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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 (~2,430 ha currently; main complex =

40.798306°N, -98.416298°W, NAD 1983; 597 m elevation, 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 77 as of 2022; 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 using standardized methodologies on a set rotation to monitor the effectiveness of our management techniques in promoting native biodiversity since 2015. Additionally, we have conducted surveys of native and exotic slough-dwelling fish and monitored groundwater levels since 2012 and 2011, respectively. We added anuran vocalization surveys to our monitoring program in 2018 and Whooping Crane behavioral and habitat surveys in 2019. We also took part in the Nebraska Bumble Bee Atlas project in 2020 and 2021. In 2021 and 2022, we participated in the Monarch Watch Tagging Program and Project Monarch Health. Finally, we conducted aerial Sandhill Crane counts from mid-February to mid-April, continuing a study which began in 2002. We discontinued the Institute for Bird Populations (IBS)'s Monitoring Avian Productivity and Survivorship (MAPS) program in 2020, which involved banding at four different sites throughout the breeding season (June-July) as we determined that point count data sufficed to answer most of our current management questions and the project was labor intensive while yielding data at a limited spatial scale (Federal Bird Banding Permit No. 23224, Station Permit: Platte River Whooping Crane Trust, Wood River, NE; currently inactive). In this report, we summarize all species detections from research conducted in 2022 that was subject to permitting or was supported by regional USFWS programs. All species detections were 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, aside from aerial crane, plant, and soil macroinvertebrate surveys, which spanned the Central Platte River Valley (CPRV; Chapman to Overton, Nebraska) and/or the Western Rainwater Basins (Phelps and Kearney Counties). Earlier reports included data from Buffalo County, at Dippel Island, which we have since sold to the Platte River Recovery Implementation Program (effective 2018).

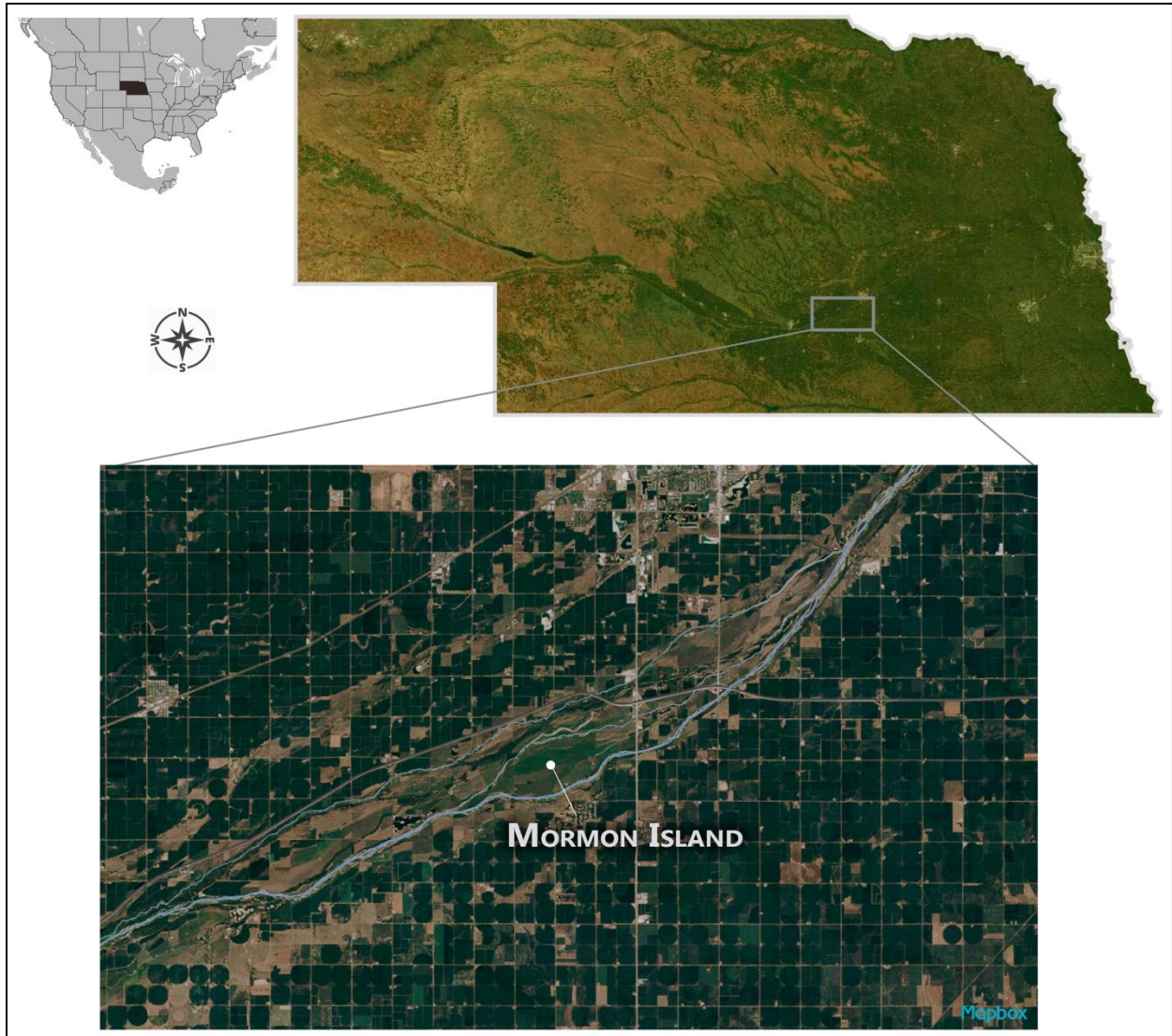
As of 16 December 2022, the Crane Trust field team performed 114 avian surveys, 40 small mammal surveys across 14 sites totaling 2000 trap nights (trap number x nights set), 46 vegetation surveys, 4 days of fish seining, 63 butterfly species of concern surveys, 9 aerial Sandhill Crane surveys, a total of 54 anuran call surveys, and took part in the Monarch Watch Tagging Program and Project Monarch Health. Below is a summary of species detections from 2022 and general methods for surveys.

