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Species Detection,
Collection, and
Monitoring Report

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A summary of species detected during long-term monitoring at the Crane Trust and permitted collection activities in the calendar year.

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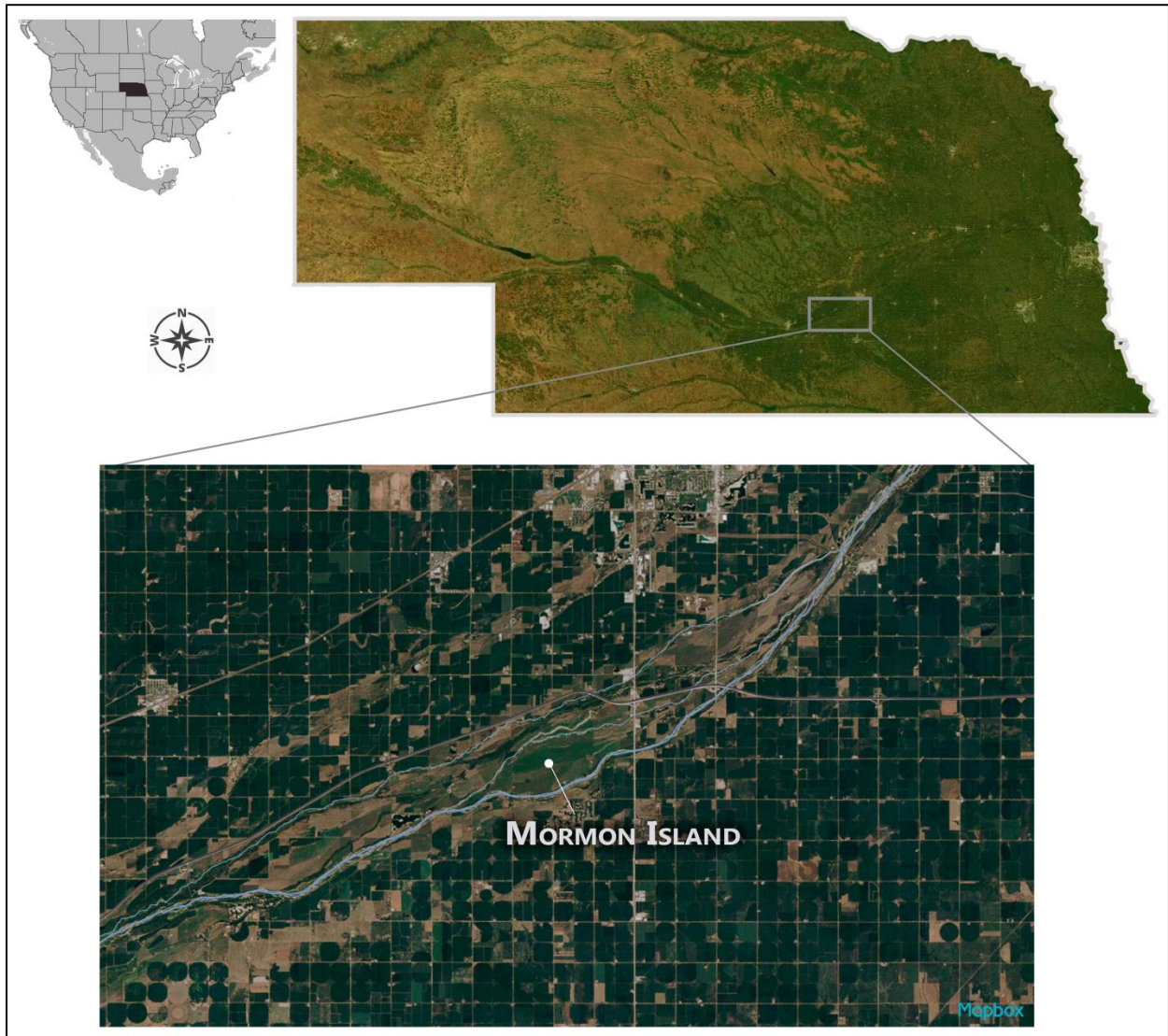
Introduction

During the summer of 2015 we implemented a long-term biological monitoring plot layout system through set transects establishing survey lines in all parts of the Crane Trust properties with differing soils, vegetation, management practices, and land use histories (main complex 2,025 ha; 40.798306°N, -98.416298°W, NAD 1983; 597 m elev., Hall County; Figure 1). These plots consist of two parallel transects: the vegetation line, totaling 100m and the bird, small mammal, and butterfly species of concern line, totaling 200m. Due to the complex mosaic of soil types and management histories on the property the total number of monitoring sites totaled 69 as of 2019; new sites are added as additional conservation properties are acquired or incorporated into Crane Trust management efforts. We have continued our efforts to survey the vegetation, avian community, small mammals, and butterfly species

at these sites utilizing standardized methodologies on a set rotation to monitor the effectiveness of our management techniques in promoting native biodiversity. Additionally, we conducted surveys of native and exotic slough dwelling fish and monitored ground water levels. We also added anuran vocalization surveys in 2018. We added three new monitoring sites on our recently acquired Martin's Meadows property in 2017. In 2019, we added new monitoring sites to the North Binfield property sold by the Platte River Recovery Implementation Program, which is currently under private ownership. We also added new monitoring sites on the Crane Trust's Alda Farms and Mormon Island properties associated with the restoration of cropland to native grassland. We conducted additional long-term grassland songbird monitoring through the IBS's (Institute for Bird Populations) MAPS program (Monitoring Avian Productivity and Survivorship) which involved banding at four different sites throughout the breeding season (June-July), and we conducted migration banding at two locations during the spring of 2019 (Federal Bird Banding Permit No. 23224, Station Permit: Platte River Whooping Crane Trust, Wood River, NE). Finally, we conducted aerial Sandhill Crane counts from mid-February to mid-April, continuing a study which began in 2002. In this report we summarize all species detections from research conducted in 2019. Aside from aerial Crane Surveys, which span the Central Platte River Valley, all detections are from a 13.5 km reach of the Platte River beginning 3 km west of Alda Rd. and continuing east to HWY 281 in Hall County Nebraska. Previous reports included data from Buffalo County, at Dippel Island, which we have since sold to the Platte River Recover Implementation Program.

As of December 6th 2019 the Crane Trust field team performed 112 avian surveys across 69 monitoring sites, 39 small mammal surveys totaling 1950 trap nights (trap number x nights set), 34 vegetation surveys, 4 days of fish seining, 54 butterfly species of concern surveys, over 2,000 net hours of bird banding effort, 10 aerial Sandhill Crane surveys, and a total of 84 anuran call surveys. Below is a summary of the species detections from and general methods for surveys.

