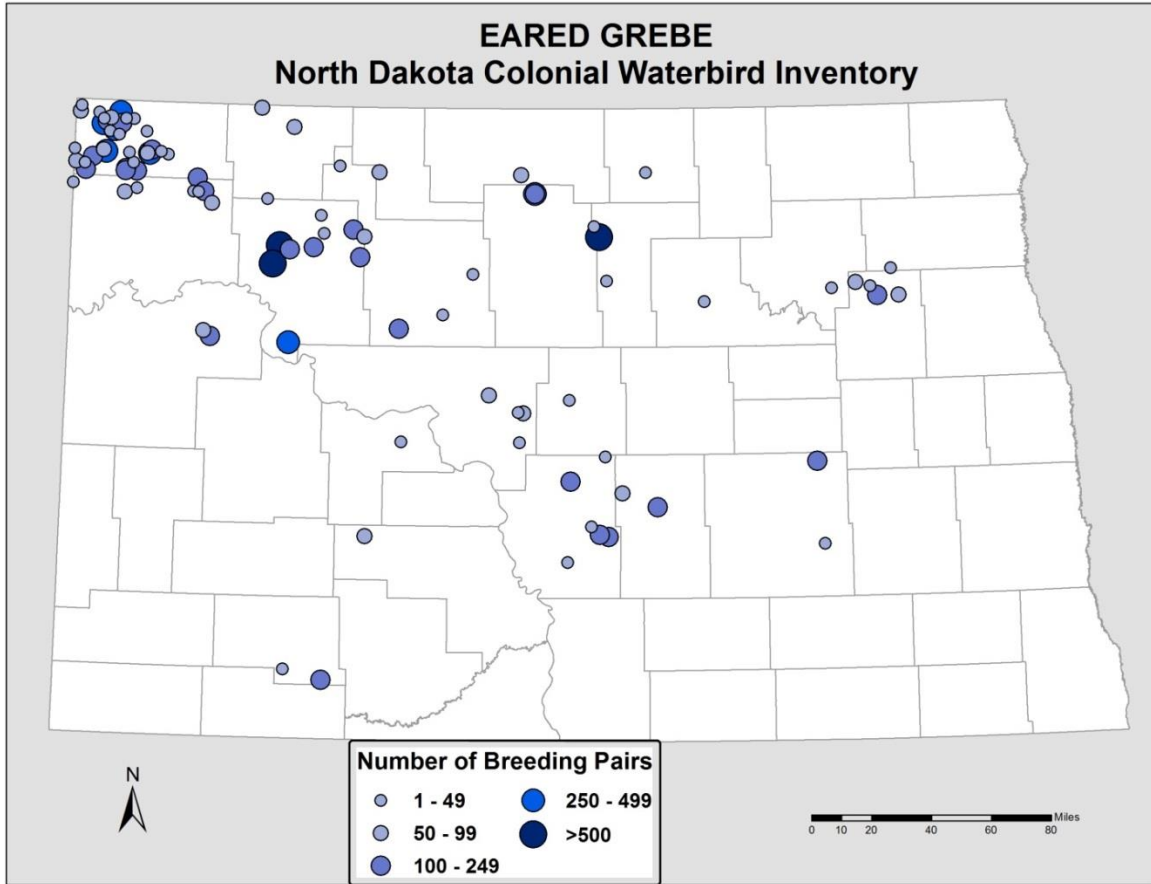


Black Tern is a Level I Species of Conservation Priority because of its need for landscapes full of shallow wetlands and grasslands, and its sensitivity to wetland loss. This species tends to breed singly or in small colonies in small marshes, and thus, this survey likely missed some small colonies. Three marshes had more than 10 pairs of terns: North of Lagoda (Kidder Co.), W. Roosevelt Twp. (Renville Co.), and Jct. Hwy 32-CR4 (Nelson Co.). Besides the 18 colonies documented in this study, Black Terns were noted at an additional 18 sites where they possibly were breeding. Just 17% of known colonies and 10% of known breeding pairs were found at key waterbird sites, and thus this species will need conservation measures beyond managing the key sites. In addition, Black Tern was the only colonial waterbird species documented in 61% of its colonies. All nests were found in marsh vegetation.