The 2022 Crane Trust research team consisted of *Director of Conservation Research* Andrew J. Caven (Jan-Aug), *Director of Conservation Research* Carrie Roberts (Aug-Present), *Wildlife Biologist* Bethany Ostrom, *Range Manager* Joshua D. Wiese, *Threatened and Endangered Species Specialist* David Baasch, *Biological Science Technician* Matthew Schaaf, *Moth Technician* Alexa Rojas, *Saunders' Conservation Fellow* Charlotte Tate, *Lila O. Wilson Biological Monitoring Intern* Brittany Wasas, Oklahoma State University *PhD student* Abraham Kanz, and Oklahoma State University *Biological Science Technician* Dawson Kosmicki. Volunteers included Sam Johnson (Hastings College), and Colleen Childers. External researchers associated with our 2022 projects included Dr. Craig Davis (Oklahoma State University), Dr.

Mary J. Harner (University of Nebraska at Kearney), and Matthew R. Rabbe (U.S. Fish and Wildlife Service). We also want to thank The Nature Conservancy, Audubon Nebraska, and the Platte River Recovery Implementation Program for land access and logistical support during the 2022 field season.

### **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 or baked) oats, sunflower seeds, and cracked corn. For general methods see Newsome (2015). Mealworms were also

added in areas suspected or known to have 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; the 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 late July and ended in late September. Total survey trap effort concluded at 2000 trap nights (trap number per site (50)\*sites trapped (13)\*trap nights per site (3)+1 practice trap night(50)).

This year, individuals that died in traps were left on site and not collected as voucher specimen. Trap mortality was 3.0%, which is in line with mortality levels observed in 2016 (3.3%), 2017 (3.5%), 2018 (2.9%), and 2020 (2.5%). However, this represents an increase over last year’s 1.6% trap mortality. Trap mortality totaled 6 individuals of 198 caught (Table 1). We captured 11 total species, although we did not detect the Least Shrew or Plains Pocket Mouse as in some past years. Notably, both vole species captures were significantly down from the past two years and Deer Mice, more specifically Prairie Deer Mice, were significantly the most frequently trapped species.

**Methods:**

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

**Table 1. Small Mammals Detected at the Crane Trust 2022**

Common Name	Genus species	Number	Mortality	Male	Female
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	8	2		5
Thirteen-lined Ground Squirrel	<i>Ictidomys tridecemlineatus</i>	2		1	1
Prairie Vole	<i>Microtus ochrogaster</i>	1			1
Meadow Vole	<i>Microtus pennsylvanicus</i>	12		5	7
White-footed Mouse	<i>Peromyscus leucophagus</i>	37		21	14
Deer Mouse	<i>Peromyscus maniculatus</i>	5		2	3
Prairie Deer Mouse	<i>Peromyscus maniculatus bairdii</i>	111	2	55	51
Deer Mouse or White-footed Mouse	<i>Peromyscus spp.</i>	6		4	2
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	1			1
Plains Harvest Mouse	<i>Reithrodontomys monatus</i>	11		7	4
Masked Shrew or Prairie Shrew	<i>Sorex spp. (cinereus or haydeni)</i>	3	2	1	2

Meadow Jumping Mouse	<i>Zapus hudsonius</i>	1	
<b>Total</b>		<b>198</b>	<b>6</b>

## Avian Monitoring

We conducted stationary focal point surveys for 15 minutes at long-term monitoring sites throughout the year, with two surveys conducted at each site during the breeding season. During these surveys, all species detected by sight and/or vocalization were recorded. The total number of individual birds detected of each species was estimated, taking efforts not to double-count individuals. Each bird detection was recorded as within 50m or outside 50m of the observer. We did not try to estimate the real population based off the number of birds detected, but instead treated each count as an index for discerning the relative abundance of 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 regularly counted multiple times across rotational surveys. Common names are consistent with American Ornithological Union standards.

Point-count surveys were conducted at 45 monitoring sites across Crane Trust-managed properties in 2022, thus far totaling (as of 12/16/2022) 114 surveys and 89,488 birds counted of 135 species (including incidental sightings from 30 locations). Total counts of each species are presented in Table 2. 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/near Crane Trust properties. A significant density of Sandhill Cranes roosted between Hwy 281 and Alda Rd., along the Crane Trust’s main conservation property (aerial survey estimates are presented in a later section of the report). We recorded 9 Upland Sandpiper, 193 Grasshopper Sparrow, and 693 Bobolink during breeding season surveys as well as 306 Northern Pintail, 1 Piping Plover, 1 Short-eared Owl, and 29 Black Tern during migration surveys.

