2019 INTERIOR LEAST TERN AND PIPING PLOVER ANNUAL REPORT FOR THE LOWER PLATTE RIVER, NEBRASKA

NEBRASKA GAME & PARKS

Nongame Bird Program

TERN & PLOVER CONSERVATION PARTNERSHIP

This report is dedicated to the memory and life's work of Dr. Mary Bomberger Brown. Mary was the coordinator of the Tern and Plover Conservation Partnership from 2007-2019 and made significant and indelible contributions to conservation, science and service.

Mary passed away on August 24, 2019.

Photos: Mary Bomberger Brown erects a cage around a Piping Plover nest at a housing development along the lower Platte River (cover). Mary Bomberger Brown bands a Least Tern at a sand and gravel mine in Douglas County, Nebraska (above).

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We thank our partners for their contribution to this project in 2019.

Bluewater Development Corp.
Central Sand and Gravel
Lake Socorro HOA
Lanoha Development Co.
Loup Power District
Lower Platte North NRD Lower Platte South NRD Lyman-Richey Corp.
Mallard Sand and Gravel
Nebraska Natural Legacy Project
Nebraska Public Power District
Old Castle Materials
Overland Sand and Gravel
Papio-Missouri NRD
Preferred Sands of Genoa
Ritz Lake Development
Riverview Shores HOA
Sandy Pointe Development
Stalp Gravel Company
U.S Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Geological Survey
Western Sand and Gravel

PREFACE

This document reports on our monitoring, research, and management activities during the past 12 months (Sep. 2018 – Aug. 2019). We prepared it to inform our partners, cooperating agencies, funding sources, and other interested parties of our activities and to provide a preliminary summary of our results.

The data, data analyses, results, summaries, and interpretations found in this document are not final and should be considered as such when being cited or referred to in documents, reports, proposals, or presentations. Please contact us before using any of this material and for additional information that may be available.

In an effort to make the information in this document more accessible, it is divided into four sections: Introduction, Monitoring, Research, and Management.

Introduction: This section describes the project area and summarizes conditions encountered during the 2019 field season.

Monitoring: This section describes the data we collect every year for basic demographic analyses and includes the number of nests and chicks found in the focus area. These data are collected and summarized in a form that allows comparison across the ranges of both species.

Research: This section describes our research objectives, research methods, data collection, and data analyses.

Management: This section describes our actions intended to protect Interior Least Terns and Piping Plovers and their nests from interference and disturbance.

Mary Bomberger Brown (left) and Ian Hoppe weighing a Least Tern chick

DEFINITIONS

OFF-RIVER SITE DEFINITIONS

Active mine – an off-river site managed by a sand and gravel mining company that is actively mined and is regulated by the Mine Safety and Health Administration (MSHA).

Inactive mine – an off-river site managed by a sand and gravel mining company but is no longer actively mined and is no longer regulated by the Mine Safety and Health Administration (MSHA).

Lakeshore housing development – an off-river site, usually managed by a homeowners association, with at least one house on the property that an individual or family occupies for all or part of the year.

Off-river site – Any area used as breeding habitat by terns and plovers located away from a river channel.

Transition site – an off-river site that is no longer managed by a sand and gravel mining company or regulated by the Mine Safety and Health Administration (MSHA) and does not have homeowners in residence on the property; transition sites are primarily managed by the real estate developer rather than a sand and gravel mining company or a homeowners association.

AGE DEFINITIONS

Adult – life stage after completing first migration cycle (winter-spring); a bird is in adult plumage one year of age or older and capable of breeding.

After hatch year – a bird in at least its second calendar year of life (Pyle 1997).

Chick – life stage from hatching to when a bird is capable of flight (plover: hatch day to 27 days post-hatch; tern: hatch day to 20 days post-hatch).

Fledgling – Brief period when a juvenile bird is capable of short flights but is still dependent on parental care.

Hatch year – a bird in first-basic plumage during its first calendar year of life (Pyle 1997).

Juvenile – a bird in juvenal plumage, before the first prebasic molt (Pyle 1997).

Mary Bomberger Brown (right), former Governor Dave Heineman (center), and Chris Thody

INTRODUCTION

The lower Platte River and its major tributaries provide important nesting and migratory stopover habitat for two bird species of special conservation concern, the Endangered Species Act (ESA) – endangered Interior Least Tern (*Sternula antillarum athalassos*) and the ESA - threatened Piping Plover (*Charadrius melodus*). The Nebraska Nongame and Endangered Species Conservation Act also protects both species at the state level. The Tern and Plover Conservation Partnership (TPCP), based at the University of Nebraska-Lincoln School of Natural Resources, and Nongame Bird Program (NBP), based at the Nebraska Game and Parks Commission (NGPC), work cooperatively on Interior Least Tern and Piping Plover monitoring, research, management, and outreach activities in Nebraska. Our monitoring and research efforts are primarily focused along the lower Platte, Loup, and Elkhorn rivers in the eastern part of the state. However, we also work on tern and plover issues across the state, including Lake McConaughy, and the region.

FOCUS ANIMALS

Piping Plovers are small, migratory shorebirds often seen running along sandy shorelines. Adults are approximately 18 cm in length with a 48 cm wingspan. They feed on small invertebrates and insects and are frequently seen probing their bills into sandy substrates along the water's edge.

The species was first described in 1824 from a type specimen collected in New Jersey (American Ornithologists' Union 1998). Meriwether Lewis and William Clark saw Piping Plovers, and recorded their observations in what was to become the state of Nebraska, during their 1803–1805 "Voyage of Discovery" across North habitat located in Nebraska on 13 October 2005; to date, it has not been reinstated.

Interior Least Terns are the smallest tern found in North America. They are feisty, swallow-shaped birds most often seen in flight. Adults are approximately 20 to 23 cm in length with a 50cm wingspan. They feed on small fish and are often observed hovering over water before diving to catch a small fish in their bill. They are colonial, nesting in close proximity to each other and placing their nest and eggs directly on the ground.

Our mission is to prevent and meditate conflicts between nesting terns and plovers and people, facilitate communication and promote proactive cooperation between agencies and people, and promote learning among stakeholders.

The Least Tern was first described in 1847 from a type specimen collected in Guadeloupe, West Indies (American Ornithologists' Union 1998). Meriwether Lewis and William Clark recorded their first observation of an Interior Least Tern on 5 August 1804 along the Missouri River, near present day Omaha, Nebraska while on their 1803—1805 "Voyage of Discovery" across North America. The species was placed on the Endangered Species List on 27 June 1985 (50 Federal Register 21784–21792), and a Recovery Plan was issued in September 1990. As a result of their listing status, Interior Least Terns are protected by the Federal Endangered Species Act (1973) and the Nebraska Nongame and Endangered Species Conservation Act (Neb. Rev. Stat. § 37-80111). However, the Interior Least Tern was proposed for federal delisting on 23 October 2019.

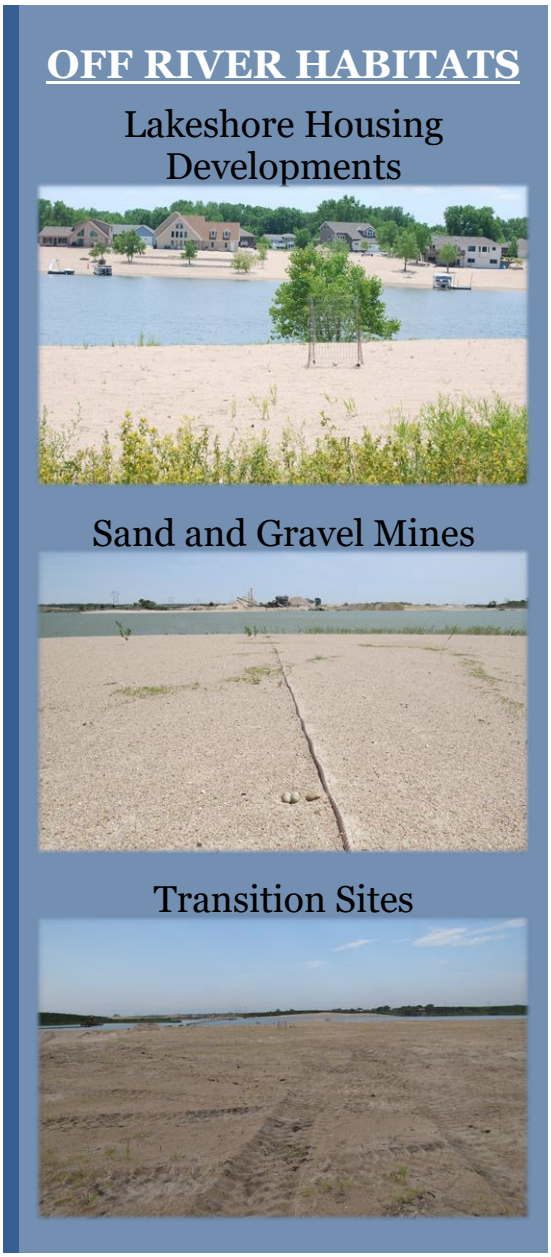
Piping Plovers and Interior Least Terns are integral parts of the fauna of Nebraska. Terns and plovers were described by all of the major expeditions that passed through the region (e.g., Lewis and Clark, John James Audubon, Stephen Long, Duke Paul Wilhelm, Governor Kemble Warren, and Ferdinand Hayden), but they were known by Native Americans well before that period of time. Historically, terns and plovers flourished on sparsely-vegetated midstream sandbars of the Platte, Missouri, Loup, Elkhorn, and Niobrara rivers. However, much of this natural habitat has been lost due to broad-scale alterations of natural river systems. The amount of suitable sandbar habitat has been reduced by the presence of invasive plant species, construction of dams and reservoirs, river channelization, bank stabilization, hydropower generation, and water diversion. Terns and plovers frequently nest on human-created habitats that occur outside of the river channel. These habitats are created by industrial and commercial activities such as sand and gravel (aggregate) mining, dredging, and construction operations. This change in nesting habitat from exclusively river sandbars to a combination of on-river and off-river habitats is the result of the decrease in available river nesting habitat and the increase in available human-created off-river nesting habitat.