County	Number Colonies	Number Breeding Pairs	Average Colony Size
Kidder	3	22	7
Renville	1	20	---
Nelson	2	17	9
Pierce	2	10	5
Divide	3	9	3
McHenry	1	7	---

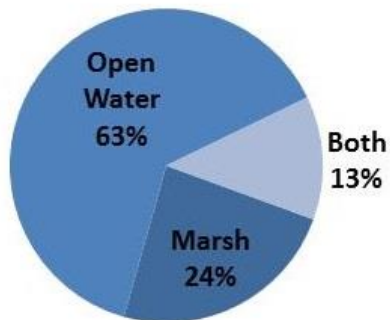
County	Number Colonies	Number Breeding Pairs	Average Colony Size
Morton	1	7	---
Wells	1	7	---
Dickey	1	3	---
Stutsman	1	3	---
Burleigh	1	1	---
Mountrail	1	1	---

EARED GREBE

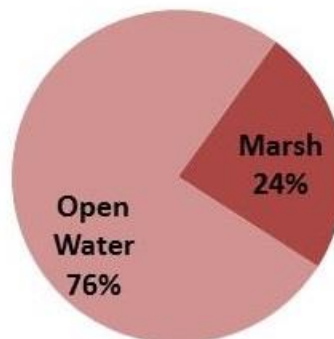


Eared Grebe was the most abundant grebe found during the 2014-2015 surveys. Because of its abundance, surveyors only counted colonies with at least 25 pairs, unless the site was also being surveyed for other, higher priority, species. Few Eared Grebe colonies (14%) or pairs (27%) were nesting in key waterbird sites. In addition, 62% of surveyed grebe colonies and 53% of pairs were in single species colonies. Eared Grebes nest either within marsh vegetation or out in the open; during this survey, 2/3rds of colonies and 3/4ths of pairs nested in open water.

Nest Substrate
Proportion of Colonies



Nest Substrate
Proportion of Nests



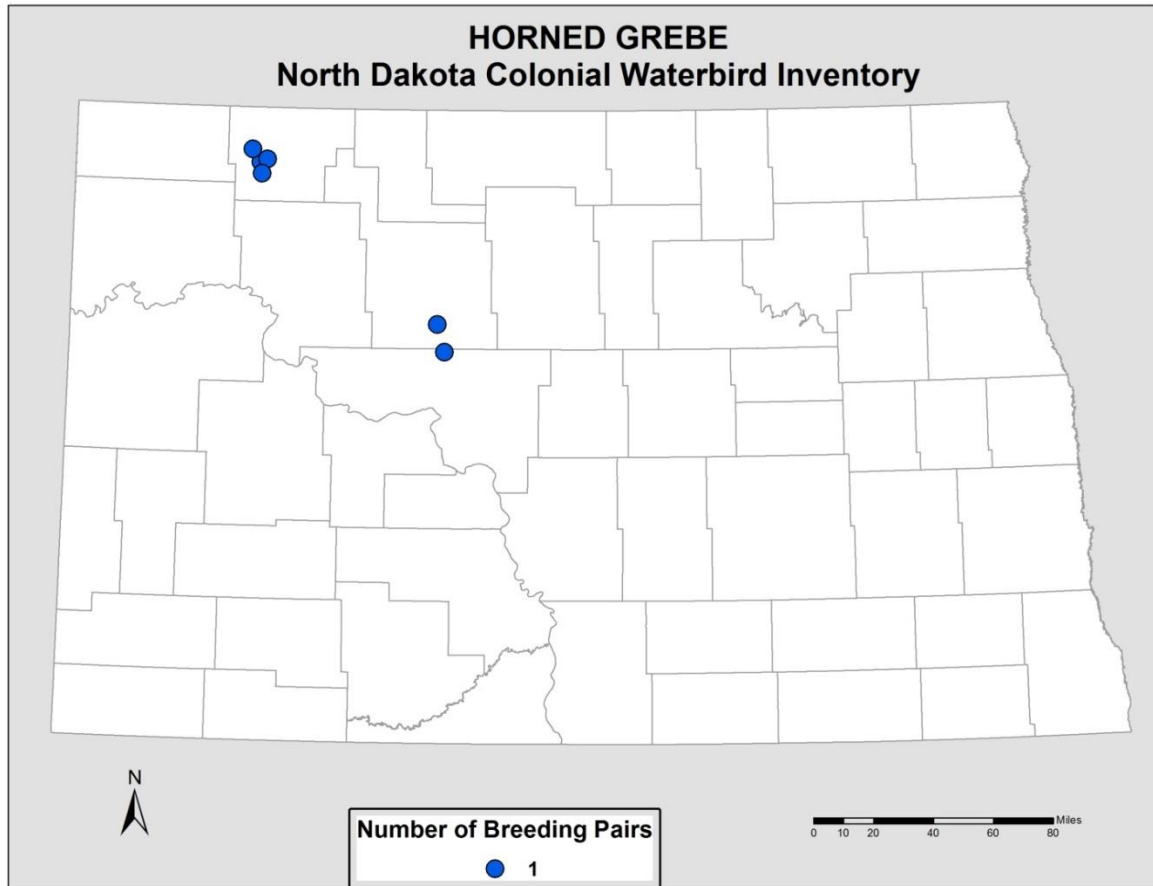
Number of Eared Grebe colonies and breeding pairs per county, 2014-2015