### 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 2022

Common names, scientific names, alpha codes, and total counts for each species detected during Crane Trust long-term monitoring surveys. Data from point count surveys as well as incidental detections in the calendar year 2022 are included. Aerial survey data is presented separately in a later section of this report.

Common name	<i>Genus species</i>	Alpha Code	Count
American Avocet	<i>Recurvirostra americana</i>	AMAV	8
American Coot	<i>Fulica americana</i>	AMCO	9
American Crow	<i>Corvus brachyrhynchos</i>	AMCR	34
American Goldfinch	<i>Spinus tristis</i>	AMGO	282

American Kestrel	<i>Falco sparverius</i>	AMKE	11
American Robin	<i>Turdus migratorius</i>	AMRO	371
American Wigeon	<i>Mareca americana</i>	AMWI	10
American Tree Sparrow	<i>Spizelloides arborea</i>	ATSP	38
American White Pelican	<i>Pelecanus erythrorhynchos</i>	AWPE	217
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BAEA	46
Bank Swallow	<i>Riparia riparia</i>	BANS	282
Baltimore Oriole	<i>Icterus galbula</i>	BAOR	121
Barn Swallow	<i>Hirundo rustica</i>	BARS	156
Baird's Sandpiper	<i>Calidris bairdii</i>	BASA	3
Black-bellied Plover	<i>Pluvialis squatarola</i>	BBPL	2
Black-capped Chickadee	<i>Poecile atricapillus</i>	BCCH	2
Belted Kingfisher	<i>Megaceryle alcyon</i>	BEKI	11
Bell's Vireo	<i>Vireo bellii</i>	BEVI	30
Brown-headed Cowbird	<i>Molothrus ater</i>	BHCO	1648
Blue Jay	<i>Cyanocitta cristata</i>	BLJA	95
Black Tern	<i>Chlidonias niger</i>	BLTE	29
Bobolink	<i>Dolichonyx oryzivorus</i>	BOBO	693
Brown Thrasher	<i>Toxostoma rufum</i>	BRTH	52
Blue-winged Teal	<i>Spatula discors</i>	BWTE	90
Cackling Goose	<i>Branta hutchinsii</i>	CACG	355
Canada Goose	<i>Branta canadensis</i>	CANG	1224
Clay-colored Sparrow	<i>Spizella pallida</i>	CCSP	14
Cedar Waxwing	<i>Bombycilla cedrorum</i>	CEDW	16
Chipping Sparrow	<i>Spizella passerina</i>	CHSP	7
Chimney Swift	<i>Chaetura pelagica</i>	CHSW	1
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	CLSW	209
Common Grackle	<i>Quiscalus quiscula</i>	COGR	95
Cooper's Hawk	<i>Accipiter cooperii</i>	COHA	1
Common Merganser	<i>Mergus merganser</i>	COME	19
Common Yellowthroat	<i>Geothlypis trichas</i>	COYE	321
Double-crested Cormorant	<i>Nannopterum auritum</i>	DCCO	54
Dark-eyed Junco	<i>Junco hyemalis</i>	DEJU	18
Dickcissel	<i>Spiza americana</i>	DICK	1289
Downy Woodpecker	<i>Dryobates pubescens</i>	DOWO	19
Eastern Bluebird	<i>Sialia sialis</i>	EABL	1
Eastern Kingbird	<i>Tyrannus tyrannus</i>	EAKI	165
Eastern Meadowlark	<i>Sturnella magna</i>	EAME	56
Eastern Wood-Pewee	<i>Contopus virens</i>	EAWP	9
European Starling	<i>Sturnus vulgaris</i>	EUST	717
Eastern White-crowned Sparrow	<i>Zonotrichia leucophrys leucophrys</i>	EWCS	1
Field Sparrow	<i>Spizella pusilla</i>	FISP	65
Fox Sparrow	<i>Passerella iliaca</i>	FOSP	1
Franklin's Gull	<i>Leucophaeus pipixcan</i>	FRGU	8