Piping Plovers and Interior Least Terns are migratory birds that spend significant portions of the year in different parts of the Western Hemisphere. They are present in their nesting areas for about four months of the year. The other eight months are spent on migration and on their overwintering areas. Piping Plovers spend the winter along the Gulf of Mexico, southern Atlantic Coast, in the Bahamas, and on other Caribbean Islands. These habitats are characterized by wide sandy beaches and a combination of sand flats, mudflats, tide pools, marshes, lagoons, and large inlets. Interior Least Terns spend the winter well off-shore and along coasts, bays, estuaries, and river mouths near Central and South America. Loss of overwintering habitat contributed to the decline of both species. The principal threats to tern and plover overwintering habitat include habitat loss and degradation, increased coastal residential and industrial development, and stochastic events (e.g., global sea level rise, oil spills, water pollution, and hurricanes).

Mary Bomberger Brown (left), Marth Tacha and Pete Melcher at the Loup Power District “sandpile” near Genoa

FOCUS AREA

We define our study area as the lower Platte River system in eastern Nebraska, including a portion of the Loup River and numerous off-river sites (Fig. 1, Table 1). We concentrate our monitoring and research efforts in our primary study area, from the Loup Power District diversion to the Missouri-Platte River confluence; throughout the remainder of this report our primary study area is referred to as the lower Platte River (Fig. 2). The TPCP concentrates its monitoring and research efforts on off-river nesting habitats in our primary study area. These off-river nesting habitats include lakeshore housing developments, active and inactive sand and gravel mines, and transition sites. During some years, additional monitoring and research efforts have occurred on off-river nesting habitats along the Middle Loup, Elkhorn, and North Platte rivers. We define the lower Platte River proper as the 103 river miles lying between the Loup-Platte River confluence (near Columbus, Platte County) and the Missouri-Platte River confluence (near Plattsmouth, Cass County). The NBP concentrates its monitoring and research efforts on river sandbars along the lower Platte River proper from the North Bend bridge to Missouri River confluence. The lower Platte River passes through eight counties (Platte, Colfax, Butler, Dodge, Saunders, Douglas, Sarpy, and Cass) and four Natural Resources Districts (Lower Platte South, Lower Platte North, Papio-Missouri, and Lower Loup).



2019 OFF-RIVER CONDITIONS

Overall, we monitored 23 sites in 2019. Conditions at off-river sites were different overall in 2019 compared to previous years. Several sites were impacted by flooding that occurred during early spring in 2019. Washouts and damaged infrastructure resulted in closures or limited access at a few sites. Several sites that we have monitored over the years neared the end of their lifespan and provided minimal nesting habitat in 2019. In fact, one housing development (Riverview Shores near North Bend) that has hosted nesting terns and plovers for more than thirteen years had no nests in 2019. We do not plan to monitor this site in the future. Another site in Saunders County that had been included in our efforts was no longer part of our program in 2019. However, a new site (Stalp Gravel Company near West Point) was monitored for the first time in 2019. We continued to work closely with sand and gravel mining companies and their staff, developers, construction workers, and homeowners.

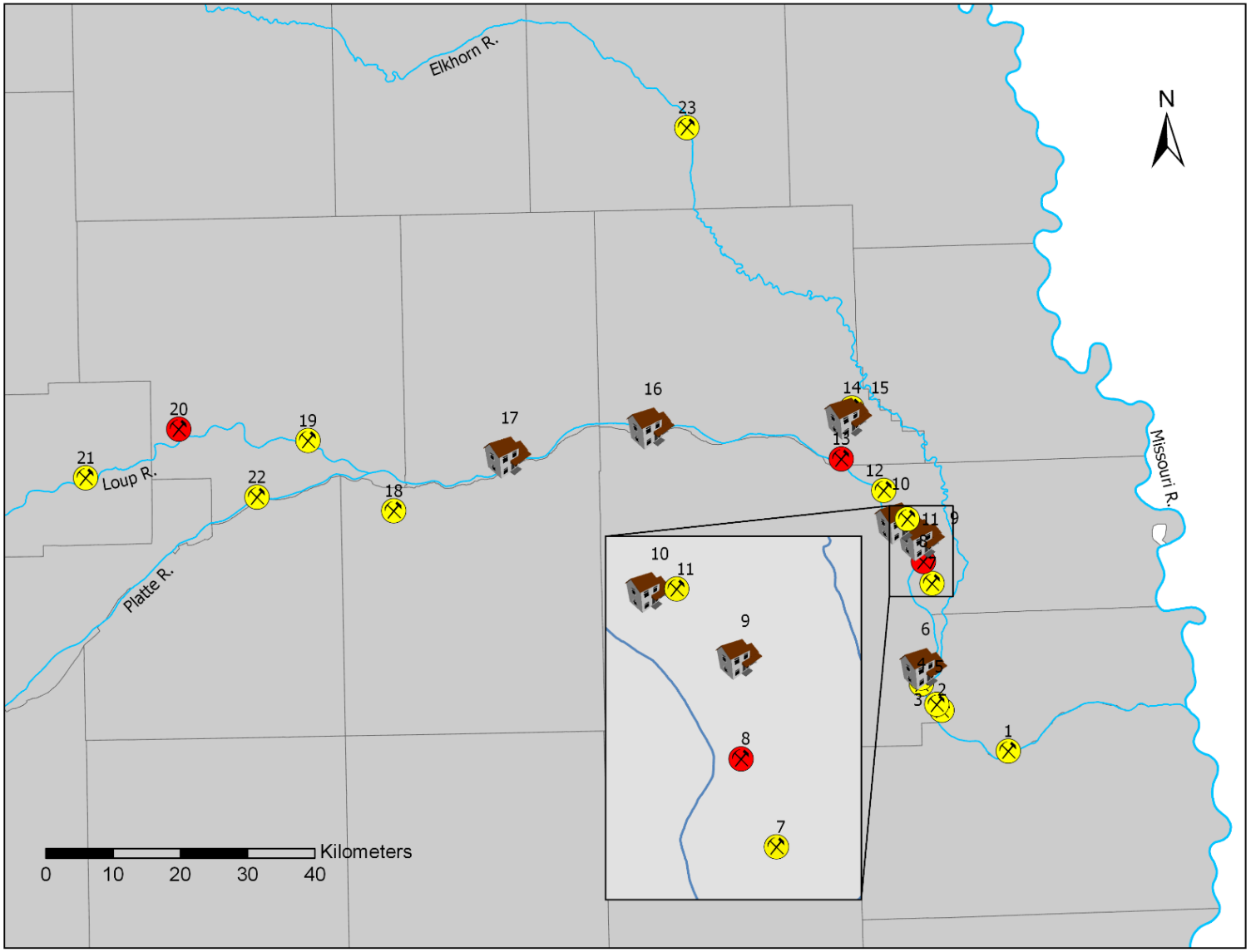


Figure 1. Locations of off-river Interior Least Tern and Piping Plover nesting areas within our study area are marked. Off-river sites can be matched to numbers in Table 1.

Table 1. Off-river tern and plover nesting sites; site numbers correspond with Figure 1.