County	Number Colonies	Number Breeding Pairs	Average Colony Size
Divide	33	4,346	132
Mountrail	10	2,258	226
Burleigh	6	553	92
McHenry	2	551	276
Pierce	3	540	180
Williams	7	362	52
Ward	5	327	65
Nelson	5	327	65
Kidder	2	313	157
Stutsman	2	273	137
Mclean	4	240	60
McKenzie	2	232	116
Hettinger	2	191	96
Ramsey	2	34	17
Burke	3	153	51
Morton	1	98	---
Bottineau	1	57	---
Renville	1	56	---
Mercer	1	37	---
Benson	1	31	---
Rolette	1	22	---
Walsh	1	19	---
Sheridan	1	8	---

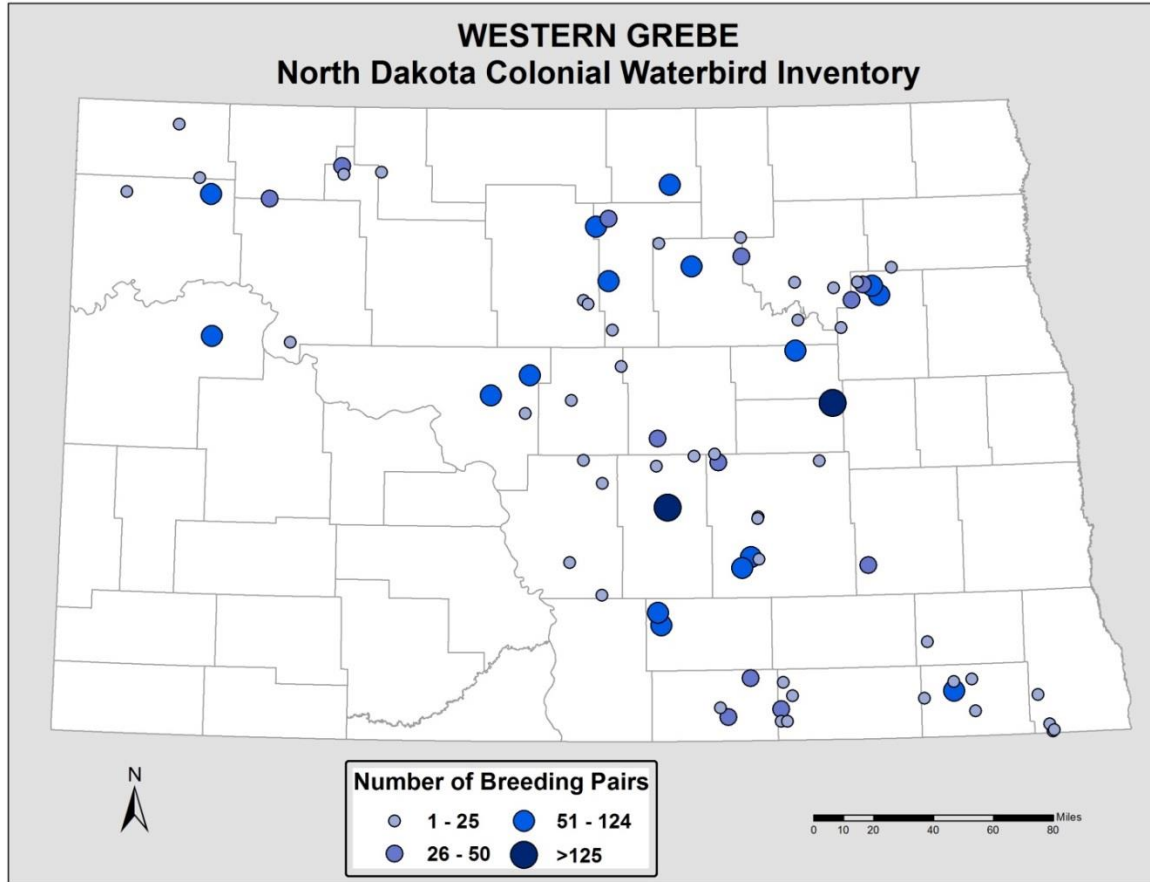
Colonies with at least 200 pairs of breeding Eared Grebes, 2014-2015

Site	County	Total Pairs
Ross	Mountrail	636
Debing Twp marsh	Mountrail	550
Rush Lake	Pierce	515
92nd St-142nd Ave NW	Divide	489
West Gooseneck Twp	Divide	468
J. Clark Salyer NWR	McHenry	450
Southeast Burg Twp	Divide	434
Muskrat Lake	Mountrail	384
Alkabo WPA	Divide	307