Great Blue Heron	<i>Ardea herodias</i>	GBHE	63
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	GCFL	12
Golden-crowned Kinglet	<i>Regulus satrapa</i>	GCKI	3
Great Horned Owl	<i>Bubo virginianus</i>	GHOW	5
Gray Catbird	<i>Dumetella carolinensis</i>	GRCA	43
Great Egret	<i>Ardea alba</i>	GREG	4
Green Heron	<i>Butorides virescens</i>	GRHE	3
Greater Prairie-Chicken	<i>Tympanuchus cupido</i>	GRPC	31
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	GRSP	193
Greater Yellowlegs	<i>Tringa melanoleuca</i>	GRYE	80
Greater White-fronted Goose	<i>Anser albifrons</i>	GWFG	153
Green-winged Teal	<i>Anas crecca</i>	GWTE	74
Harris's Sparrow	<i>Zonotrichia querula</i>	HASP	7
Hairy Woodpecker	<i>Dryobates villosus</i>	HAWO	1
House Finch	<i>Haemorhous mexicanus</i>	HOFI	8
Horned Lark	<i>Eremophila alpestris</i>	HOLA	1
Hooded Merganser	<i>Lophodytes cucullatus</i>	HOME	1
House Wren	<i>Troglodytes aedon</i>	HOWR	247
Indigo Bunting	<i>Passerina cyanea</i>	INBU	6
Killdeer	<i>Charadrius vociferus</i>	KILL	222
Lark Bunting	<i>Calamospiza melanocorys</i>	LABU	1
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	LBDO	11
Least Flycatcher	<i>Empidonax minimus</i>	LEFL	1
Least Sandpiper	<i>Calidris minutilla</i>	LESA	15
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	LISP	3
Mallard	<i>Anas platyrhynchos</i>	MALL	141
Mourning Dove	<i>Zenaida macroura</i>	MODO	276
Nashville Warbler	<i>Leiothlypis ruficapilla</i>	NAWA	1
Northern Bobwhite	<i>Colinus virginianus</i>	NOBO	278
Northern Cardinal	<i>Cardinalis cardinalis</i>	NOCA	63
Northern Flicker	<i>Colaptes auratus</i>	NOFL	46
Northern Harrier	<i>Circus hudsonius</i>	NOHA	18
Northern Pintail	<i>Anas acuta</i>	NOPI	306
Northern Shoveler	<i>Spatula clypeata</i>	NSHO	9
Northern Shrike	<i>Lanius borealis</i>	NSHR	1
Orange-crowned Warbler	<i>Leiothlypis celata</i>	OCWA	5
Orchard Oriole	<i>Icterus spurius</i>	OROR	108
Osprey	<i>Pandion haliaetus</i>	OSPR	1
Palm Warbler	<i>Setophaga palmarum</i>	PAWA	1
Pied-billed Grebe	<i>Podilymbus podiceps</i>	PBGR	2
Piping Plover	<i>Charadrius melodus</i>	PIPL	1
Prairie Falcon	<i>Falco mexicanus</i>	PRFA	2
Purple Martin	<i>Progne subis</i>	PUMA	2
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	RBGR	14



Red-breasted Nuthatch	<i>Sitta canadensis</i>	RBNU	2
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	RBWO	31
Red-eyed Vireo	<i>Vireo olivaceus</i>	REVI	8
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	RHOW	76
Rough-legged Hawk	<i>Buteo lagopus</i>	RLHA	3
Ring-necked Pheasant	<i>Phasianus colchicus</i>	RNEP	202
Rock Pigeon	<i>Columba livia</i>	ROPI	11
Red-tailed Hawk	<i>Buteo jamaicensis</i>	RTHA	16
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	RWBL	2719
Sandhill Crane	<i>Antigone canadensis</i>	SACR	68123
Sanderling	<i>Calidris alba</i>	SAND	15
Say's Phoebe	<i>Sayornis saya</i>	SAPH	1
Savannah Sparrow	<i>Passerculus sandwichensis</i>	SAVS	8
Short-eared Owl	<i>Asio flammeus</i>	SEOW	1
Semipalmated Sandpiper	<i>Calidris pusilla</i>	SESA	9
Sedge Wren	<i>Cistothorus stellaris</i>	SEWR	45
Snow Goose	<i>Anser caerulescens</i>	SNGO	5211
Sora	<i>Porzana carolina</i>	SORA	1
Song Sparrow	<i>Melospiza melodia</i>	SOSP	164
Spotted Sandpiper	<i>Actitis macularius</i>	SPSA	32
Spotted Towhee	<i>Pipilo maculatus</i>	SPTO	41
Swamp Sparrow	<i>Melospiza georgiana</i>	SWSP	19
Tree Swallow	<i>Tachycineta bicolor</i>	TRES	91
Trumpeter Swan	<i>Cygnus buccinator</i>	TRUS	4
Turkey Vulture	<i>Cathartes aura</i>	TUVU	38
Upland Sandpiper	<i>Bartramia longicauda</i>	UPSA	9
Vesper Sparrow	<i>Pooecetes gramineus</i>	VESP	17
Virginia Rail	<i>Rallus limicola</i>	VIRA	1
Warbling Vireo	<i>Vireo gilvus</i>	WAVI	27
White-breasted Nuthatch	<i>Sitta carolinensis</i>	WBNU	2
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	WCSP	5
Western Kingbird	<i>Tyrannus verticalis</i>	WEKI	9
Western Meadowlark	<i>Sturnella neglecta</i>	WEME	692
White-faced Ibis	<i>Plegadis chihi</i>	WFIB	137
Willow Flycatcher	<i>Empidonax traillii</i>	WIFL	58
Wilson's Phalarope	<i>Phalaropus tricolor</i>	WIPH	16
Wilson's Snipe	<i>Gallinago delicata</i>	WISN	5
Wild Turkey	<i>Meleagris gallopavo</i>	WITU	28
Wood Duck	<i>Aix sponsa</i>	WODU	11
Yellow Warbler	<i>Setophaga petechia</i>	YEWA	223
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	YHBL	3
Yellow-rumped Warbler	<i>Setophaga coronata</i>	YRWA	1
Yellow-shafted Flicker	<i>Colaptes auratus auratus</i>	YSFL	5
<b>Total</b>			<b>89,488</b>

## Slough Fish Monitoring

Each survey consisted of six 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 five-gallon bucket for identification and counting purposes. No individuals were collected. Two sloughs were sampled on 2 occasions each. We detected 5,233 individual fish of 7 species across 27 runs in 2022, compared to 7,201 individual fish of 16 species across 39 runs in 2021. We noted a large proportional and real increase in the number of invasive Western Mosquitofish (*Gambusia affinis*) captured in 2022 (n = 4,488, 85.8% of sample) over 2021. By contrast, the Plains Topminnow, a species of concern in Nebraska, accounted for 6.7% of captures – roughly the same as 2021. These numbers continue to signal a cause for concern as the sloughs at the Crane Trust are considered quality Plains Topminnow habitat.