#	Site Name	River	Owner	Site Type	County	2019 Nesting
1	Louisville Lakes	Platte	Western Sand and Gravel	Transition	Sarpy	No
2	Linoma Beach #50	Platte	Lyman Richey	Inactive Mine	Sarpy	No
3	Linoma Beach #51	Platte	Lyman Richey	Active Mine	Sarpy	No
4	Lyman-Richey #52	Platte	Lyman Richey	Active Mine	Sarpy	No
5	Sandy Pointe	Platte	Sandy Pointe Development	Housing	Saunders	Yes
6	Sand Creek	Platte	Western Sand and Gravel	Active Mine	Saunders	Yes
7	OMG-Graske Pit	Platte	Old Castle Materials Group	Active Mine	Saunders	Yes
8	Waterloo #40	Platte	Lyman Richey	Active Mine	Douglas	No
9	Mallard Landing	Platte	Homeowners' Association	Housing	Douglas	No
10	Bluewater	Platte	Bluewater Dev. Corporation	Housing	Douglas	No
11	Valley #7	Platte	Lyman Richey	Active Mine	Douglas	Yes
12	KMG	Platte	Mallard Sand and Gravel	Active Mine	Dodge	Yes
13	Western Fremont	Platte	Western Sand and Gravel	Active Mine	Dodge	No
14	Ritz Lake	Platte	Homeowners' Association	Housing	Dodge	Yes
15	NE Fremont North	Platte	Lyman Richey	Active Mine	Dodge	No
16	Riverview Shores	Platte	Homeowners' Association	Housing	Dodge	No
17	Socorro Lake	Platte	Homeowners' Association	Housing	Colfax	No
18	Bellwood #73	Platte	Central Sand and Gravel	Active Mine	Butler	Yes
19	Columbus #71	Loup	Central Sand and Gravel	Active Mine	Platte	No
20	Genoa North #95	Loup	Central Sand and Gravel	Inactive Mine	Platte	No
21	LPPD-Loup Diversion	Loup	Preferred Rocks - LPPD	Active Mine	Nance	Yes
22	Overland – Silver Creek	Platte	Overland Sand and Gravel	Active Mine	Merrick	Yes
23	Stalp - West Point	Elkhorn	Stalp Gravel Company	Active Mine	Cumming	Yes

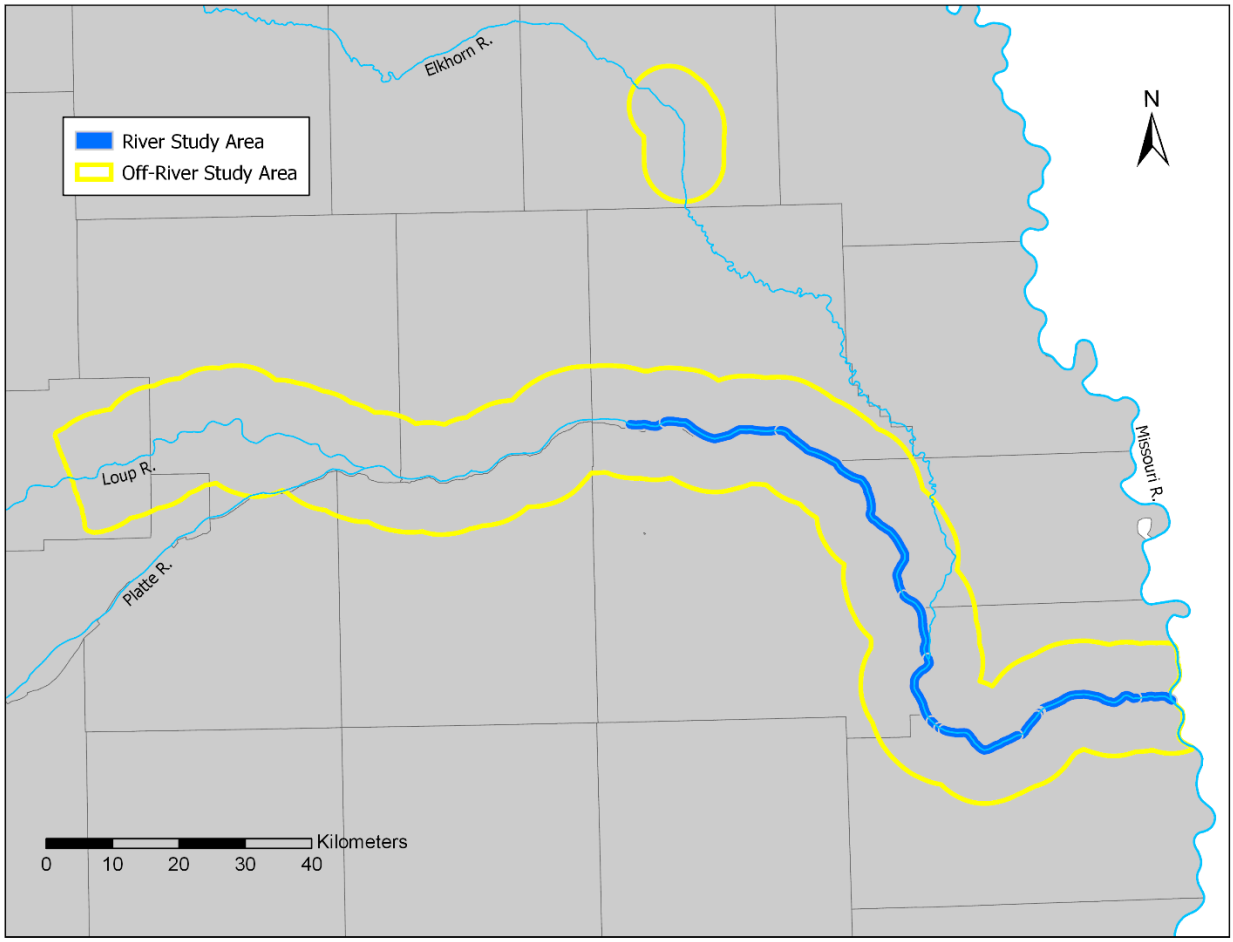


Figure 2. Our primary study area – the yellow box outlines the area where the TPCP concentrates it off-river monitoring and research efforts, and the dark blue outlines the area where the NBP concentrates its on-river monitoring and research efforts.

2019 River Conditions

The amount of suitable sandbar nesting habitat on the lower Platte River varies from year to year. Daily and seasonal fluctuations in the volume of water flowing in the river caused by annual rainfall, ice and snow accumulation, ground water levels, and river channel morphology influence sandbar development and maintenance. General water flow conditions on the lower Platte River are monitored by the United States Geological Survey (USGS) stream gages.

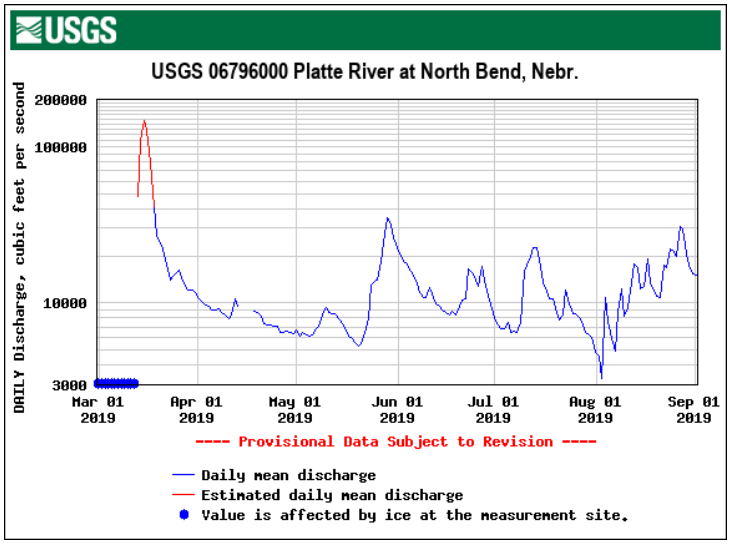


Figure 3. Daily water discharge (cubic feet per second; cfs) from March 1 through September 1 2019 measured at the North Bend gage, Dodge County.

Early spring 2019 brought one of the most dramatic flooding events to Nebraska in recorded history. Flooding in March resulted from intense rainfall and rapid snowmelt following a winter of heavy snowfall. Stream flow exceeded 200,000 cubic feet per second (cfs) at the Louisville gage. The previous peak streamflow recorded at the Louisville gage since 1953 was 160,000 cfs in 1993. The March flooding created sandbars of exceptional size and height, but higher than average stream flows continued throughout much of the summer. The continuing high water levels affected our ability to survey the river during the nesting season.