Figure 1. Map of Mormon Island, Hall County Nebraska, the largest site owned and managed by the Crane Trust since 1978. Also depicting the Big Bend Region of the Platte River and Nebraska's position within the United States.



Footnote: Aerial imagery clearly depicts the prairie habitat of Mormon Island within a largely agricultural landscape.

Small Mammal Monitoring

We used Sherman Box Traps baited with a seed mixture of sterilized (autoclaved) oats, sunflower seeds, and cracked corn. For general methods see Newsome (2015). Mealworms were also added in areas suspected or known to contain high proportions of Soricomorpha. Traps were placed every 5m along a 200m set transect with an additional 10 traps placed within 10m of the transect for incidental detections. Small mammals were identified to species when possible; age, sex, and reproductive status

of each individual were also recorded when possible. Measurements such as weight and length were not recorded unless necessary for identification. Our trapping began in early August and ended in late September. Total survey trap effort concluded at 1950 trap nights (trap number per site (50)*sites trapped (13)*trap nights per site (3)).

No individual was killed for collection; however, individuals that died in trap were taken as samples to be submitted to teaching or scientific collections (UNL). This year trap mortality was 1.1% of animals trapped, representing a slight decrease from 2016 (3.3%), 2017 (3.5%), and 2018 (2.9%). Trap mortality totaled 2 individuals of 184 caught (Table 1). Interestingly, both were associated with being drowned in trap during heavy flooding. The heavy flooding, which inundated areas rarely under water, seemed to impact the composition of the small mammal community markedly. Meadow Voles nearly doubled in abundance from 2018 to 2019 and Meadow Jumping Mouse numbers increased nearly 10 fold. Additionally, the Plains Pocket Mouse was detected for the first time in the five-year history of the study. However, most other species declined markedly in abundance, including the Northern Short-tailed Shrew (-93.8%), White-footed Mouse (-96.8%), and Western Harvest Mouse (-78.6%), given all the same trap locations, comparable trapping effort, and similar survey periods to 2018.

Methods:

Newsome, S. 2015. Small Mammal Mark-Recapture Population Dynamics at Core Research Sites at the Sevilleta National Wildlife Refuge, New Mexico (1989-present). 2016. Sevilleta LTER: Long Term Ecological Research, University of New Mexico, Albuquerque, NM, USA.

Table 1. Small Mammals Detected at the Crane Trust 2019

Scientific Name	Common Name	Number	Mortality
<i>Blarina brevicauda</i>	Northern Short-tailed Shrew	1	0
<i>Ictidomys tridecemlineatus</i>	Thirteen-lined Ground Squirrel	1	0
<i>Microtus ochrogaster</i>	Prairie Vole	20	0
<i>Microtus pennsylvanicus</i>	Meadow Vole	121	0
<i>Perognathus flavescens</i>	Plains Pocket Mouse	2	0
<i>Peromyscus leucophagus</i>	White-footed Mouse	2	1
<i>Peromyscus maniculatus</i>	Deer Mouse	13	0
<i>Reithrodontomys megalotis</i>	Western Harvest Mouse	1	0
<i>Reithrodontomys monatus</i>	Plains Harvest Mouse	3	0
<i>Zapus hudsonius</i>	Meadow Jumping Mouse	20	1
Total		184	2

Avian Monitoring

We conducted 1/8 mile-long (200m) moving surveys along set transects to be completed in 15 minutes, and stationary focal point surveys to also be completed in 15 minutes, with both methods starting from the same location. During these surveys all species detected by sight and/or vocalization were recorded. The total number of individual birds detected of each species was recorded, taking efforts not to double-count individuals. Each bird detection was recorded as within 50m or outside 50m of the point or

transect. We did not try to estimate the real population based off the number of birds detected, but treated that as an index for discerning the relative abundance of particular species. In some ways this data equates to *bird detection days*, as individual birds (i.e. - Whooping Cranes, breeding songbirds, etc.), which stayed for a significant length of time, were often counted multiple times across rotational surveys. Common names are consistent with AOU standards. We also participate in the MAPS program, a cooperative North America-wide effort to gather demographic data on land bird species at multiple spatial scales utilizing standardized constant-effort mist netting, a mark-recapture technique, over multiple year periods.

Point-count surveys were conducted at 69 sites across Crane Trust managed properties in 2019 thus far totaling (as of 12/06/2019) 112 surveys and 1.17 million birds counted of 150 species (including incidental sightings during this time). Banding efforts captured 303 individuals of 40 species. In total 161 species and 1,171,810 individual birds were detected and identified on Crane Trust properties; total counts of each species, added across both mist netting and long-term monitoring survey efforts, are presented in Table 2. Bird species that were banded in 2019 are marked with an asterisk (Federal Bird Banding Permit No. 23224). No accidental mortalities occurred during banding efforts in 2019 and no individuals were intentionally collected for research efforts.

We detected several priority species for the US FWS Mountain-Prairie Region (6). Bald Eagles were common and detected throughout the year, including 2 nesting locations on Crane Trust properties. Around 190,000 Sandhill Cranes roosted between HWY 281 and Alda Rd., along the Crane Trust's main conservation property, during peak migration (aerial survey estimates are presented in a later section of the report). We recorded 24 Upland Sandpipers predominantly during breeding season surveys on Mormon Island. We detected a Peregrine Falcon on April 4th, 2019 and we logged 271 Grasshopper Sparrow detections. However, for the first time since beginning our long-term research program in 2015 we did not detect any Henslow's Sparrows on Crane Trust managed properties. This may have been a result of unfavorable management rotations, which did not leave enough standing biomass for nesting habitat. However, large scale flooding may have also played a role in inhibiting Henslow Sparrow habitat use. We also did not record any Piping Plover use of Crane Trust managed properties in 2019. However, we did log some interesting detections. We detected five Carolina Wrens between November 3rd and 15th 2019 on Shoemaker Island. We also logged 10 Snowy Plover detections (maximum of 4 sighted at once) between May 14th and 23rd 2019 south of Mormon Island on the main channel of the Platte River. We also noted a 140% increase in the number of Pheasants compared to 2018.

Methods:

Gregory, R.D., D.W. Gibbons, and P.F. Donald. 2004. Bird census and survey techniques. Pages 17–56 in W.J. Sutherland, I. Newton, and R.E. Green, editors, *Bird ecology and conservation: A handbook of techniques*. Oxford University Press, Oxford, United Kingdom.

Table 2. Avian Detections and Abundance at the Crane Trust 2019:

Common names, scientific names, alpha codes, and total counts for each species detected on Crane Trust long-term monitoring surveys. Data from transect, point count, and mist netting surveys (indicated by *) in the calendar year 2019 are included. Aerial Sandhill Crane survey data is presented separately.