### 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 in 2022**

Common Name	Scientific Name	Count	
Western Mosquito Fish	<i>Gambusia affinis</i>	4,488	85.8%
Brook Stickleback	<i>Culaea inconstans</i>	233	4.5%
Brassy Minnow	<i>Hybognathus hankinsoni</i>	144	2.8%
Plains Topminnow	<i>Fundulus sciadicus</i>	349	6.7%
Green Sunfish	<i>Lepomis cyanellus</i>	14	0.3%
Creek Chub	<i>Semotilus atromaculatus</i>	3	0.06%
Black bullhead	<i>Ameiurus melas</i>	2	0.04%
Total		5,233	

## Vegetation Monitoring

We targeted plants in excellent condition, in fruit or flower (ideally both), to fill in distribution 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 plant specimens from across Crane Trust properties and the Central Platte River Valley (Table 4). Collections and identifications were made primarily by J. Wiese and A. Caven.

Most of the plants collected were encountered on vegetation surveys which include both point-line intercept (every two meters) and quadrat (0.5m x 1.0m every 10m) ocular cover estimation methods along a 100m permanently-marked transect. We conducted 50 such surveys during the 2022 growing season from 24 May to 13 October, just before the first frost. Notable finds in 2022 included Cup Plant (*Oenothera rhombipetala*) a native species that was likely introduced through restoration, though it is well known in the hilly parts of Hall County per Kaul et al. (2012). We also encountered Cardinal flower (*Lobelia cardinalis*), Purple False Foxglove (*Agalinis purpurea*), which are both Tier 2 at risk plant species in the state (Schneider et al. 2018). Despite additional surveying efforts, no Western Prairie Fringed

Orchid (*Platenthera praeclara*) were detected this year in areas it had been historically (Caven 2022). Additionally, we detected Amur Honeysuckle (*Lonicera maackii*), a highly invasive, exotic vining shrub seen mostly in Eastern Nebraska and is new to Hall County (Kaul et al. 2012). In total, we made collections of just 11 plants of 7 species in 2022, as we already have quality specimens for most local species in our herbarium. We also report here 5 specimens of 5 different species from earlier survey years (2019-2020) that were previously unprocessed. We expect collection efforts to remain moderate over the next several years.

**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:**

Caven, A.J. 2022. Western prairie fringed orchid management, ecology, and decline at Mormon Island. *Transactions of the Nebraska Academy of Sciences*. 42:1-8.

Kaul, R.B., D. Sutherland, and S. Rolfsmeier. 2012. The flora of Nebraska, second edition. School of Natural Resources, University of Nebraska-Lincoln, Lincoln, NE, USA.

Schneider, R., M. Fritz, J. Jorgensen, S. Schainost, R. Simpson, G. Steinauer, and C. Rothe-Groleau. 2018. Revision of the Tier 1 and 2 Lists of Species of Greatest Conservation Need: A Supplement to the Nebraska Natural Legacy Project State Wildlife Action Plan. The Nebraska Game and Parks Commission, Lincoln, NE

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 in 2022**

Collection dates, nomenclature, status as native or introduced (i.e., “exotic”), number of individual plants collected, and status as a county recorder per Kaul et al. (2012).

Date Collected	Family	Genus species	Common Name	Status	No. Collected	Co. Record
8/2/2022	Onagraceae	<i>Oenothera rhombipetala</i>	Four-point evening primrose	N	2	-
8/8/2022	Solanaceae	<i>Solanum interius</i>	Plains black nightshade	N	1	-
5/23/2022	Caprifoliaceae	<i>Lonicera maackii</i>	Amur honeysuckle	E	2	Hall
6/14/2022	Cyperaceae	<i>Carex hallii</i>	Deer sedge	N	2	-
6/14/2022	Cyperaceae	<i>Carex aurea</i>	Golden sedge	N	1	-
6/14/2022	Cyperaceae	<i>Carex crawei</i>	Crawe’s sedge	N	1	-
6/18/2022	Caryophyllaceae	<i>Saponaria officinalis</i>	Soapweed/Bouncin gbet	E	2	-

**Butterfly Species of Concern Monitoring**

We counted butterflies using linear walking transects. Surveys were conducted by two research personnel; the observer spotted butterfly species of concern, while the recorder utilized a GPS and a

compass to navigate the monitoring transect, record data, and aid in the detection of butterflies. We counted “butterflies observed ahead and to the sides to the limit at which a species can be identified with binoculars” (Swengel 1996). Detections were recorded as within 10m of the transect or outside of this area. Only Regal Fritillaries within 10m of the transect line were sexed. Males have 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 using GPS as well. All sightings within 200m of the start of a monitoring transect and their corresponding GPS locations were included as incidental detections associated with specific monitoring plots. In total, we surveyed 21 monitoring sites 3 times each in 2022. 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 three times during the Regals’ active 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. We also recorded incidental detections of Monarchs and Regal Fritillaries made off long-term monitoring plots while out conducting other survey work. Previous to 2020, we only reported abundance estimates from systematic monitoring surveys. Generally, this works well for Regal Fritillaries considering their strong associations with particular habitats and their resident life history. However, as migrants, Monarch concentrations can shift widely from year to year, and sometimes their highest densities are detected outside of our monitoring plot system. Furthermore, there is significant temporal variability in peak Monarch abundance, and the highest densities can migrate through the Central Platte River Valley outside of our standardized survey periods. Therefore, starting in 2020 we also began reporting incidental butterfly species of concern detections in our annual *Species Detection, Collection, and Monitoring Report*.