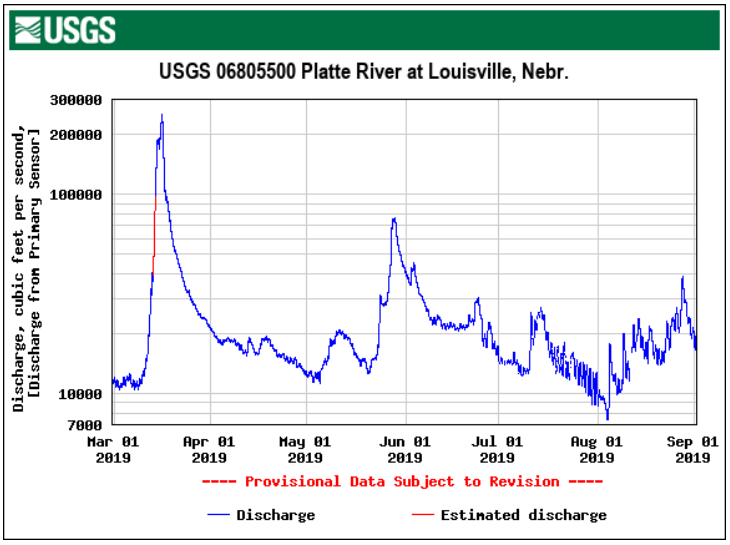


Figure 4. Daily water discharge (cubic feet per second; cfs) from March 1 through September 1 2019 measured at the Louisville gage, Cass County.

Despite higher than normal flows, the amount, size and elevation of sandbars provided in-channel habitat during much of the summer. Daily discharge at the North Bend gage (USGS 06796000 Platte River) was generally less than 10,000 cfs (cubic feet per second) from 15 April to 20 May. Water levels peaked during the breeding season at 34,800 cfs on 29 May. Daily water discharge at the Louisville gage (USGS 06805500 Platte River) generally ranged from 8,000 to 15,000 cfs in late April through mid-May, but a major peak occurred in late May and reached 72,800 cfs on 29 May during the breeding season. Water discharge remained essentially above 10,000 cfs throughout the rest of the breeding season.

COLOR BANDING SCHEMES ACROSS THE U.S. AND CANADA

Piping Plovers and Interior Least Terns are banded by authorized research groups across their ranges. Plovers have longer legs than terns which makes it much easier to mark them with color bands. Throughout their range plovers receive one to six leg bands and terns generally receive one or two leg bands depending on the site where they are banded (Fig. 5). Piping Plover research groups, based across the U.S. and Canada, place different colored flags on a plover's upper leg to indicate where they were originally banded (Fig. 6).

Figure 5. Piping Plover chick (left) and Interior Least Tern chick (right).

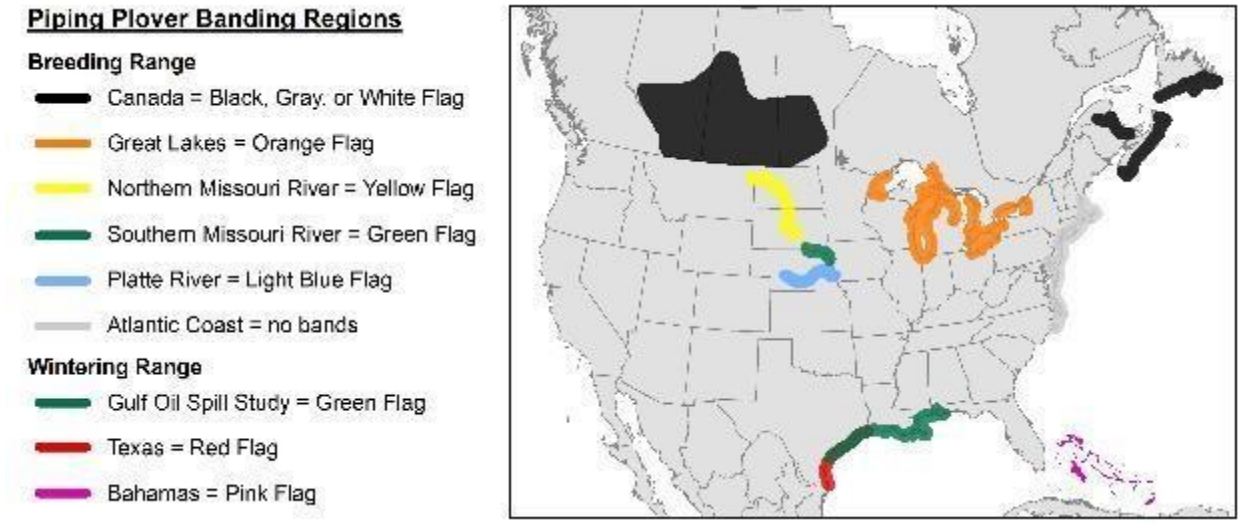


Figure 6. Piping Plover research groups place different colored flags on Piping Plovers to indicate where they were originally banded.

MONITORING

MONITORING REGIONAL MOVEMENTS OF BANDED TERNS & PLOVERS

Piping Plover Breeding Season Observations

We banded no birds in 2019, but we did re-sight previously banded birds. To date, we have banded 841 plovers; 165 adults and 676 chicks (Table 2). The majority of plovers (836) color-banded in our primary study area were captured at off-river sites; we banded five plover chicks with USGS bands only on river sandbars in 2009. Since 2008, we observed plovers in our primary study area originally banded in locations throughout the Great Plains and US Gulf Coast. During the 2019 breeding season, we observed plovers that were originally banded along the lower Platte River, the Missouri River between South Sioux City, NE and Yankton, SD, and the US Gulf Coast. Plovers banded along the Missouri River between South Sioux City, NE and Yankton, SD and some plovers banded along the US Gulf Coast are banded by the Virginia Tech University Shorebird Program. Some plovers banded along the US Gulf Coast in Texas are banded by the Coastal Bend Bays and Estuaries Program.

In 2019, we observed 18 previously banded Piping Plovers in our primary study area. We observed 14 plovers with light blue-flags indicating they were originally banded along the lower Platte River, one plover with a blue flag indicating it was originally banded along the central Platte River, two plovers with green flags indicating they were originally banded along the Niobrara River or Missouri River south of Yankton, SD, and one plover with a red flag indicating it was originally banded near Galveston Island, Texas.

Over the last eleven years, a number of Piping Plovers originally banded along the lower Platte River have been re-sighted nesting in other locations across the Great Plains (Table 3). Of the 717 plovers banded on the lower Platte River prior to 2019, 262 (37%) have been re-sighted during the breeding season at least one year after they were banded; 223 returned to nest along the lower Platte River, five have been observed on the central Platte River, 25 have been observed on the Missouri River, five have been observed on the Niobrara River, and three have been observed in the alkali lakes region of North Dakota. A majority (60%) of lower Platte River plovers that returned to the lower Platte River to nest were originally banded as adults. A majority (81%) of lower Platte River plovers reported outside of the lower Platte River study area during the nesting season were originally banded as chicks. Overall, 74% of the lower Platte River plovers banded as adults and 26% of the lower Platte River plovers banded as chicks have been re-sighted at least once during a breeding season at least one year after they were banded.

In 2019, we did not receive any reports of lower Platte River plovers nesting outside the study area. As of this writing, we have not received any reports of lower Platte River plovers observed on along the Missouri or Niobrara rivers in 2019.

Table 2. Number of Piping Plovers banded along the lower Platte River by year.