Common Name	Species Name	Alpha Code	Count
American Coot	<i>Fulica americana</i>	AMCO	64
Alder Flycatcher	<i>Empidonax alnorum</i>	ALFL	1*
American Crow	<i>Corvus brachyrhynchos</i>	AMCR	15
American Goldfinch	<i>Spinus tristis</i>	AMGO	440*
American Kestrel	<i>Falco sparverius</i>	AMKE	2
American Robin	<i>Turdus migratorius</i>	AMRO	273*
American Wigeon	<i>Mareca americana</i>	AMWI	40
American Tree Sparrow	<i>Spizelloides arborea</i>	ATSP	103
American White Pelican	<i>Pelecanus erythrorhynchos</i>	AWPE	458
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BAEA	70
Bank Swallow	<i>Riparia riparia</i>	BANS	37
Baltimore Oriole	<i>Icterus galbula</i>	BAOR	77*
Barn Swallow	<i>Hirundo rustica</i>	BARS	95
Baird's Sandpiper	<i>Calidris bairdii</i>	BASA	9
Black-capped Chickadee	<i>Poecile atricapillus</i>	BCCH	9
Belted Kingfisher	<i>Megaceryle alcyon</i>	BEKI	14
Bell's Vireo	<i>Vireo bellii</i>	BEVI	42
Brown-headed Cowbird	<i>Molothrus ater</i>	BHCO	936*
Blue Grosbeak	<i>Passerina caerulea</i>	BLGR	1
Blue Jay	<i>Cyanocitta cristata</i>	BLJA	73
Black Tern	<i>Chlidonias niger</i>	BLTE	45
Bobolink	<i>Dolichonyx oryzivorus</i>	BOBO	599*
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	BRBL	14
Brown Creeper	<i>Certhia americana</i>	BRCR	2
Brown Thrasher	<i>Toxostoma rufum</i>	BRTH	63*
Bufflehead	<i>Bucephala albeola</i>	BUFF	23
Blue-winged Teal	<i>Spatula discors</i>	BWTE	126
Cackling Goose	<i>Branta hutchinsii</i>	CACG	1265
Cattle Egret	<i>Bubulcus ibis</i>	CAEG	2
Canada Goose	<i>Branta canadensis</i>	CANG	49870
Canvasback	<i>Aythya valisineria</i>	CANV	3
Carolina Wren	<i>Thryothorus ludovicianus</i>	CARW	5
Clay-colored Sparrow	<i>Spizella pallida</i>	CCSP	16*
Cedar Waxwing	<i>Bombycilla cedrorum</i>	CEDW	9*
Chipping Sparrow	<i>Spizella passerina</i>	CHSP	32*
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	CLSW	565*
Common Goldeneye	<i>Bucephala clangula</i>	COGO	15
Common Grackle	<i>Quiscalus quiscula</i>	COGR	132
Cooper's Hawk	<i>Accipiter cooperii</i>	COHA	1
Common Merganser	<i>Mergus merganser</i>	COME	67
Common Nighthawk	<i>Chordeiles minor</i>	CONI	11
Common Yellowthroat	<i>Geothlypis trichas</i>	COYE	289*

Double-crested Cormorant	<i>Phalacrocorax auritus</i>	DCCO	41
Dark-eyed Junco	<i>Junco hyemalis</i>	DEJU	10
Dickcissel	<i>Spiza americana</i>	DICK	712*
Downy Woodpecker	<i>Picoides pubescens</i>	DOWO	21
Eastern Bluebird	<i>Sialia sialis</i>	EABL	19
Eared Grebe	<i>Podiceps nigricollis</i>	EAGR	1
Eastern Kingbird	<i>Tyrannus tyrannus</i>	EAKI	104*
Eastern Meadowlark	<i>Sturnella magna</i>	EAME	63
Eastern Phoebe	<i>Sayornis phoebe</i>	EAPH	3
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	EATO	1*
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	EUCD	9
European Starling	<i>Sturnus vulgaris</i>	EUST	114*
Field Sparrow	<i>Spizella pusilla</i>	FISP	104*
Forster's Tern	<i>Sterna forsteri</i>	FOTE	44
Franklin's Gull	<i>Leucophaeus pipixcan</i>	FRGU	322
Gadwall	<i>Mareca strepera</i>	GADW	44
Great Blue Heron	<i>Ardea herodias</i>	GBHE	15
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	GCFL	4*
Great Horned Owl	<i>Bubo virginianus</i>	GHOW	4
Gray Catbird	<i>Dumetella carolinensis</i>	GRCA	40*
Gray-cheeked Thrush	<i>Catharus minimus</i>	GCTH	1*
Great Egret	<i>Ardea alba</i>	GREG	33
Greater Prairie-chicken	<i>Tympanuchus cupido</i>	GRPC	79
Greater Scaup	<i>Aythya marila</i>	GRSC	6
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	GRSP	271*
Greater Yellowlegs	<i>Tringa melanoleuca</i>	GRYE	27
Greater White-fronted Goose	<i>Anser albifrons</i>	GWFG	197
Green-winged Teal	<i>Spatula crecca</i>	GWTE	82
Harris's Sparrow	<i>Zonotrichia querula</i>	HASP	5
Hairy Woodpecker	<i>Picoides villosus</i>	HAWO	3
House Finch	<i>Haemorhous mexicanus</i>	HOFI	2
Horned Lark	<i>Eremophila alpestris</i>	HOLA	5
Hooded Merganser	<i>Lophodytes cucullatus</i>	HOME	5
House Sparrow	<i>Passer domesticus</i>	HOSP	5
House Wren	<i>Troglodytes aedon</i>	HOWR	219*
Indigo Bunting	<i>Passerina cyanea</i>	INBU	3
Killdeer	<i>Charadrius vociferus</i>	KILL	264
Least Flycatcher	<i>Empidonax minimus</i>	LEFL	4*
Lesser Scaup	<i>Aythya affinis</i>	LESC	24
Interior Least Tern	<i>Sterna antillarum athalassos</i>	LETE	3
Lesser Yellowlegs	<i>Tringa flavipes</i>	LEYE	15
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	LISP	9*
Loggerhead Shrike	<i>Lanius ludovicianus</i>	LOSH	1