This year was a notably low year for both Regal Fritillaries and Monarchs (Table 5). Regal Fritillaries declined by 70.1% from 2021 surveys. Similarly, Monarchs declined by 86.9%. Taking part in Monarch Watch Tagging Program and Project Monarch Health, we netted, collected parasite samples, tagged, and released 34 Monarchs which are included in our incidental counts.

**Methods:**

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* 21:183–205.

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

**Table 5. Butterfly Detections 2022**

Common Name	Regal Fritillary	Monarch
<b>Systematic On-Plot</b>	64	29
<b>Count per Survey</b>	1.02	0.46

Common Name	Regal Fritillary	Monarch
Incidental On-Plot	30	26
Incidental Off-Plot	26	61
<b>Total</b>	120	116

## Soil Macroinvertebrate Collections

We collected soil macroinvertebrates in partnership with A. Kanz and Dr. C. Davis of Oklahoma State University as part of a 3-year study funded by the EPA to examine macroinvertebrates in conjunction with vegetation communities and soil characteristics as indicators of wet meadow function in the Central Platte River Valley. Macroinvertebrates were collected from 20 X 20 X 25 cm blocks of excavated soil, which were sampled 6 times at each site across a 100 m transect. We sampled 26 total sites during the summer of 2022. Sample identifications were made primarily by A. Kanz.

### Methods:

Davis, C.A., J.E. Austin, and D.A. Buhl. 2006. Factors influencing soil invertebrate communities in riparian grasslands of the Central Platte River floodplain. *Wetlands* 26(2):438-454.

**Table 6. Counts of Soil Macroinvertebrates Collected in 2022**

Scientific name	Common name	Number
Amadilladiidae	Pill Bug	823
Aporrectodea trapezoides	Earthworm, family Lumbricidae	755
Aranaeidae	Spiders	7
Asilidae	Robber-fly	4
Cantharidae	Soldier Beetle	1
Carabidae	Ground Beetle	80
Chrysomelidea	Leaf Beetles	2
Curculionidae	Weevils	52
Diplocardia spp.	Earthworm, family Acanthodrilidae	379
Dolichopodidae	Long-legged Flies	4
Elateridae	Click Beetle	146
Formicidae	Ants	920
Fulgoromorpha	Planthoppers	5
Lepidoptera	Butterflies and Moths	62
Myriapoda	Millipedes and Centipedes	6
Pentatomidae	Stink-bugs	9
Scarabaeidae	Scarab Beetles	114
Staphylinidae	Rove Beetle	19
Tabanidae	Horse-Fly	11
Tenebrionidae	Darkling Beetles	1
Therevidae	Stiletto-Fly	2

Tipulidae	Crane Fly	3
Trogossitidae	Bark-gnawing Beetles	1
Trombidiidae	Velvet Mites	1

## 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 three differentiable categories (Weir and Mossman 2005; USGS 2012):

### Table 7. 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 four species in 2022 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 2022, Boreal Chorus Frogs had both the highest mean calling index and were detected on the highest percentage of monitoring sites (this is consistent with both highest call index and highest percentage of plots for this species in 2021; however, it should be noted that the Boreal Chorus Frog was detected at 100% of sites in 2021). In general, all species detected were not as widespread in 2022 as they were in 2021; this decrease may be attributable to the exceptionally dry weather in 2022, as much of the Platte River Basin, including the Central Platte, was in some level of drought throughout the year.

### Table 8. Mean anuran species abundance index and percent of plots present during surveys conducted in 2022

Common Name	Scientific Name	Call Index	% Plots
Boreal Chorus Frog	<i>Pseudacris maculata</i>	2.5	80.5%
Woodhouse’s Toad	<i>Anaxyrus woodhousii</i>	1.9	73.2%
Plains Leopard Frog	<i>Lithobates blairi</i>	1.5	31.7%
Cope’s Gray Treefrog	<i>Hyla chrysoscelis</i>	1	17.1%

#### 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 about 2 million Sandhill Cranes in the Central Platte River Valley (Chapman to Overton, NE) across 9 weeks of surveys in 2022. Relative error estimates per survey ranged from -44.8 to +28.0% comparing ocular to photo counts (mean= 7.4). 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 625,900±61,800 on March 21<sup>st</sup>. Peak abundance appeared to occur over a relatively short time period in 2022, although this time period was slightly longer than it was in 2021 (peak abundance in 2021 lasted approximately two weeks (with numbers greater than 200,000 only for a two-week period).

**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 9. Sandhill Crane Count by Survey Week 2022**

Survey Date	SACR Count	Bias Corrected
2/14/2022	27,423	27,425±645
2/23/2022	52,167	57,859±7,300
3/1/2022	58,389	67,300±10,300
3/8/2022	347,473	365,500±29,500
3/15/2022	482,736	534,900±34,200
3/21/2022	621,521	625,900±61,800
3/29/2022	149,330	169,500±11,800
4/9/2022	143,097	146,400±20,600
4/14/2022	9,974	11,800±3,200



## Whooping Crane Behavioral Monitoring Research

The objective of the Whooping Crane (*Grus americana*) behavioral monitoring study is to collect behavioral data that will allow us to calculate Whooping Crane time budgets and link them to the habitats they are utilizing. Behavioral monitoring data can help us determine which values various habitats provide (i.e. – forage resources, safe areas for social display, etc.) as well as how behavior varies within and across habitat types. This data can also help us document potential threats as well as specific forage resources consumed by Whooping Cranes. In short, we gathered natural history information that has the potential to inform conservation efforts through behavioral observations.