Year	Adults	Chicks	TOTAL
2008	19	12	31
2009	18	23	41
2010	9	48	57
2011	15	31	46
2012	11	73	84
2013	15	58	73
2014	27	72	99
2015	17	93	110
2016	15	129	144
2017	11	113	124
2018	8	24	32
2019	0	0	0
TOTAL	**165**	**676**	**841**

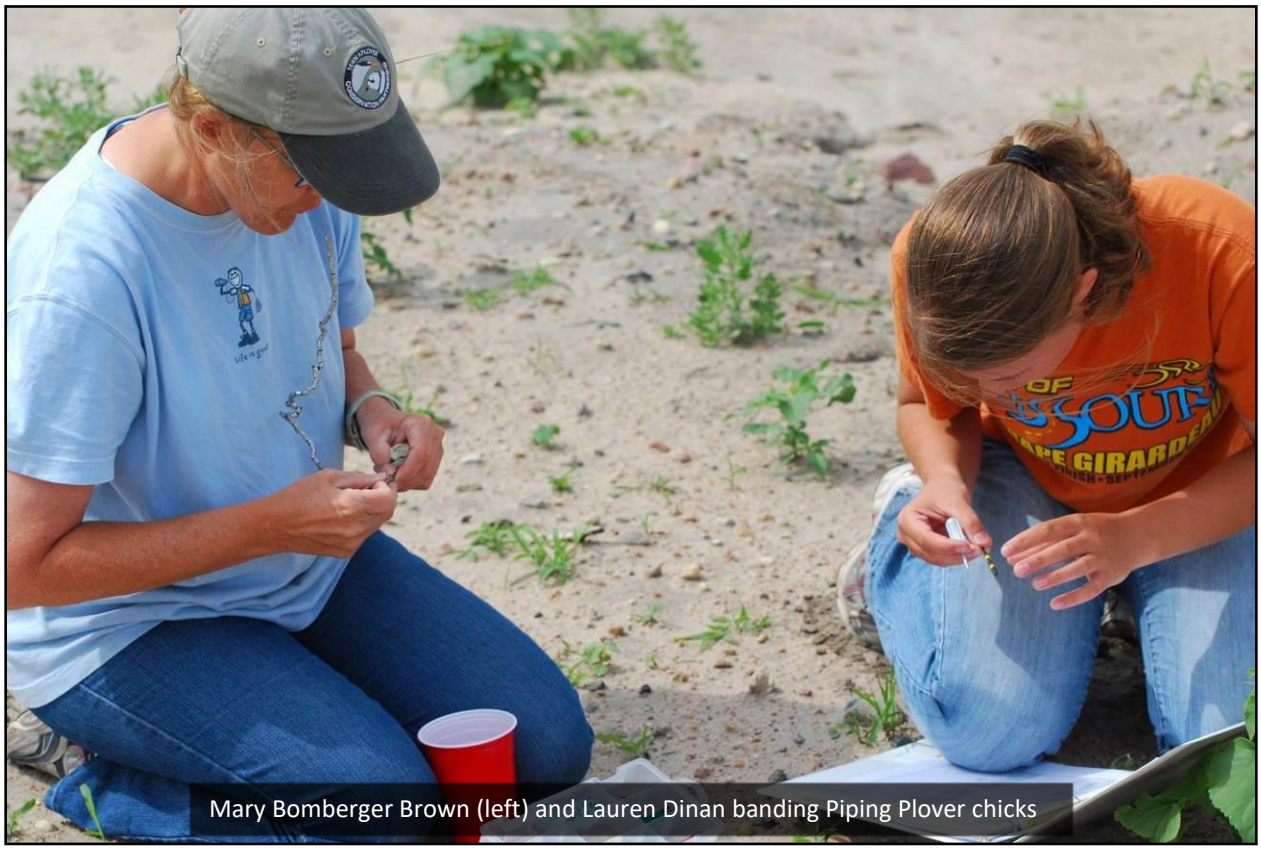
Table 3. Number of Piping Plovers previously banded along the lower Platter River and re-sighted during the breeding season at least one year after they were originally banded.

Age Banded	lower Platte River	central Platte River	Missouri River	Niobrara River	North Dakota	TOTAL
Adults	139	1	6	0	0	**141**
Chicks	100	3	19	5	3	**120**
TOTAL	**224**	**4**	**25**	**5**	**3**	**261**

Mary Bomberger Brown (left), Peyton Burt, Jamie Briske and Joel Jorgensen at Lake McConaughy

Table 4. Number of Interior Least Terns banded on the lower Platte River each year.

Year	Adults	Chicks	TOTAL
2008	0	168	168
2009	0	199	199
2010	0	118	118
2011	0	120	120
2012	0	76	76
2013	0	93	93
2014	0	190	190
2015	20	202	222
2016	7	121	128
2017	0	126	126
2018	0	0	0
2019	0	0	0
TOTAL	**27**	**1287**	**1440**



Mary Bomberger Brown (left) and Lauren Dinan banding Piping Plover chicks

Piping Plover Non-Breeding Season Observations

Winter Range

Every year a number of Piping Plovers banded along the lower Platte River are observed in wintering areas during the non-breeding season (Fig. 7). As of 30 September 2019, we received 11 reports of lower Platte River plovers in their winter range following the 2019 breeding season; all were observed along the US Gulf Coast except one that was observed in Mexico at Isla Holbox, Quintana Roo state, Mexico. This was also the first lower Platte River plover reported in the winter range following the 2019 breeding season on 30 July, 2019. This plover was banded along the lower Platte River as a 1-day old chick at a mining facility near Genoa, Platte County, Nebraska in 2018.

Over the course of this study, 126 plovers originally banded in our primary study area have been re-sighted in their winter range during the non-breeding season, with several birds observed more than once. Of the 126 plovers, 51 were originally banded as adults and 76 were originally banded as chicks. Winter sightings of lower Platte River plovers extend from the southern tip of Texas to the Florida Keys and north along the US Atlantic Coast to South Carolina. In December 2017 we also had our first lower Platte River Plover reported and photographed wintering outside of the United States. This plover was reported wintering at Isla Holbox, Quitana Roo state, Mexico which is north of Cancun, Mexico. There was a second report of the plover overwintering at Isla Holbox, Quitana Roo state, Mexico in August 2018, and a third Platte River plover reported at the same location in July 2019. Lower Platte River plovers have been reported in seven states and 30 counties along the US coast (Table 5). The majority of winter re-sightings have occurred along the US Gulf Coast. The first reports of lower Platte River plovers along the US Atlantic Coast occurred during the winter of 2012–2013. To date, seven lower Platte River Plovers have been observed wintering along the US Atlantic Coast.

Since 2008, we have received a total of 585 reports of lower Platte River plovers observed during the non-breeding seasons (2008–2019), with most reports provided by resident and visiting birders and recreational wildlife photographers.

One red-flagged plover, observed along the lower Platte River in 2019, was originally banded along the US Gulf Coast. We also observed a green-flagged plover in May 2019 banded by Virginia Tech along the Missouri River that was banded as an adult in 2007, making it at least 13 years old.

Table 5. States/Countries where lower Platte River plovers have been observed overwintering.

State	Number of LPR Plovers	Percent of Total
Alabama	3	2.4%
Florida	26	20.6%
Georgia	2	1.5%
Louisiana	16	12.6%
Mississippi	6	4.8%
South Carolina	2	1.5%
Texas	68	53.9%
Mexico	3	1.7%
TOTAL	**126**	**100%**