Mallard	<i>Anas platyrhynchos</i>	MALL	659
Marsh Wren	<i>Cistothorus palustris</i>	MAWR	3
Mourning Dove	<i>Zenaida macroura</i>	MODO	234
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	NAWA	2
Northern Bobwhite	<i>Colinus virginianus</i>	NOBO	280
Northern Cardinal	<i>Cardinalis cardinalis</i>	NOCA	39
Northern Flicker (undistinguished)	<i>Colaptes auratus</i>	NOFL	71*
Northern Harrier	<i>Circus hudsonius</i>	NOHA	18
Northern Mockingbird	<i>Mimus polyglottos</i>	NOMO	1
Northern Pintail	<i>Anas acuta</i>	NOPI	690
Northern Shoveler	<i>Spatula clypeata</i>	NSHO	48
Northern Waterthrush	<i>Parkesia noveboracensis</i>	NOWA	1*
Orange-crowned Warbler	<i>Oreothlypis celata</i>	OCWA	3*
Orchard Oriole	<i>Icterus spurius</i>	OROR	76*
Osprey	<i>Pandion haliaetus</i>	OSPR	1
Ovenbird	<i>Seiurus aurocapilla</i>	OVEN	1*
Pied-billed Grebe	<i>Podilymbus podiceps</i>	PBGR	5
Peregrine Falcon	<i>Falco peregrinus</i>	PEFA	1
Prairie Falcon	<i>Falco mexicanus</i>	PRFA	1
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	RBGR	12*
Ring-billed Gull	<i>Larus delawarensis</i>	RBGU	17
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	RBWO	12
Redhead	<i>Aythya americana</i>	REDH	12
Red-eyed Vireo	<i>Vireo olivaceus</i>	REVI	2
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	RHOW	21
Rough-legged Hawk	<i>Buteo lagopus</i>	RLHA	4
Ring-necked Duck	<i>Aythya collaris</i>	RNDU	39
Ring-necked Pheasant	<i>Phasianus colchicus</i>	RNEP	185
Rock Pigeon	<i>Columba livia</i>	ROPI	9
Red-tailed Hawk	<i>Buteo jamaicensis</i>	RTHA	13
Ruddy Duck	<i>Oxyura jamaicensis</i>	RUDU	2
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	RWBL	4547*
Sandhill Crane (does not include aerial surveys)	<i>Antigone canadensis</i>	SACR	353297
Savannah Sparrow	<i>Passerculus sandwichensis</i>	SAVS	11
Lesser Canada Goose	<i>B. c. parvipes</i>	SCGO	20
Short-eared Owl	<i>Asio flammeus</i>	SEOW	5
Sedge Wren	<i>Cistothorus platensis</i>	SEWR	138*
Snow Goose	<i>Anser caerulescens</i>	SNGO	750946
Snowy Plover	<i>Charadrius nivosus</i>	SNPL	10
Sora	<i>Porzana carolina</i>	SORA	2
Song Sparrow	<i>Melospiza melodia</i>	SOSP	194*
Spotted Sandpiper	<i>Actitis macularius</i>	SPSA	18

Spotted Towhee	<i>Pipilo maculatus</i>	SPTO	46*
Sharp-shinned hawk	<i>Accipiter striatus</i>	SSHA	2
Stilt Sandpiper	<i>Calidris himantopus</i>	STSA	1
Swainson's Hawk	<i>Buteo swainsoni</i>	SWHA	3
Swainson's Thrush	<i>Catharus ustulatus</i>	SWTH	6*
Swamp Sparrow	<i>Melospiza georgiana</i>	SWSP	12
Swainson's Thrush	<i>Catharus ustulatus</i>	SWTH	2
Tree Swallow	<i>Tachycineta bicolor</i>	TRES	88
Trumpeter Swan (includes aerial survey detections)	<i>Cygnus buccinator</i>	TRUS	80
Turkey Vulture	<i>Cathartes aura</i>	TUVU	33
Upland Sandpiper	<i>Bartramia longicauda</i>	UPSA	24
Vesper Sparrow	<i>Pooecetes gramineus</i>	VESP	1
Warbling Vireo	<i>Vireo gilvus</i>	WAVI	21*
White-breasted Nuthatch	<i>Sitta carolinensis</i>	WBNU	23
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	WCSP	2
Western Kingbird	<i>Tyrannus verticalis</i>	WEKI	2
Western Meadowlark	<i>Sturnella neglecta</i>	WEME	483
White-faced Ibis	<i>Plegadis chihi</i>	WFIB	21
Whooping Crane (total detections = crane use days)	<i>Grus americana</i>	WHCR	56
Willow Flycatcher	<i>Empidonax traillii</i>	WIFL	38*
Willet	<i>Tringa semipalmata</i>	WILL	15
Wilson's Phalarope	<i>Phalaropus tricolor</i>	WIPH	47
Wilson's Snipe	<i>Gallinago delicata</i>	WISN	24
Wild Turkey	<i>Meleagris gallopavo</i>	WITU	33
Wood Duck	<i>Aix sponsa</i>	WODU	5
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	WRSA	13
White-throated Sparrow	<i>Zonotrichia albicollis</i>	WTSP	8
Yellow Warbler	<i>Setophaga petechia</i>	YEWA	221*
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	YHBL	16
Yellow-rumped Warbler	<i>Setophaga coronata</i>	YRWA	52*
Yellow-shafted Flicker	<i>C. a. auratus</i>	YSFL	10
Total			1171810

Slough Fish Monitoring

Each survey consisted of seven to eight runs totaling ~150m of the slough. Using a seine net sized to the general width of the slough channel, we ran the net at the slough bottom capturing as many fish as possible. We then dumped those fish into a 5-gallon bucket for identification and counting purposes. No individuals were collected. Two sloughs were sampled on two occasions each. We noted a large proportional and real increase in the number of Brook Stickleback's (*Culaea inconstans*) captured in

2019 (n = 1,182, 34.4% of sample) over previous years (2018: n = 352, 13.8% of sample). The invasive Western Mosquitofish accounted for approximately 42% of all individuals captured, a decline from 2018 (46%) and a significant drop from 2017 (84%). By contrast, the Plains Topminnow, a species of concern in Nebraska, accounted for 6.2% of captures, which was an increase over 2018 (1.9%) and 2017 (1.8%). These numbers, though potentially improving, signal a cause for concern as the sloughs at the Crane Trust are considered quality Plains Topminnow habitat. Finally, we detected 16 species of fish, 6 more than in 2018.

Methods:

Onorato, D.P., R.A. Angus, and K.R. Marion. 1998. Comparison of a small-mesh seine and a backpack electroshocker for evaluating fish populations in a North-Central Alabama stream. *North American Journal of Fisheries Management* 18: 361-373.