Whooping Crane locations were provided via the United States Fish and Wildlife (USFWS) managed public sightings database as well as locations of GPS-tracked Whooping Cranes that were provided by the USGS, FWS, and CWS. Once a report was received, qualified biologists were sent to confirm public reports of Whooping Cranes. In addition to filling out the traditional USFWS sightings report, biologists also conducted scan sampling to get a more comprehensive view of their behavior. Research was conducted predominantly in south-central Nebraska (Rainwater Basins, the Loup River system, Platte River system, etc.) with occasional work outside of this area (throughout Nebraska and northern Kansas) as time and funds allowed. All work was conducted following the guidelines drafted by the USFWS and the Nebraska Game and Parks Commission (NGPC) for “avoiding Whooping Crane disturbance and harassment” including making observations from >610 m (~0.4 mi, 2,000 ft.), avoiding intrusions into habitats to measure habitat parameters until after the cranes have clearly departed the area, etc., and immediately reporting any information regarding observations of injured cranes to the proper authorities.

We used an instantaneous scan sampling approach which included counting the number of Whooping Cranes displaying a particular behavior at one-minute intervals for a period of no less than 30 minutes unless the cranes left the use location or moved out of sight. We relied on high resolution long-range photography and videography to document Whooping Crane forage consumption. We also documented eagle-crane interactions considering the recent increase in observations of Bald Eagles attempting to depredate crane species regionally. We also recorded the presence of any aircraft and documented Whooping Crane reactions them.

During the spring of 2022, we observed 17 unique Whooping Crane groups that were comprised of 45 individuals including 37 adults and 8 juveniles. We collected 926 instantaneous scan samples of Whooping Crane groups which totaled 2,383 individual behaviors documented. We obtained several photographs and observed Whooping Cranes utilizing several different landcover classes including corn field (n=962), river (n=424), natural lacustrine (n=240), winter wheat field (n=238), wet meadow (n=230), open-water slough (n=139), other agricultural field (n=120), and soybean field (n=30). During the spring of 2022, much of the Whooping Crane use we observed occurred within central Nebraska, but also included observations in central Kansas palustrine and lacustrine wetlands. Foraging and/or drinking were the most common behavioral activities recorded in most landcover classes. Loafing was the most common behavior while in natural lacustrine wetlands and river landcovers while walking in search of food was the most common behavior observed in open-water sloughs. Preening and loafing

were most often observed in wetland landcover classes. We also observed 4 potential aircraft-Whooping Crane interactions and 2 bald eagle-Whooping Crane interactions during spring 2022.

During the fall of 2022, we observed 8 unique Whooping Crane groups comprised of 20 individuals including 14 adults and 6 juveniles. We collected 714 instantaneous behavioral scan samples which totaled 1,944 individual behaviors documented. We obtained several photographs and observed Whooping Cranes utilizing several different landcover classes including river (n=276), corn field (n=1,095), flooded shallow marsh (n=378), and wet meadow (n=195). During the fall of 2022, all of the Whooping Crane use we observed occurred within central Nebraska. Foraging and/or drinking (49%) were the most common behavioral activities recorded in most landcover classes. Foraging (45%) was the most common behavior observed while in wetland landcovers while foraging (52%), loafing (20%), and alert (16%) were the most common behaviors observed in cornfields. We observed no potential aircraft-or bald eagle-Whooping Crane interactions during fall 2022.

In total, across both spring and fall migrations in 2022, we observed 25 unique Whooping Crane groups including 65 individuals of which 14 were juveniles and completed 1,640 scan samples and documented 4,327 behaviors. Use was comparatively high in the Rainwater Basins in the spring and well above average on the Middle Loup River in the fall of 2022.

## **Moth Species Research**

The broad purpose of the moth species research project was to gain a better understanding of the moth community within the central Platte River Valley in southcentral Nebraska, with a focus on documenting species of concern and ecological importance.

We used three methods to detect moth species. First, we employed high-resolution motion-sensor triggered infrared videography and photography at relatively large flowered nectar-producing plants known to be pollinated by macro-moth species present on Mormon Island, the last known location of the Western Prairie Fringed Orchid (*Platanthera praeclara*) within the Central Platte River Valley. The second method used to detect nocturnal moths was targeted toward capturing underwing species, many of which are listed by the State of Nebraska as Species of Greatest Conservation Need. We coated the top of a 5x10 cm board with holes drilled into it 1 cm deep and placed on top of a 60 cm of a 90-cm tall, free-standing 10x10 cm white post with a fermented mixture of beer or wine, yeast, and banana as this taxon as well as a number of other moth species are known to be attracted to fermenting fruit. The third collection method involved the use of UV light traps which were targeted toward the entire nocturnal moth community. We used a white queen-sized sheet stretched vertically between two poles and placed a UV light to illuminate the sheet. We attempted to capture 1 individual for each species observed each night; however, multiple captures of a single species were occasionally made in a given night so total captures are not representative of the relative abundance of each species in the landscape.