Rattler Lake WPA	Divide	301
East of Kensal	Stutsman	248
Brown WPA	Ward	240
Northeast Kickapoo Twp	Mountrail	235
S.central Smoky Butte Twp	Divide	233
138th Av NW curve ponds	Divide	225
Wildrose WPA	Divide	224
Horsehead Lake	Kidder	220
Clear Lake east end marsh	Burleigh	202

HORNED GREBE



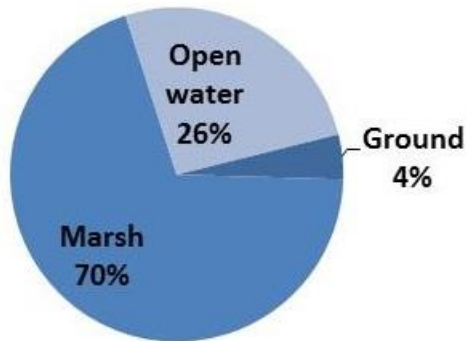
Horned Grebe is a Level I Species of Conservation Priority (Hagen *et al.* 2005), amid evidence of a contraction of the species' breeding range in North Dakota (Stedman 2000). Horned Grebes nest singly or in small loose congregations. Thus this survey may have missed nesting birds. Two of the nests found during this inventory were in shrubs at water level, two were in marsh vegetation, and one was in open water. In addition, Horned Grebe were seen in appropriate habitat at Lake Nettie refuge and Peach Lake, Stutsman County.