Table 3. Fish Detected at the Crane Trust

Common Name	Scientific Name	Count	%
Western Mostquito Fish	<i>Gambusia affinis</i>	1444	42.04%
Brook Stickleback	<i>Culaea inconstans</i>	1182	34.41%
Brassy Minnow	<i>Hybognathus hankinsoni</i>	509	14.82%
Plains Topminnow	<i>Fundulus sciadicus</i>	214	6.23%
Bluegill	<i>Lepomis macrochirus</i>	34	0.99%
Johnny Darter	<i>Etheostoma nigrum</i>	11	0.32%
Gizzard Shad	<i>Dorosoma cepedianum</i>	10	0.29%
Unidentified Sunfish	<i>Lepomis spp</i>	8	0.23%
Green Sunfish	<i>Lepomis cyanellus</i>	7	0.20%
Largemouth Bass	<i>Micropterus salmoides</i>	7	0.20%
Smallmouth Bass	<i>Micropterus dolomieu</i>	2	0.06%
Fathead Minnow	<i>Pimephales promelas</i>	2	0.06%
Bigmouth Shiner	<i>Notropis dorsalis</i>	1	0.03%
Creek Chub	<i>Semotilus atromaculatus</i>	1	0.03%
Red Shiner	<i>Cyprinella lutrensis</i>	1	0.03%
Common Carp	<i>Cyprinus carpio</i>	1	0.03%
Northern Plains Killifish	<i>Fundulus kansae</i>	1	0.03%
Total		3435	100.00%

Vegetation Monitoring

We targeted plants in excellent condition, in fruit or flower (ideally both), to fill in gaps and verify species for collection to the Crane Trust herbarium. We recorded the area where the plant was found to the nearest transect, the date it was collected, and its relative abundance in the area. We collected 45 plant specimens from across Crane Trust properties (Table 4). Collections were made by J. Wiese, A. Caven, B. Winter, J. Salter, and A. Fowler. Identification was done by A. Caven and J. Wiese. Dr. Robert Kaul of the University of Nebraska-Lincoln Herbarium verified county records.

Additionally, vegetation surveys using both point-line intercept (every two meters) and quadrat (0.5m x 1.0m every 10m) methods along a 100m permanently marked transect were conducted. Surveys began in July and ended in early October with the first frost. Notable finds in 2019, included *Polygala verticillata*, *Heteranthera limosa*, and *Setaria faberi*, which all represented new records to Crane Trust properties but not county records (Nagel and Kolstad 1987). Recent county records included *Ratibida pinnata*, *Dianthus armeria*, and *Monarda citriodora* (Kaul et al. 2006).

Methods:

Symstad, A.J., C.L. Wienk, and A.D. Thorstenson. 2008. Precision, Repeatability, and Efficiency of Two Canopy-Cover Estimate Methods in Northern Great Plains Vegetation. *Rangeland Ecology and Management* 61: 419-429.

Additional Relevant Sources:

Kaul, R.B., D. Sutherland, and S. Rolfsmeyer. 2006. The flora of Nebraska. School of Natural Resources, University of Nebraska-Lincoln, Lincoln, NE, USA.

Nagel, H.G., and O.A. Kolstad. 1987. Comparison of plant species composition of Mormon Island Crane Meadows and Lillian Annette Rowe Sanctuary in central Nebraska. *Transactions of the Nebraska Academy of Sciences* 15:37-48.

Table 4. Plant Specimens Collected for the Crane Trust Herbarium 2019

Family	Species	Common Name	No. Collected
Amaranthaceae	<i>Amaranthus tuberculatus</i> (Moq.) Sauer	Roughfruit amaranth	2 ^C
Asteraceae	<i>Heliopsis helianthoides</i> (L.) Sweet	Smooth oxeye	1
Asteraceae	<i>Ratibida pinnata</i> (Vent.) Barnhart	Pinnate prairie coneflower	1 ^H
Asteraceae	<i>Rudbeckia hirta</i> L.	Blackeyed Susan	1
Asteraceae	<i>Liatris glabrata</i> Rydb.	Scaly blazing star	1 ^{FK}
Brassicaceae	<i>Hesperis matronalis</i> L.	Dames rocket	1 ^H
Brassicaceae	<i>Arabis pycnocarpa</i> M. Hopkins	Creamflower rockcress	1
Campanulaceae	<i>Lobelia spicata</i> Lam.	Palespike lobelia	1
Campanulaceae	<i>Triodanis perfoliata</i> (L.) Nieuwl.	Clasping Venus' looking-glass	1
Caryophyllaceae	<i>Dianthus armeria</i> L.	Deptford pink	1 ^H
Chenopodiaceae	<i>Chenopodium glaucum</i> L. var. <i>glaucum</i>	Oak-leaf goosefoot	2
Convolvulaceae	<i>Calystegia sepium</i> (L.) R. Br. ssp. <i>angulata</i> Brummitt	Hedge false bindweed	1
Convolvulaceae	<i>Ipomoea purpurea</i> (L.) Roth	Tall morning-glory	1

Crassulaceae	<i>Penthorum sedoides</i> L.	Ditch stonecrop	1 ^C
Cyperaceae	<i>Carex granularis</i> Muhl. ex Willd.	Limestone meadow sedge	1
Cyperaceae	<i>Carex laeviconica</i> Dewey	Smoothcone sedge	1 ^C
Cyperaceae	<i>Carex gravida</i> L.H. Bailey	Heavy sedge	1
Cyperaceae	<i>Carex scoparia</i> Schkuhr ex Willd.	Broom sedge	1
Cyperaceae	<i>Carex stipata</i> Muhl. ex Willd.	Awlfruit sedge	1
Euphorbiaceae	<i>Euphorbia hexagona</i> Nutt. ex Spreng.	Sixangle spurge	1 ^{FK}
Fabaceae	<i>Dalea leporina</i> (Aiton) Bullock	Foxtail prairie clover	1 ^C
Gentianaceae	<i>Eustoma grandiflorum</i> (Raf.) Shinnars	Showy prairie gentian	1
Juncaceae	<i>Juncus dudleyi</i> Wiegand	Dudley's rush	1
Lamiaceae	<i>Monarda citriodora</i> Cerv. ex Lag.	Lemon beebalm	1 ^H
Lamiaceae	<i>Scutellaria lateriflora</i> L.	Blue skullcap	1
Linaceae	<i>Linum sulcatum</i> Riddell	Groved flax	1
Malvaceae	<i>Abutilon theophrasti</i> Medik.	Velvetleaf	2 ^C
Onagraceae	<i>Oenothera speciosa</i> Nutt.	Pinkladies	2 ^C
Plantaginaceae	<i>Plantago lanceolata</i> L.	Narrowleaf plantain	1
Poaceae	<i>Setaria faberi</i> Herrm.	Japanese bristlegrass	1 ^C
Poaceae	<i>Panicum dichotomiflorum</i> Michx.	Fall panicgrass	1 ^C
Poaceae	<i>Eragrostis pectinacea</i> (Michx.) Ness ex Steud.	Tufted lovegrass	1
Poaceae	<i>Setaria viridis</i> (L.) P. Beauv.	Green bristlegrass	1 ^C
Poaceae	<i>Secale cereale</i> L.	Cereal rye	1 ^C
Poaceae	<i>xElyhordeum macounii</i> (Vasey) Barkworth & D.R. Dewey	Macoun's barley	1 ^C
Poaceae	<i>Koeleria macrantha</i> (Ledeb.) Schult.	Prairie Junegrass	1
Poaceae	<i>Elymus hispidus</i> (Opiz) Melderis	Intermediate wheatgrass	1 ^C
Polygalaceae	<i>Polygala verticillata</i> L.	White milkwort	1 ^C
Polygonaceae	<i>Polygonum lapathifolium</i> L.	Curlytop knotweed	1
Polygonaceae	<i>Polygonum persicaria</i> L.	Spotted ladythumb	1
Pontederiaceae	<i>Heteranthera limosa</i> (SW.) Willd.	Blue mudplantain	1 ^C