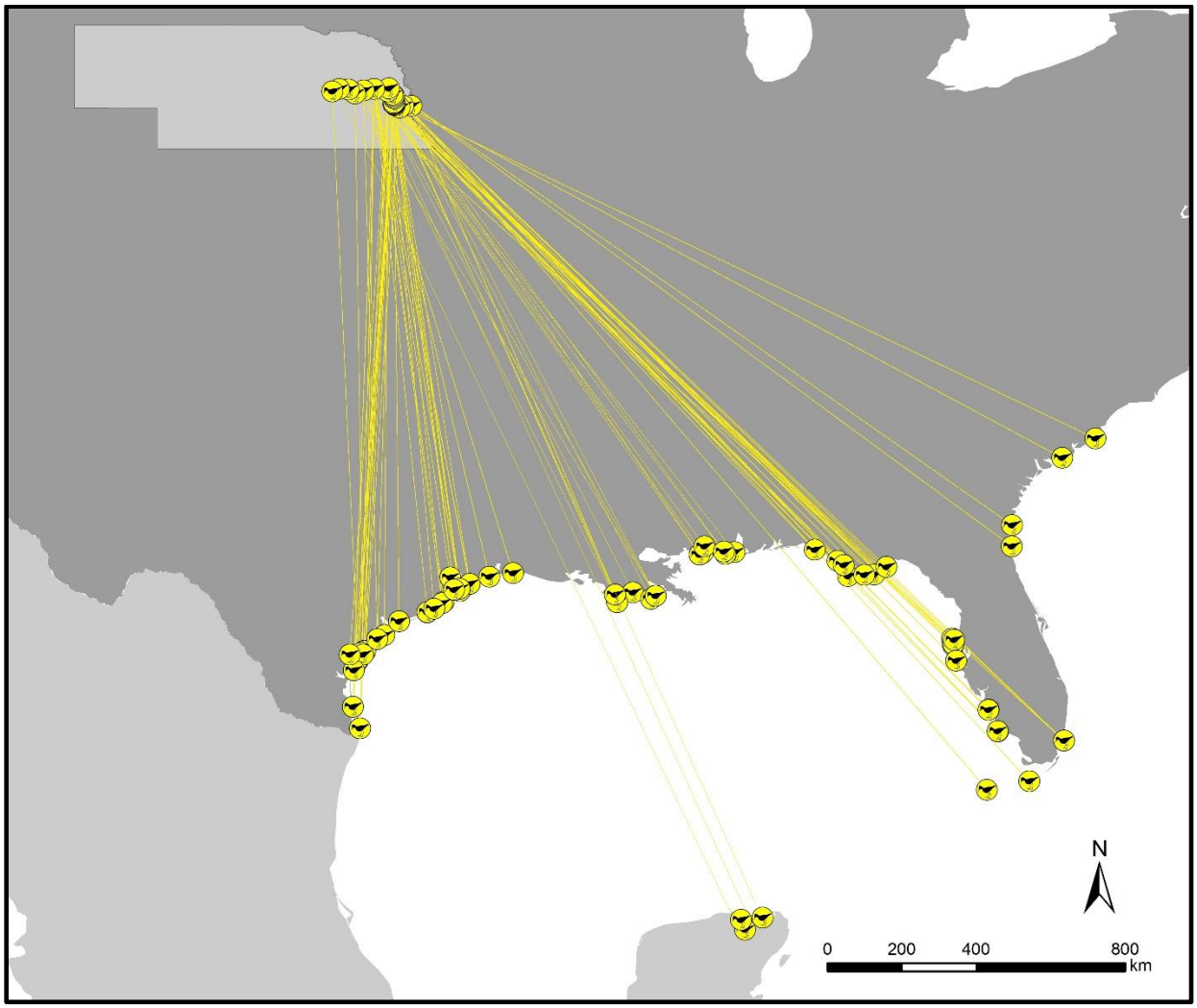


Figure 7. Locations where light blue-flagged plovers, originally banded in our primary study area, have been observed during the non-breeding season on the US Gulf and Atlantic coasts and the Yucatan Peninsula from 2008 to 2019.

MONITORING NESTS & CHICKS

Methods: Off-River Habitat

In 2019, we began conducting Interior Least Tern and Piping Plover surveys at off-river sites in late April. Throughout the breeding season (late April – early August) we surveyed each off-river site at least once every five to seven days. During each visit to off-river sites, we counted the number of terns and plovers present, located new nests, checked the status of known nests, and searched for tern and plover chicks. In 2019, we eliminated our banding efforts and only tracked nest status and chick status. Every time a new nest was found, we assigned it a unique identification number and recorded the nest location using a handheld GPS unit (Garmin Oregon 550t, Garmin Ltd., Olathe, KS, USA). We recorded the number of eggs in each nest and "floated" the eggs in water to determine the nest initiation date (Hays and LeCroy 1972). Using the egg floating data, we calculated the eggs' expected hatch date, assuming a 28-day incubation period for plovers and a 21-day incubation period for terns. A majority of the nests were located one to

seven days after the first egg was laid. During each subsequent nest check, after the day the nest was found, we checked eggs for any damage and recorded the status of each nest. We determined the status of each tern and plover nest based on the following criteria:

Confirmed Successful: 'pipped' eggs or newly-hatched chick(s) observed in or in the immediate vicinity (< 1 meter) of the nest cup

Likely Successful: empty, but intact nest cup located on or after the expected hatch date; nest cup may contain small pieces of eggshell

Confirmed Failed: nest cup and/or eggs found destroyed or abandoned

Likely Failed: nest not relocated on repeat visits prior to expected hatch date

Undetermined: nest not re-checked prior to hatch date or not enough evidence to determine nest fate

At some off-river sites, Interior Least Terns and Piping Plovers placed their nests in areas not accessible to us for safety reasons. In these cases, we only recorded the number of nests, eggs, adults, chicks, fledglings and juveniles that were visible from a distance.

We recorded the total number of active nests and the total number of terns and plovers in each of the following age classes:

Adults: birds one year or older, in adult plumage, and capable of breeding

Chicks: young birds incapable of flight (plovers < 28 days old and terns < 21 days old)

Fledglings: young birds capable of flight but still dependent on parents

Juveniles: birds capable of sustained flight and independent from parents but not in adult plumage (within the first year of life)

We recorded any notable observations including weather conditions, bird injuries, and evidence of disturbance caused by humans, dogs, cats, vehicles, natural predators, or recent severe weather events. We recorded the band combinations of all terns and plovers observed or recaptured with leg bands.

Results: Off-River Habitat

In 2019, we located 19 Piping Plover nests and 25 Interior Least Tern nests at off-river sites in our primary study area (Table 6). These nests were distributed across 11 sites, one site along the Loup River, 9 sites along the lower Platte River, and one along the Elkhorn River (Figs. 8–9). Nests were located at two lakeshore housing developments and nine sand and gravel mines. In 2019, 11% of plover nests and 28% of tern nests were confirmed successful, while 21% of plover nests and 28% of tern nest were confirmed failed (Tables 7–8). We observed 12 plover chicks and 14 tern chicks on off-river sites (Table 6).

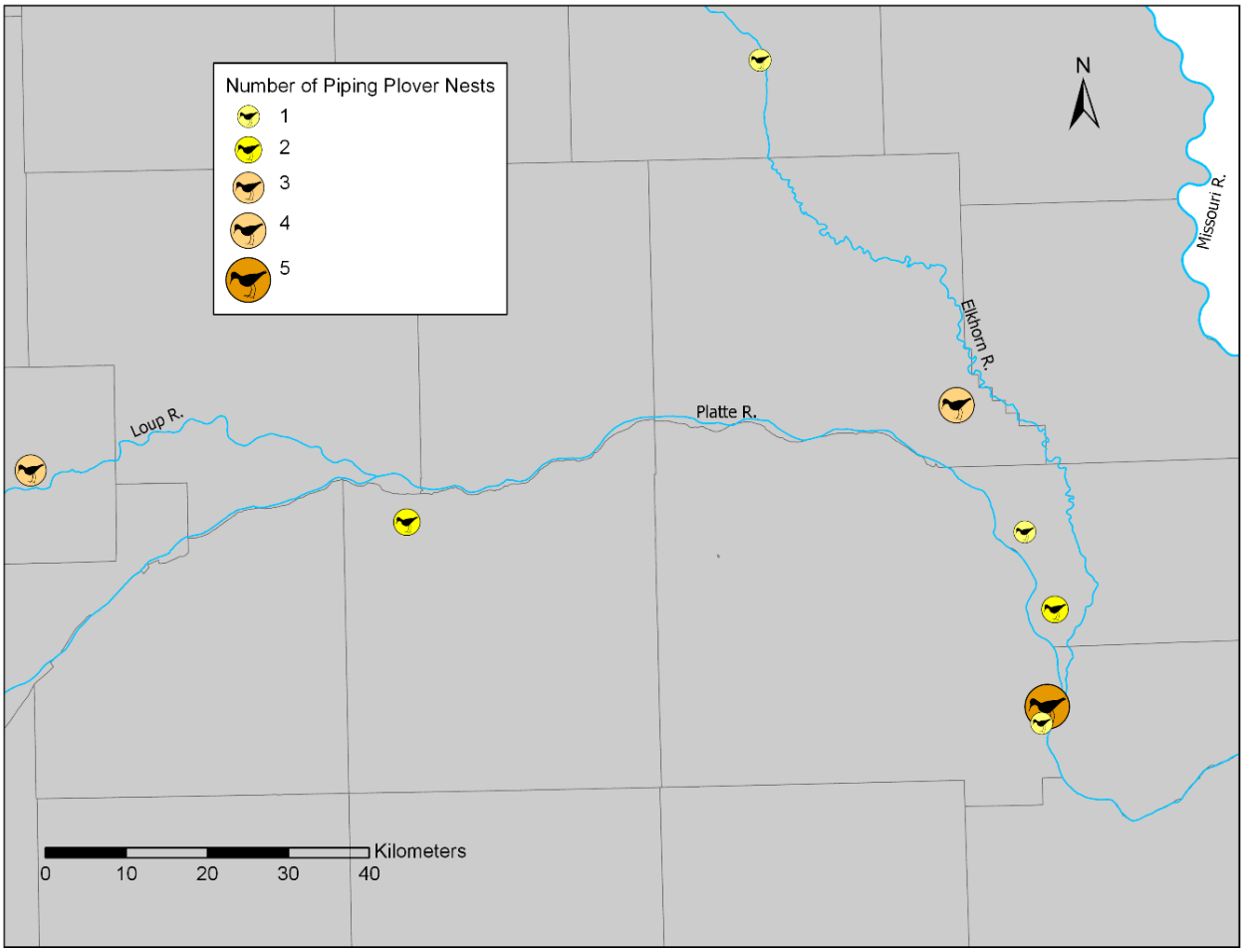


Figure 8. Location of off-river Piping Plover nest sites in 2019.