WESTERN and CLARK'S GREBES

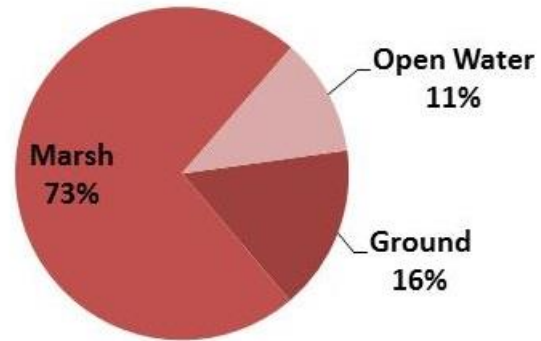
Western Grebe was the second-most common grebe species surveyed during this inventory, with documentation of 75 colonies and more than 2,500 breeding pairs in 30 counties. Large numbers of birds were found at an additional six sites, but breeding was not confirmed. Colonies with less than 25 pairs generally were not surveyed, thus the actual state-wide total number of colonies and breeding pairs is higher. Western Grebe tended not to occur at the key waterbird sites – just 13% of colonies and 28% of known pairs were in key sites. About 47% of Western Grebe colonies and 61% of pairs occurred in mixed-species colonies, primarily with Eared Grebes. More than 70% of Grebe nests were found in marsh vegetation, with most of the remainder in open water (see charts on next page). Atypically, Western Grebes at Big Meadow WPA (Williams Co.) built their nests on the dry shorelines of artificial waterfowl-nesting islands. Western Grebes were observed breeding very close to busy roads at three sites with no apparent negative impact on the birds. However, surveyors discovered one site with dead grebes that had been shot, the only direct threat observed for this species.

Distinguishing Clark's Grebe from the more common Western Grebe, especially at a distance, is very difficult and impeded the ability of surveyors to document breeding. During this survey, Clark's Grebes were observed, but not confirmed breeding, at three locations: Broken Bone Lake (Benson Co.), Lake Alice (Ramsey Co.), and south of Kulm (Dickey Co.).

**Nest Substrate
Proportion of Colonies**



**Nest Substrate
Proportion of Nests**



Number of Western Grebe colonies and breeding pairs per county, 2014-2015

County	Number Colonies	Number Breeding Pairs	Average Colony Size
Kidder	3	300	100
Nelson	6	235	39
Pierce	4	183	46
Stutsman	7	179	26
Benson	4	176	44
McLean	3	152	51
Sargent	5	140	28
Foster	1	132	---
Williams	2	129	65
Eddy	1	125	---
Logan	2	123	62
McIntosh	3	74	25
Ward	3	71	24
McKenzie	1	70	---
Ramsey	3	55	18