Notes: “^C” refers to a recent addition to Crane Trust properties using Nagel and Kolstad (1987) as a reference, “^H” refers to a county record using Kaul et al. (2006) as a reference, and “^{FK}” refers to collections made off Crane Trust properties at a University of Nebraska-Lincoln research site near Fort Kearny, NE.

Butterfly Species of Concern Monitoring

We counted butterflies using linear walking transects. Surveys were conducted by two research personnel; the observer spots butterfly species of concern, while the recorder utilizes a GPS and a compass to navigate the monitoring transect, record data, and aid in the detection of butterflies. We count “butterflies observed ahead and to the sides to the limit at which a species can be identified with binoculars” (Swengel 1996). Detections are recorded as within 10 meters of the transect or outside of this area. Only Regal Fritillaries within 10 m of the transect line were sexed. The male has a lower line of orange spots on the hind wing, while females have two lines of white spots. Monarchs were not sexed since male and female morphological differences are slight, and accuracy may be compromised. Monarchs and Regals were incidentally recorded on the walk to and from biological monitoring plots utilizing GPS as well. All sightings within 200 meters of the start of a monitoring transect and their corresponding GPS locations were included as incidental detections. Surveys lasted 15 minutes and were only conducted during favorable weather conditions (sunny, wind under 10mph) between the late morning (10:00am) and the midafternoon (4:00pm). All plots were visited at least three times during the Regals’ active time period, from June 15th to September 15th, and at least once during peak Regal activity, from June 15th to August 1st, based on the timing of Regal activity demonstrated from previous work conducted in the region. Regal Fritillary counts reached their highest point since we began systematic monitoring in 2015 and were up over 100% from last survey season and well above median values (\bar{x} = 93). Monarch counts were up about 40% over last year and just above median values (\bar{x} = 91).

Methods:

Caven, A. J., King, K. C., Wiese, J. D., & Buckley, E. M. B. (2017). A descriptive analysis of Regal Fritillary (*Speyeria idalia*) habitat utilizing biological monitoring data along the big bend of the Platte River, NE. *Journal of Insect Conservation*, 1-23.

Swengel, A.B. 1996. Effects of fire and hay management on abundance of prairie butterflies. *Biol Conserv* 76(1): 73-85.

Table 5. Butterfly Detections 2019

Common Name	Abundance
Monarch	140
Regal Fritillary	177

Herpetofauna Research

In 2018 we began an anuran monitoring program estimating general abundance and species presence or absence based on vocalization activity following the methods of USGS (2012). Abundance is broken up into 3 differentiable categories (Weir and Mossman 2005; USGS 2012):

Table 6. Amphibian Calling Index

- | | |
|---|----------------------------------------------------------------------------------|
| 1 | Individuals can be counted; there is space between calls |
| 2 | Calls of individuals can be distinguished but there is some overlapping of calls |
| 3 | Full chorus, calls are constant, continuous and overlapping |

Surveys were conducted as early as 30 minutes after official sunset in humid and low wind (<15 mph) conditions, with early spring temperatures above 42° F (March-15 to May-15) and late spring-summer temperatures above 50° F (May-15 forward) (Weir and Mossman 2005; USGS 2012). Surveys lasted 5 minutes per site and were conducted at least 2-4 times per survey season at each site, with 1-2 surveys conducted in the early spring period and 1-2 surveys conducted in the late spring-summer period at each site (USGS 2012). A recording device was brought to each site to record novel calls and to provide evidence for species not previously detected on Crane Trust properties. Novel calls were investigated physically following timed survey periods at a set location. Playback was also used to look for rare species following the official survey, but not during.

We detected five species in 2019 including the Cope’s Grey Treefrog. Several recent public reports and range extensions (pers. comm. K. Geluso, McLean et al. 2015) suggest that Cope’s Grey Treefrogs have significantly expanded their range along the Platte River in recent years. In 2018, Boreal Chorus Frogs had both the highest mean calling index and were the only species detected on 100% of monitoring sites. However, in 2019 Woodhouse’s Toads were also detected at 100% of sites. Our results also suggested an increased spatial distribution of Plains Leopard Frogs, which were detected across 58% of sites in 2018 but 92% of plots in 2019, as well as Cope’s Gray Treefrogs, which were detected at 25% of sites in 2018 and 67% of plots in 2019. Though the particularly wet year may have contributed to an increase in distribution of several species, call indices to determine abundance remained remarkably similar to 2019. Though Plains Spadefoot Toads were detected in 2018, we failed to detect them again in 2019.

Table 7. Mean anuran species abundance index and percent of plots present during surveys conducted in 2019.

Common Name	Scientific Name	Call Index	% Plots
Boreal Chorus Frog	<i>Pseudacris maculata</i>	2.75	100.0
Woodhouse’s Toad	<i>Anaxyrus woodhousii</i>	1.51	100.0
Plains Leopard Frog	<i>Lithobates blairi</i>	1.38	91.6
Cope’s Gray Treefrog	<i>Hyla chrysoscelis</i>	1.05	66.7
Bullfrog	<i>Lithobates catesbeianus</i>	1.00	58.3
Plains Spadefoot Toad	<i>Spea bombifrons</i>	0.00	0.0

Methods:

US Geological Survey. 2012. North American Amphibian Monitoring Program: Protocol. Patuxent Wildlife Research Center, Laurel, Maryland, USA.

<https://www.pwrc.usgs.gov/naamp/index.cfm?fuseaction=app.protocol>

Weir, L. A., J.A. Royle, P. Nanjappa, and R.E. Jung. 2005. Modeling anuran detection and site occupancy on North American Amphibian Monitoring Program (NAAMP) routes in Maryland. *Journal of Herpetology* 39(4): 627-640.

