U.S. Fish & Wildlife Service

Avian Health Project

Chase Lake NWR

October 2011

Arrowwood NWR Complex

Introduction

The waterbird colony at Chase Lake National Wildlife Refuge (NWR) has changed drastically during the past two decades. It has increased both in species composition and overall numbers. To date, the following species of colonial nesting birds have been recorded at the colony: American White Pelican, Ring-billed Gull, California Gull, Double-crested Cormorant, Black-crowned Night-Heron, Little Blue Heron, Great Egret, Cattle Egret, Snowy Egret, Caspian Terns, White-faced Ibis, and Glossy Ibis. Many of the changes at Chase Lake NWR remain unquantified given the remoteness of the nesting islands. The recent growth in numbers and diversity at the Chase Lake colony has coincided with a period of increased precipitation and rapid range expansion of several waterbird species in this region, which may be attributable, at least in part, to regional climate change. These recent population changes within the colony combined with Chase Lake NWR's history of disease have raised concern for the current and future health of the birds that nest at Chase Lake NWR.

Monitoring of the colonial nesting species on Chase Lake NWR's islands for avian health issues, will assist in better understanding of how disease impacts this colony. Disease issues have been present at Chase Lake for several years. In 1992, there was an indicated, but unconfirmed outbreak of Newcastle Disease virus (NDv) on the nesting islands that killed "many" gulls, Double-crested Cormorants, and young American White Pelicans. In 1993, rising water levels began to engulf the original nesting islands where the dead birds were found. Since then, new islands (referred to as: north, middle, and south) have formed as peninsulas were cut off from the mainland. Beginning in 2002, West Nile virus (WNv) has been identified as a significant cause of morbidity and mortality in young pelicans at Chase Lake NWR and other breeding colonies in the northern Great Plains. In 2010, Newcastle Disease virus was confirmed on the north island at Chase Lake NWR. The beginning of the mortality event was first observed 21 July. A pelican and cormorant that were submitted to the National Wildlife Health Center (NWHC) were diagnosed with a virulent strain of Newcastle Disease. During the mortality event there were about 500 gulls, 320 cormorants, and 40 dead pelicans observed. Fortunately the mortality event seemed to be confined to the north nesting island and did not impact birds on the south island

Study Area and Methods

Study Area: Chase Lake NWR is located 12 miles northwest of Medina in Stutsman County, North Dakota (47°01'N, 99°27'W). The 4,440-acre refuge is within the glaciated Missouri Coteau physiographic region and has an additional 6,113 acres of state and federal lands adjacent to it. A large portion of Chase Lake NWR (4,185 acres) is also designated as a Wilderness Area. The Coteau is characterized by morainic, gently rolling plains interspersed with closed wetlands, prairie pastures, hayfields, and cropland. Approximately 50% of the refuge consists of wetlands; the remaining area is native grasslands. Chase Lake, the largest wetland on the refuge, is a shallow, alkaline lake fed by ground water and run-off. Vegetation in the areas where the ground-nesting birds nest is primarily Marshelder (*Iva xanthifolia*), Absinthe Wormwood (*Artemisia absinthium*), Poison Ivy (*Toxicodendron radicans*), Stinging Nettle

(*Urtica dioica*), Smooth Brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), and Western Snowberry (*Symphoricarpos occidentalis*) while the shrub-nesting birds inhabit Chokecherry (*Prunus virginiana*) and Northern Hawthorn (*Crataegus rotundifolia*).

Methods: To monitor the colonial nesting species found at Chase Lake NWR, weekly surveillance of the islands was conducted by using spotting scopes from hills with good vantage points or making site visits to the islands. Initial surveillance of the islands was completed via spotting scope to limit disturbance to the birds while in their egg laying and incubation phases. During that time, the birds were monitored for approximately one hour with notable observations being recorded.