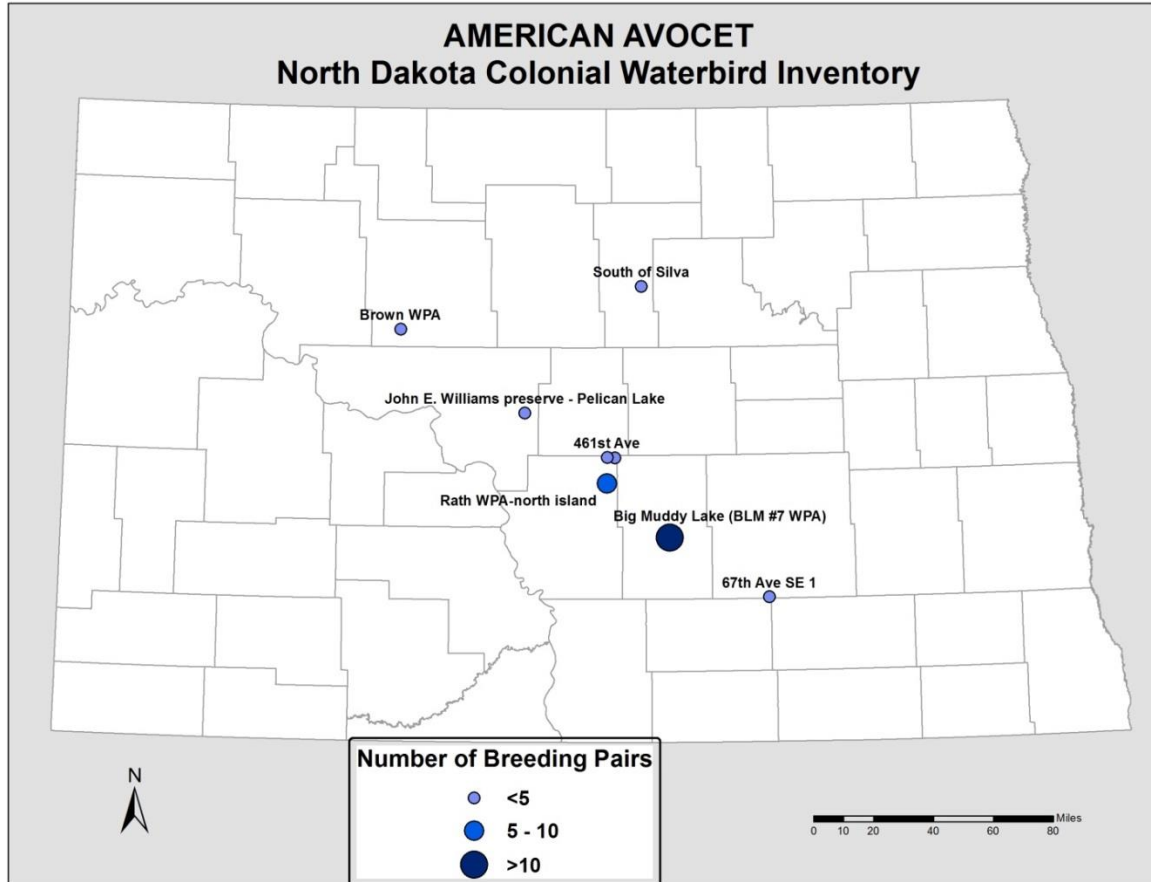
County	Number Colonies	Number Breeding Pairs	Average Colony Size
Wells	2	52	26
Rolette	1	51	---
Burleigh	4	44	11
Dickey	5	43	9
Sheridan	2	33	17
Barnes	1	32	---
Divide	2	29	15
Mountrail	2	25	13
Burke	1	23	---
Walsh	1	22	---
McHenry	2	18	9
Richland	4	15	4
Towner	1	10	---
Ransom	1	8	---
Renville	1	8	---

Colonies with at least 50 pairs of Western Grebes, 2014-2015

Site	County	Total
Horsehead Lake	Kidder	270
South of McHenry	Foster	132
Big Meadow WPA	Williams	125
Northeast Hillsdale Twp	Eddy	125
Mud Lake	Benson	122
North of Cogswell	Sargent	105
Lake Nettie NWR	McLean	88
Demick's Lake	McKenzie	70
Central Ruben Twp	Nelson	70

Site	County	Total
McKenna Lake	Logan	65
McHugh Slough	Nelson	64
West Kilgore Lake	Pierce	61
Evanenko WPA	McLean	60
Central Sealey Twp	Logan	58
Horseshoe Lake	Pierce	58
West of Trautman Sl.	Stutsman	56
School Lake	Stutsman	52
Long Lake	Rolette	51

SHOREBIRDS



Shorebirds are best surveyed using different methods than those employed during this inventory, so all shorebird records were incidental sightings recorded during site visits for other species.

Four largely aquatic shorebirds are listed as Level I or Level II Species of Conservation Priority. Of these, only American Avocet were found in any numbers during this survey, with confirmed breeding at eight sites and possible breeding at another 16 sites. In general, avocets nest singly or a few pairs but 30 birds were reported at Big Muddy Lake. All reported nests and broods were on small sandy or bare soil islands in wetlands.

Of the remaining three species, only Willet was confirmed breeding – a single brood found near Harmony Lake in Mercer County. This finding was West River, where the species should be much less common. Willet also were recorded in Burleigh and Pierce counties, but not confirmed breeding. An unexpected result was the paucity of Marbled Godwit encounters – just three records, in Burleigh, Logan and Stutsman counties and no confirmed breeding. Wilson’s Phalarope were more frequently encountered – 16 sites in eight counties – but also no confirmation of breeding.