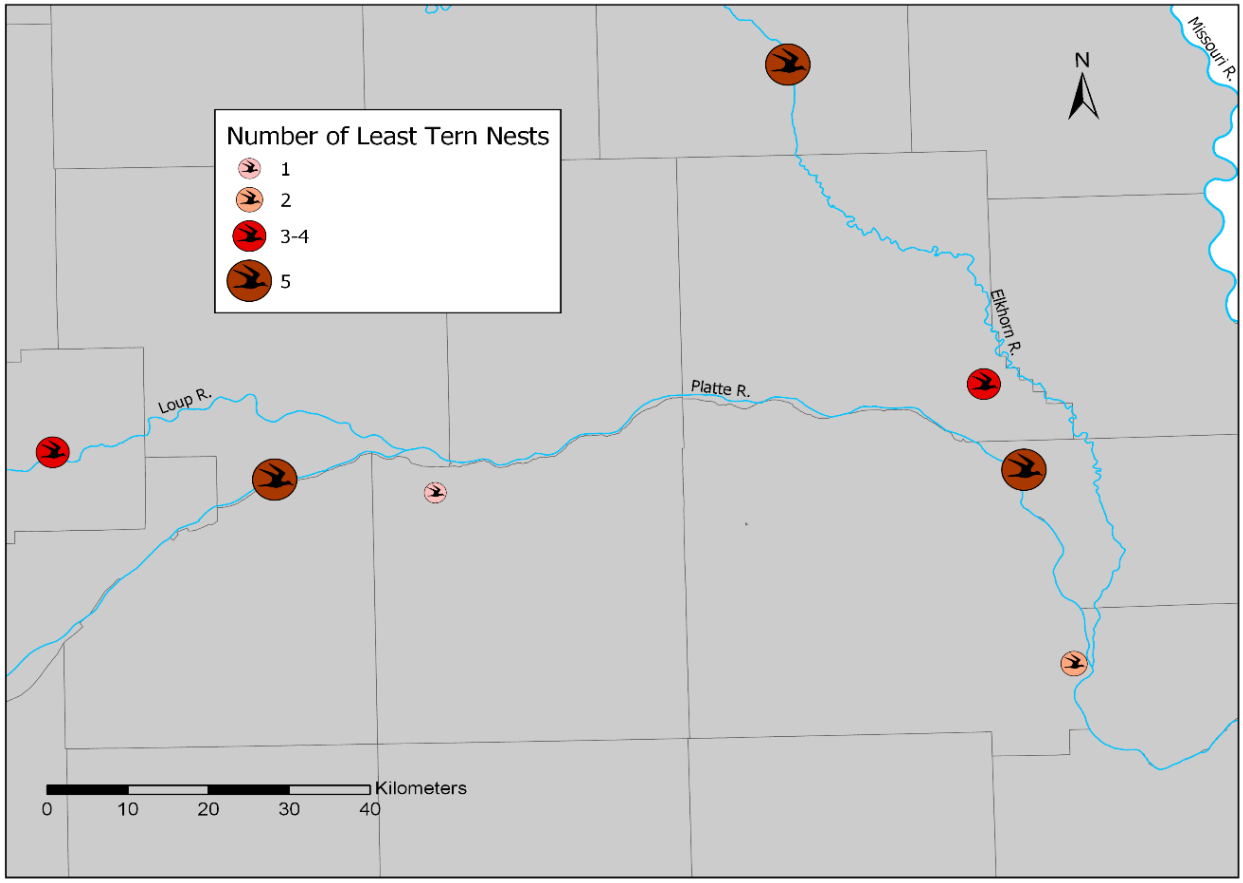


Figure 9. Location of off-river Interior Least Tern nest sites in 2019.

Mary Bomberger Brown (rear) and Melissa Panella erecting signs and fencing around a tern and plover nesting area

Table 6. The number of Interior Least Tern and Piping Plover nests and chicks observed at each off-river site along the lower Platte River 2019.

Site Name	Site Type	Piping Plover		Interior Least Tern	
		# Nests	# Chicks	# Nests	# Chicks
Louisville Lakes	Transition	0	0	0	0
Linoma Beach #50	Inactive Mine	0	0	0	0
Linoma Beach #51	Active Mine	0	0	0	0
Sandy Pointe	Housing	5	3	2	1
Sand Creek	Active Mine	1	0	0	0
G Plant	Active Mine	0	0	0	0
OMG-Graske Pit	Active Mine	2	2	0	0
Bluewater	Housing	0	0	0	0
Valley #7	Active Mine	1	0	0	0
KMG	Active Mine	0	0	5	0
Western Fremont	Active Mine	0	0	0	0
Ritz Lake	Housing	4	4	3	1
NE Fremont North	Active Mine	0	0	0	0
Riverview Shores	Housing	0	0	0	0
Bellwood #73	Active Mine	2	0	1	0
Columbus #71	Active Mine	0	0	0	0
Genoa North #95	Inactive Mine	0	0	0	0
LPPD-Loup Diversion	Active Mine	3	3	4	3
Overland – Silver Creek	Active Mine	0	0	5	3
West Point	Active Mine	1	0	5	6
TOTAL		**19**	**12**	**25**	**14**

Table 7. Piping Plover nest fates on off-river sites along the lower Platte River in 2019.

Nest Fate	Mines	Housing	Transition	Total
Confirmed Hatched	1	1	0	2
Likely Hatched	5	5	0	10
Confirmed Failed	2	2	0	4
Likely Failed	1	1	0	2
Undetermined	1	0	0	1
TOTAL	**10**	**9**	**0**	**19**

Table 8. Interior Least Tern nest fates on off-river sites along the lower Platte River in 2019.

Nest Fate	Mines	Housing	Transition	Total
Confirmed Hatched	6	1	0	7
Likely Hatched	5	2	0	7
Confirmed Failed	6	1	0	7
Likely Failed	2	1	0	3
Undetermined	1	0	0	1
TOTAL	**20**	**5**	**0**	**25**

Methods: On-River Habitat

Access to river sandbars differs from access to off-river sites, so we take a different approach to monitoring terns and plovers nesting on midstream river sandbars. It was more difficult to survey the river in 2019 compared to other years due the historic flooding and summer high flows, but we were still able to survey all portions of the river below the North Bend bridge. However, some surveys occurred late in the nesting season and therefore some nesting activity was certainly undetected. In 2019, we cooperated with the U.S. Fish and Wildlife Service – Nebraska Field Office (USFWS), which led an effort to survey the river via airboat. USFWS staff surveyed from North Bend to the I-80 bridge on 19 June and 2 July. USFWS personnel and Joel Jorgensen surveyed the Platte River from the Missouri River confluence to the I-80 bridge on 23 July.

We (or USFWS personnel) visually scanned for habitat, the presence of terns and plovers and behaviors suggestive of nesting or breeding. When a group was located, we stopped and surveyed the sandbar from the airboat looking for adults and recently fledged juveniles. In 2019, we focused on recording general colony information about the location and approximate number of birds rather than exact nest locations and nest success.

Results: On-River Habitat

In 2019, we observed two Piping Plover nests, three Piping Plover chicks, and five color-banded plovers. We observed 246 adult least terns and 54 nests (Table 9), with an additional 34 juvenile terns observed on the 23 July survey. These unusually high counts of terns on the river, along with our historically low numbers of nesting off-river, point to a notable response from terns to the large amounts of new sandbar habitat created along the Platte after the major flooding events of 2019.

Table 9. The minimum number of Interior Least Tern and Piping Plover nests and adults observed on river segments, based on river miles, on the lower Platte River 2019.