In order to make site visits to the islands for monitoring, it is necessary to have a boat and motor. As previously mentioned, a large portion of Chase Lake NWR is designated as a Wilderness Area. Therefore, management of the refuge must conform to the 1964 Wilderness Act. The use of motorized vehicles and mechanical equipment on the refuge must be carefully considered to preserve the character and integrity of the wilderness area. In order to conduct research at the colony, a Minimum Requirements Decision process was followed to determine the minimum activity needed. It was determined that a flat bottom boat and 10hp motor were the appropriate minimum tools to safely access the islands. Monitoring during site visits consisted of walking through the islands and recording the presence of sick or dead specimens or boating around the islands and monitoring with binoculars. During key stages of reproduction such as incubation, staff minimized disturbance to the birds by staying on the periphery of the sub-colonies. When visibly sick (exhibiting signs of illness) specimens or fresh (<1day old) carcasses were found, they were euthanized and/or collected. The specimens were then stored in a cool place and submitted for necropsy to the NWHC the following day. If at all possible, freezing of the specimens was avoided in order to preserve the tissues for testing.

To estimate the number of nests present at the waterbird colony, several methods were used. Using digital, aerial photographs, staff from USGS Northern Prairie Wildlife Research Center (NPWRC) in Jamestown, ND used a pixel-based, user-assisted method for digital counting of the pelican and gull nests on the north and south islands. Direct ground-based counts were also completed for several pelican, egret, and heron nests on the south island and pelican nests on the middle island. Pelican nests located under shrubs and not visible in the aerial photographs were hand-counted on the south island. All nests were spray-painted to avoid double counting. Most egret and heron nests were located in shrubs, thus an accurate digital count is not possible.

Results

During FY11, the nesting colonies at Chase Lake NWR were monitored from 20 May through 4 October. During these 17 weeks, the islands were monitored a total of 24 times. Weekly site visits to the islands commenced on 9 June and concluded on 4 October. During this time, the islands were visited 21 times and 13 specimens (either euthanized or freshly dead) were collected for necropsy (Table 1).

An aerial survey and digital photographs of the nesting colonies were completed on 6 June by USFWS staff. Using the digital photographs, staff from NPWRC were able to count the number of pelican and gull nests present on the north and south islands (Table 2). Of the 11,218 pelican nests on the south island (Table 2), 10,309 were counted digitally from the aerial photograph, while 909 were hand-counted under the shrubs on the north and east sides of the island. In addition to the pelican nests, staff from Arrowwood NWR complex and NPWRC counted for several of the other waterbird species. A total of 2,027 unidentified egret and heron nests were tallied in the shrubs of the south island (Table 2) on 22 September and 4 October. Using the same program as they used for the pelican nests, NPWRC was able to digitally count 9,724 gull nests on the north island (Table 2). After a site visit to the north island on 13 July, NPWRC staff estimated that two-thirds of the gull nests belonged to Ring-billed Gulls while the remaining one-third were California Gulls (Table 2).

In 27 July, Arrowwood NWR complex staff and NPWRC staff banded a total of 271 pelican chicks on the south island. During the site visits that followed banding a total of 26 dead, banded chicks were found. The bands were collected, but none of the birds were fresh enough to collect and submit for necropsy.

Discussion

The main objective of this project was to monitor the colonial nesting species at Chase Lake NWR for issues related to avian health. Monitoring via spotting scope and site visits to the islands was able to occur on a consistent basis (24 visits within a 17-week period). The purpose of surveying the colonies with spotting scopes was to reduce the amount of disturbance to the birds during their egg-laying and incubation stages. During those stages, the pelicans, in particular, are more prone to abandoning their nests or young if they are disturbed too often. Staff initiated weekly site visits to the islands once it was determined that the majority of the birds had completed incubation.

Site visits were a key component to the monitoring of the islands and resulted in the collection of a variety of specimens that were submitted for testing. The collected specimens were diagnosed with a wide variety of diseases (Table 1). The various diagnoses reveal several health issues impacting birds at Chase Lake NWR and underscore the importance of continued monitoring in future years.

As mentioned before, several specimens were submitted for necropsy, but despite collection efforts, we were unable to collect any sick or dead herons, egrets, or cormorants. Since these species compromise a substantial portion of the colonial nesting population at Chase Lake, their future monitoring is important and should include the collection of specimens for necropsy. Although cormorants at Chase Lake have tested positive for disease in previous years (i.e. Newcastle Disease, 2010) we were unable to confirm the cause of death in birds this year due to the lack of collectible specimens (carcasses <1 day old). In regards to the herons and egrets, we continue to find carcasses every visit, but it is still unknown what they are dying from and whether the disease issues that have impacted the other waterbirds (pelicans, gulls, and cormorants) in previous years and this year are also affecting their population. The continuation

of thorough monitoring of the heron and egret subcolonies in the future should result in the collection of carcasses suitable for necropsy.