Additional Relevant Source:

McLean, R.P., G.D. Wright, and K. Geluso. 2015. Cope’s Gray Treefrog (*Hyla chrysoscelis*) along the Platte River, Hall County, Nebraska. *Collinsorum* 4(1):2-4.

Sandhill Crane Aerial Surveys

We counted a total of 1,506,880 (Bias Corrected = 1,546,873±203,526) Sandhill Cranes in the Central Platte River Valley (Chapman to Overton, NE) across 10 weeks of surveys in 2019. Relative error estimates per survey ranged from -23.0 to +17.7% comparing ocular to photo counts (mean= -5.3). Our counts accurately capture cranes on the river as well as those in post roost aggregations within 1 km of the river. However, cranes departing the river early and leaving this narrow band were potentially not counted or were counted at a reduced rate. Therefore, our numbers represent a systematic underestimation. The peak bias-correct abundance index was 659,870±61,378 on March 22nd. Peak abundance appeared to occur over a relatively short time period in 2019.

Methods:

Buckley, T.J. 2012. Habitat use and abundance patterns of Sandhill Cranes in the Central Platte River Valley, Nebraska, 2003–2010. Thesis. University of Nebraska-Lincoln, Lincoln, Nebraska, USA.

Table 7. Sandhill Crane Count by Survey Week 2019

Survey Date	SACR Count	Bias Corrected
2/12/2019	14,100	12,774±1,627
2/24/2019	20,500	17,400±3,097
2/28/2019	17,080	*17,080±5,363
3/6/2019	16,500	*16,500±5,445
3/11/2019	56,140	66,905±9,056
3/21/2019	326,400	*326,400±72,000
3/26/2019	670,702	659,870±61,378
4/8/2019	231,768	247,700±23,800
4/15/2019	105,165	129,400±15,500
4/19/2019	48,525	52,844±6,260

Notes: “*” indicates confidence intervals applied but bias correction not applied due to issues with photo-subplot data collection.

Conclusion

Continued implementation of our long-term biological monitoring program will help us more critically assess the impacts of our management actions upon Whooping Cranes, Sandhill Cranes, and the other migratory and breeding bird species in the Big Bend region of the Platte River in Nebraska. In 2019 we conducted 112 avian point count surveys across 69 monitoring sites and over 2,000 net hours of bird banding to detect 1,171,810 individuals of 161 avian species. We conducted 1950 trap nights to detect 192 individuals and 10 species of small mammal. We conducted 34 vegetation surveys and collected and pressed 45 vascular plant specimens for our herbarium. We conducted 54 butterfly species of concern surveys and detected 140 Monarchs and 177 Regal Fritillaries. We conducted 84 anuran vocalization surveys and documented 5 species of anurans and their relative abundances at 12 sites. Finally, we conducted 30 fish seine pulls (~12 hours, 600 m of slough) and detected 3,435 individuals of 16 species of fish. These data are all integrated into our long-term research and monitoring plan and will be used to develop models to improve management actions. This report represents preliminary findings and thus should be interpreted as such; our intention with this data is to produce peer-reviewed research that addresses issues of conservation concern in the Central Platte River Valley. As we publish results from our studies they will be posted on our website and available to the public (<https://cranetrust.org/what-we-do/conservation/research/>). We have also included a list of recent publication activity in Appendix 1 of this report. We thank the Rainwater Bison Joint Venture, the US Fish and Wildlife Service, and the Nebraska Game and Parks Commission for their continued support of our research program.

Appendix 1. Recent Publication Activity by Crane Trust Research Staff, 2015 to Present

1. Baasch, D.M., P.D. Farrell, A.J. Caven, K.C. King, J.M. Farnsworth, and C.B. Smith. 2019. Sandhill Crane use of riverine roost sites along the central Platte River in Nebraska, USA. *Monographs of the Western North American Naturalist* 11(1): 1-13.
2. Baasch, D.M., P.D. Farrell, A.T. Pearse, D.A. Brandt, A.J. Caven, M.J. Harner, G.D. Wright and K.L. Metzger. 2019. Diurnal habitat selection of migrating Whooping Crane in the Great Plains. *Avian Conservation and Ecology* 14(1):6.
3. Caven, A.J., E.M. Brinley Buckley, J.D. Wiese, B. Taddicken, B. Krohn, T.J. Smith, and A. Pierson. 2019. Appeal for a Comprehensive Assessment of the Potential Ecological Impacts of the Proposed Platte-Republican Diversion Project. *Great Plains Research* 2:123-135.
4. Caven, A.J., J. Malzahn, M. Dettweiler, and E.M. Brinley Buckley. 2019. Conservation needs and knowledge gaps in the Central Platte River Valley ecosystem: Results from an interactive stakeholder workshop. Pages 15-30 in A.J. Caven, J. Malzahn, T. Franti, and E.M. Brinley Buckley, editors, *Proceedings of the Thirteenth Platte River Basin Ecosystem Symposium, 5-6 June 2018, Wood River, NE, USA*. Nebraska Water Center, University of Nebraska-Lincoln, Lincoln, NE, USA.
5. Caven, A.J., J. Malzahn, T. Franti, and E.M. Brinley Buckley, editors. 2019. *Proceedings of the Thirteenth Platte River Basin Ecosystem Symposium, 5-6 June 2018, Wood River, NE, USA*. Nebraska Water Center, University of Nebraska-Lincoln, Lincoln, NE, USA.
6. Caven, A.J., J.M. Malzahn, K.D. Koupal, E.M. Brinley Buckley, J.D. Wiese, R. Rasmussen, and C. Steenson. 2019. Adult Whooping Crane (*Grus americana*) consumption of juvenile channel catfish