Site Name	Piping Plover		Interior Least Tern	
	# Adults	# Nests	# Adults	# Nests
RM 75–64	2	1	21	8
RM 63–50	1	1	42	15
RM 49–40	1	0	12	4
RM 39–25	1	0	51	27
RM 25–1	NA	NA	120	NA
TOTAL	**5**	**2**	**246**	**54**

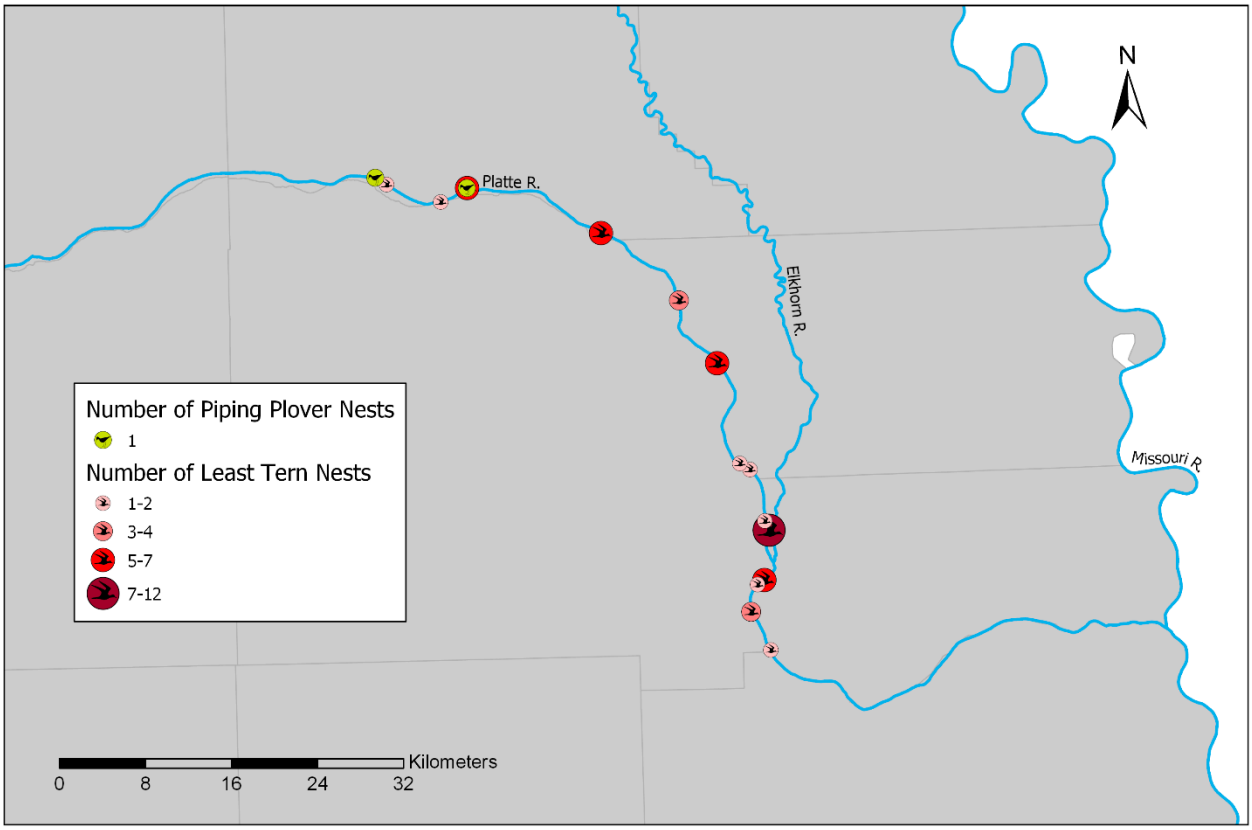


Figure 10. Location of Plover and Tern nests on river sandbars during the 2019 season. Surveys on the lower portions (I-80 bridge to Missouri River confluence) of the lower Platte River were conducted at the end of the breeding season and therefore very few nests were observed and are not included on this graphic.

Discussion on the exceptional conditions of 2019

Conditions experienced during the 2019 season translated into an exceptional season for plovers and terns in, on, and along the lower Plate River and its tributaries. The historic spring flooding event created large amounts of sandbar habitat, and in spite of consistently high water and precipitation at various

points throughout the summer, several large sandbars were available to nesting birds, especially below the confluence with the Elkhorn River. Thus, both species, and terns in particular, took advantage of this newly available habitat. Fewer birds used off-river sites, such as sand and gravel mines, in 2019. The flooding also affected a few of the off-river sites by essentially washing away available nesting habitat and limiting our access to historically productive areas. The increased building footprint and vegetation cover at multiple housing developments that we monitor expanded to such an extent that available nesting areas were no longer available or limited compared to previous years. This 'site senescence' that occurred at multiple sites in 2019 is expected to result in lower numbers in the coming years unless new sites are developed and become available. However, evolving mining practices are anticipated to result in reduced mine footprints that will in turn translate into less habitat and fewer birds in the future at off-river sites (Dinan et al 2018). Finally, discontinued monitoring at a site that traditionally hosted a consequential number of birds in recent years also affected our overall numbers at off-river sites in 2019.

The number of nests we found for both species at off-river sites were at all-time lows since at least 2006. The previous lowest totals during this period were 33 nests for plovers (2009) and 83 nests for terms (2009), compared to 19 plover and 25 tern nests during this season. The extremely low tern nest numbers are likely a result of the flooding and subsequent ample amount of on-river sandbar habitat during 2019. We believe the number of Least Tern adults/young/nest we report observing on the Lower Platte River underestimates the actual number of birds using the river in 2019. The low numbers of plover nests are more likely due to the variety of factors listed above.

RESEARCH

In previous years, we located enough nests for each species to model daily and seasonal nest survival and annual individual survival rates. Given the extremely low numbers of nesting birds this year, we did not have a large enough sample size to create reliable calculations for the 2019 season.

MANAGEMENT

The TPCP uses a voluntary, proactive approach to reduce human-bird conflicts and avoid the need for law enforcement actions in Interior Least Tern and Piping Plover management.

Before terns and plovers return to Nebraska in the spring and the field season begins, TPCP personnel meet with the production crews and property managers of the aggregate (sand and gravel) mines in our focus area. We discuss production plans for the upcoming season, safety regulations, and site access. We pay particular attention to concerns mine personnel have regarding on-site activities of the TPCP and changes to federal MSHA (Mine Safety and Health Administration) policy as it applies to non-mine personnel. We also meet with real estate developers and homeowners' associations at the lakeshore housing developments. At these meetings, we discuss the construction plans for the area and site access. We pay particular attention to property owners' concerns regarding on-site activities of the TPCP.

The result of these meetings is a set of site-specific management and monitoring plans; an equally valuable result is the TPCP becoming better acquainted with the people living and working at these sites. This makes our management efforts easier to implement and more effective as the nesting season progresses. We maintain close contact with these individuals throughout the season, so we can quickly respond to any on-site changes that develop.

Mine Safety and Health Administration (MSHA) and Institutional Animal Care and Use (IACUC)

Every year, all TPCP personnel receive MSHA training and certification for scientific (non-miner) workers. In 2019, our training was again provided by Tim Zuehlke, a MSHA certified trainer, and included mine safety, Red Cross First Aid, CPR and AED training. Copies of TPCP personnel certification cards are provided to the mining companies for their records. The Program Coordinator [MBB] completed University of Nebraska Institutional Animal Care and Use Committee (IACUC) training and maintains IACUC protocols and reporting.

Protecting Interior Least Tern and Piping Plover Nests

To protect tern and plover nesting areas, we erect "Keep Out" signs around the perimeter of all off-river nesting areas; these signs were designed in 2008 by the TPCP and have been widely adopted for use across Nebraska and other parts of the northern Great Plains. In areas where human foot or vehicle traffic is to be expected, 'psychological' barriers are added. These barriers consist of black or orange cord tied between the "Keep Out" sign posts with red-silver Mylar™ streamers attached to the cord to make it more visible.

Based on conversations with mine personnel and homeowners' associations before the nesting season begins, we mark off the areas where it would be safest for terns and plovers not to nest. At mines, these are areas that are going to be dredged during the nesting season or where heavy equipment will be operating. At housing developments, these are areas where buildings are to be constructed or utilities are to be installed. We know that terns and plovers avoid nesting in areas where the 1) substrate is disturbed by raking, 2) vegetation is present, 3) substrate particle size is unattractive to the birds or 4) areas are physically disturbed in some other way (J. Marcus, J. Dinan, R. Johnson, E. Blakenship, and J. Lackey 2007. Waterbirds 30: 251–258). In addition to planting vegetation, resurfacing the sand, and raking the substrate, we often opt for a physical method of discouraging birds from nesting in an area. Before the birds arrive, we put up grids of three-foot tall fiberglass poles with 16-foot-long streamers of red-silver Mylar™ flagging attached to them. The poles are set 16 feet apart. When the streamers blow in the wind, they make a crackling sound and sweep the ground, which discourages the birds from attempting to nest in the area.

Mary Bomberger Brown with "pebbles" the Piping Plover

We use protective wire mesh nest exclosures around plover nests, but not tern nests because of the birds' behavior around their nests—plovers walk up to their nests, while terns fly up to their nests. These exclosures help to protect plover nests from both human disturbance and natural predation. For terns, we place protective boundaries around tern nesting colonies that are in areas with human activity. We do this by placing a ring of 3-foot tall rebar poles around the nesting area; black cord with red-silver Mylar™ strips are tied between each of the poles. These marked off areas only help to protect tern nests from human disturbance; they do not reduce natural predation.

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Mary Bomberger Brown sharing a presentation about terns and plovers