A major obstacle confronted during this project was major weather events that passed through the refuge. These severe storms brought high winds, hail, and drenching rains to the refuge frequently from mid-June to the end of July. The young-of-year birds are very vulnerable at this time and can die as a result. Due to high winds that created unsafe boating conditions, it was difficult at times to make site visits to the islands immediately following a storm. By not being able to monitor shortly after a storm, no fresh specimens could be collected for necropsy and it was not possible to confirm or deny whether the cause of death in the chicks was weather-related or some other factor, such as disease. Another problem that arose with delayed monitoring was the inability to obtain an accurate estimate of chick deaths due to their high rate of decomposition.

In the upcoming years, estimating the population size of shrub-nesting ciconiiforms at Chase Lake will be important. The herons and egrets nest in distinct subcolonies throughout the south island. The nests within the subcolonies are located at various heights in the shrubs in sparse to dense cover. During ground counts this field season, none of the nests were identified by species because the counts occurred post-breeding season when the adults were gone. In the future, we intend to perform perimeter counts during the breeding season to gather species specific data to better understand the composition of the ciconiiform population. We also intend to conduct post-breeding ground counts to obtain total number of nests and obtain a count of the cormorant nests on the north and south islands. These nests, like the pelicans and gulls, will attempt to be counted using the pixel-based, user-assisted method of digital counting in the more open areas and hand-counted in the areas obstructed by vegetation.

Future monitoring and surveillance of the colony should focus on continuing to consistently visit the islands so that no disease issues or mortality events are missed. Although we would like to increase the frequency of future monitoring, it would not be to the level that would risk abandonment by any of the nesting species. Because of the increased chance of abandonment, extra caution should be taken during any attempts to site visits to the islands early in the year (May-early June).

Table 1. Summary of birds from Chase Lake NWR submitted for necropsy to the National Wildlife Health Center, Madison, WI.

Date Collected	Species	Collection Site	Diagnosis
7-6-11	Ring-billed Gull	Middle Island	Undetermined cause of death
7-12-11	California Gull	South Island	Euthanasia, emaciation, and mild infection with renal coccidia
7-12-11	Ring-billed Gull	North Island	Kidney infection with coccidia and acute pulmonary necrosis
7-21-11	Ring-billed Gull	North Island	Salmonellosis and Circovirus infection of the bursa
7-25-11	American White Pelican	South Island	*Staphylococcus aureus* isolated from the liver suggests septicemia
8-3-11	American White Pelican	South Island	New Duck disease (infection with *Riemerella anatipestifera*) [a]
8-3-11	American White Pelican	South Island	Erysipelas (infection with *Erysipelothrix rhusiopathiaea*)[a]
8-3-11	Ring-billed Gull	South Island	Salmonellosis/Low-path Avian Influenza[a]
8-3-11	Ring-billed Gull	South Island	West Nile Virus[a]
8-17-11	Sanderling	North Island	Undetermined cause of death
8-23-11	American White Pelican	North Island	West Nile Virus
8-30-11	Gadwall	South Island	Type C Botulism[a]
8-30-11	American White Pelican	South Island	Salmonellosis[a]

[a] These are preliminary results with findings to date. Final results are pending with the health center.

Table 2. Summary of nests located at Chase Lake NWR's nesting colonies in 2011.

Species	Site	Nest Total
American White Pelican	North Island	118[a]
American White Pelican	South Island	11,218
American White Pelican	Middle Island	15
Herons and Egrets[b]	South Island	2,027
Gulls[c]	North Island	9,724[d]

[a] An aerial survey conducted on 6 June indicated this nest total. Later observations by staff, suggest that there were an additional 200-300 nests that were initiated after the aerial survey.

[b] These are hand-counted, unidentified heron and egret nests found in the shrubs on the south island. Species included are Great Egrets, Cattle Egrets, Snowy Egrets, Black-crowned Night-Herons, and Little Blue Herons.

[c] The terms "gulls" refers to Ring-billed Gulls and California Gulls.

[d] Researchers estimate that two-thirds of this total are Ring-billed Gull nests.