- (*Ictalurus punctatus*) during the avian spring migration in the Central Platte River Valley, Nebraska, USA. *Monographs of the Western North American Naturalist* 11(1): 14-23.
7. King, K.C., A.J. Caven, K.G. Leung, D.H. Ranglack, and N. Arcilla. 2019. High society: behavioral patterns as a feedback loop to social structure in Plains bison (*Bison bison bison*). *Mammal Research* 64: <https://doi.org/10.1007/s13364-019-00416-7>
 8. Rabbe, M.R., A.J. Caven, and J.D. Wiese. 2019. First description of a Bald Eagle (*Haliaeetus leucocephalus*) attempting depredation on an adult Whooping Crane (*Grus americana*) of the Aransas-Wood Buffalo population. *Monographs of the Western North American Naturalist* 11(1): 24-32.
 9. Sutton, M.O., and N. Arcilla. 2019. New Breeding Record and Location for Wilson's Phalarope (*Phalaropus tricolor*) in the Nebraska Great Plains, USA. *The Prairie Naturalist* 50(2):74-75.
 10. Brinley Buckley, E.M., A.J. Caven, B.L. Gottesman, M.J. Harner, B.C. Pijanowski and M.L. Forsberg. 2018. Biological and Environmental Datasets from August 21, 2017 Total Solar Eclipse. Data in Brief, <https://doi.org/10.1016/j.dib.2018.10.008>
 11. Brinley Buckley, E.M., A.J. Caven, B.L. Gottesman, M.J. Harner, B.C. Pijanowski, M.L. Forsberg. 2018. Assessing biological and environmental effects of a total solar eclipse with passive multimodal technologies. *Ecological Indicators* 95(1): 353-369.
 12. Caven, A.J., K.C. King, E.M. Brinley Buckley, G.D. Wright, N. Arcilla, and R.P. McLean. 2018. Sustained early Interior Greater Prairie-chicken (*Tympanuchus cupido pinnatus*) lekking behavior at lek in central Nebraska. *Kansas Ornithological Society Bulletin* 69(3): 29-39.
 13. Caven, A.J., J.D. Wiese, W.R. Wallauer, and K.J. Mosher. 2018. First description of a Bald Eagle (*Haliaeetus leucocephalus*) actively depredating an adult Sandhill Crane (*Antigone canadensis*). *Western North American Naturalist* 78(2): 216-220.
 14. King, K.C., A.J. Caven, and K. Geluso. 2018. Lekking behavior of a Sharp-tailed Grouse in south-central Nebraska. *The Prairie Naturalist* 50(1): 39-41.
 15. Malzahn, J., A.J. Caven, M. Dettweiler, and J.D. Wiese. 2018. Sandhill Crane Activity in the Central Platte River Valley in Late May and Early June. *The Nebraska Bird Review* 86(4):175-180.
 16. Wiese, J.D., and A.J. Caven. 2018. Dataset of the physical conditions of Green Ash (*Fraxinus pennsylvanica*) in riparian woodlands along the central Platte River. Data in Brief. <https://doi.org/10.1016/j.dib.2018.10.063>
 17. Baasch, D.M., P.D. Farrell, J.M. Farsworth, and C.B. Smith. 2017. Nest-site selection by Interior Least Terns and Piping Plovers at managed, off-channel sites along the Central Platte River in Nebraska. *Journal of Field Ornithology* 88(3):236-249.
 18. Brinley Buckley, E.M., C.R. Allen, M. Forsberg, M. Farrell, and A.J. Caven. 2017. Capturing change: the duality of time-lapse imagery to acquire data and depict ecological dynamics. *Ecology and Society* 22 (3):30.
 19. Caven, A.J., J.D. Wiese, and W.R. Wallauer. 2017. Prairie Falcon depredation attempts on a Greater Prairie-chicken lek in south-central Nebraska. *The Prairie Naturalist* 49(2):76-78
 20. Caven, A.J., and E.M. Brinley Buckley. 2017. Greater Sandhill Crane (*Antigone canadensis tabida*) copulation detected along the Big Bend of the Platte River, South-central Nebraska. *The Nebraska Bird Review* 85(2): 83-84.

21. Caven, A.J., K.C. King, J.D. Wiese, and E.M. Brinley Buckley. 2017. A descriptive analysis of Regal Fritillary (*Speyeria idalia*) habitat utilizing biological monitoring data along the Big Bend of the Platte River, NE. *Journal of Insect Conservation* 21:183
22. Caven, A.J. J. Salter, and K. Geluso. 2017. *Ophedrys vernalis* (*Liochlorophis vernalis*) (Smooth Greensnake). Fire mortality and phenology. *Herpetological Review* 48(4):864-865.
23. Nebraska Conservation Roundtable. 2017. Cedar Spread at a Tipping Point.
24. Pearse, A.T., M.J. Harner, D.M. Baasch, G.D. Wright, A.J. Caven, and K.L. Metzger. 2017. Evaluation of nocturnal roost and diurnal sites used by Whooping Cranes in the Great Plains, USA. U.S. Geological Survey Open-File Report 2016–1209, 29 p.
25. Wiese, J.D. and A.J. Caven. 2017. *Tropidoclonion lineatum* (Lined Snake), *Thamnophis sirtalis* (Common Gartersnake). Refugia and mortality. *Herpetological Review* 48(4):868-869.
26. Wiese, J.D., B. Krohn, and A.J. Caven. 2017. Common Gartersnake (*Thamnophis sirtalis*) mortality likely resulting from cold exposure following late winter hibernaculum emergence. *Collinsorum* 6(2-3):15-16.
27. Wiese, J.D., K.C. King, A.J. Caven, and N. Arcilla. 2017. Winter predation of an adult Spiny Softshell (*Apalone spinifera*) likely committed by a Bald Eagle (*Haliaeetus leucocephalus*) in central Nebraska. *Collinsorum* 6(1):14-19.
28. Levin, I.I., R.E. Colborn, D. Kim, N.G. Perlut, R.B. Renfrew, and P.G. Parker. 2016. Local parasite lineage sharing in temperate grassland birds provides clues about potential origins of Galapagos avian *Plasmodium*. *Ecology and Evolution* 6(3):716-726.
29. Nebraska Conservation Roundtable. 2016. Nebraska Cedar Crisis.
30. Nebraska Conservation Roundtable. 2016. Eastern Redcedar in Nebraska Problems and Opportunities. Nebraska Conservation Roundtable Issue Paper No. 1
31. Wiese, J.D., E.D. Plock, and K. Geluso. 2016. Common Gartersnake (*Thamnophis sirtalis*) mortality due to haying practices in South-central Nebraska. *Collinsorum* 5(4):15-16.
32. Wiese, J.D., K.C. King, and A.J. Caven. 2016. The utilization of senesced wetland plant material by *Thamnophis sirtalis* as a thermoregulation microsite in a flooded system. *Collinsorum* 5(4):12-14.
33. Wiese, J.D., A.J. Caven, and E.M. Brinley Buckley. 2016. Eastern Racer (*Coluber constrictor*) mortality as a result of early emergence from a man-made structure hibernaculum in South-central Nebraska. *Collinsorum* 5(1):3-5.
34. Harner, M.J., G.D. Wright, and K. Geluso. 2015. Overwintering Sandhill Cranes (*Grus canadensis*) in Nebraska, USA. *The Wilson Journal of Ornithology* 127(3):457-466.
35. McLean, R.P., G.D. Wright, and K. Geluso. 2015. Cope's Gray Treefrog (*Hyla chrysoscelis*) along the Platte River, Hall County, Nebraska. *Collinsorum* 4(1):2-4.