During 2022, we sampled 17 sites including 3 cropland, 11 grassland, and 3 woodland sites. We identified 235 unique species of moths on Crane Trust properties and have several additional species currently out

for expert identification. Of these different species, we captured at least 131 species of macro-moths including underwing and sphinx moth species that are known, or at least potential pollinators of the endangered Western Prairie Fringed Orchid as well as species that are listed by the State of Nebraska as Tier-1 or Tier-2 Species of Greatest Conservation Need. We captured several White-lined Sphinx Moths (*Hyles lineata*) that are known pollinators of Western Prairie Fringed Orchid which was last documented on Crane Trust properties in the year 2000. Larger moth species, such as the Sphinx and Underwing Moths, help maintain connected habitats with their ability to disperse pollen across long distances. Having species that disperse long distances could prove to be very beneficial for maintaining genetic variability in the future if Western Prairie Fringed Orchid populations were to be re-established within their historic range. We also captured a couple of underwing species towards the end of our study including Whitney's Underwing Moth (*Catocala whitneyi*) which is listed as a Tier-1 Species of Greatest Conservation Need as well as Magdalen Underwing (*Catocala illecta*). Given that we did not capture any underwing species during the first 30 days of our study, we hypothesized these later-emerging species may include several underwing species that are listed as Tier-1 or Tier-2 Species of Greatest Conservation Need. As such, we implemented 2 additional surveys on September 19<sup>th</sup> and 20<sup>th</sup> and captured 61 unique species of moths which included White-lined Sphinx Moths, 24 species that were new to this project, and 1 new state record. In total, during 2022, we were able to capture and identify 13 new species of moths that had never been documented in the State of Nebraska. These new species included:

1. *Erinnyis ello* (Ello Sphinx)
2. *Amydria effrentella* (Lesser Dark Burrowing-webworm)
3. *Eucosma influana*
4. *Occidentalia comptulatalis*
5. *Aethes razowskii* (Razowski's Aethes Moth)
6. *Epiblema scudderiana* (Goldenrod Gall Moth)
7. *Microtheoris vibicalis* (Whip-marked Snout Moth)
8. *Haimbachia albescens* (Silvered Haimbachia Moth)
9. *Bactra maiorina*
10. *Thopeutis forbesellus*
11. *Oligia obtusa*
12. *Leucania amygdalina* (Northern Linen Wainscot)
13. *Photodes inops* (Spartina Borer)

We surveyed 3 cropland, 7 grassland, 4 wet meadow, and 3 woodland sites with varying degrees of disturbance and management history. We captured 5 species that were only captured in croplands, 59 species that were only captured in grasslands, 13 species that were only captured in wet meadows, 41 species that were only captured in woodland areas, and 117 "generalist" species that were captured in multiple habitats. We captured 49 macro- and 37 micro-moth species in cropland, 150 macro- and 122 micro-moth species in grassland, 47 macro- and 45 micro-moth species in wet meadow, and 81 macro- and 55 micro-moth species in woodland sites. All species captured and identified during 2022 are provided in Table 9.

**Table 10. Moth species counted and collected in 2022**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Counted</b>	<b>Collected</b>
<i>Abrostola urentis</i>	Spectacle nettle moth	4	
<i>Achyra rantalis</i>	Garden Webworm	12	
<i>Acrolophus arcanella</i>		1	
<i>Acrolophus plumifrontella</i>	Eastern grass tubeworm	3	
<i>Acronicta insularis</i>	Cattail Caterpillar Moth	5	
<i>Acronicta lepusculina</i>	Cottonwood Dagger Moth	1	
<i>Adelphia petrella</i>	Adelphia Moth	1	
<i>Aethes razowskii</i>	Razowski's Aethes Moth	1	
<i>Aethiophysa invisalis</i>		3	1
<i>Agnorisma badinodis</i>	Wooly grass veneer	1	
<i>Agonopterix alstroemeriana</i>	Pale-banded dart	1	
<i>Agrotis gladiaria</i>	Large tolype	1	
<i>Agrotis ipsilon</i>	Poison Hemlock Moth	2	
<i>Agrotis venerabilis</i>	Florida tetanolita	2	
<i>Amphipyra glabella</i>	Swordsman dart	1	
<i>Amydria effrentella</i>	Ipsilon Dart	1	
<i>Anagrapha falcifera</i>	Venerable dart	5	
<i>Anarta trifolii</i>	Smooth Amphipyra	3	
<i>Anavitrinella pampinaria</i>		11	
<i>Anicla illapsa</i>	Celery looper	6	
<i>Apamea burgessi</i>	Dimorphic sitochoa moth	2	
<i>Apamea devastator</i>	The Nutmeg	2	
<i>Apamea inordinata</i>	Common grey	1	1
<i>Apantesis carlotta</i>	Snowy dart	8	
<i>Apantesis parthenice</i>	Xanthophysa	1	
<i>Argyria nummulalis</i>	Dogbane saucrobotys	2	
<i>Aristotelia elegantella</i>	Burgess' brocade	1	
<i>Arta statalis</i>	Glassy Cutworm	8	
<i>Autographa precationis</i>		1	
<i>Bactra maiorina</i>	Carlotta's tiger moth	8	1
<i>Cabera quadrifasciaria</i>	Parthenice tiger	2	1
<i>Caenurgina erechtea</i>	Satin Argyria moth	25	
<i>Callima argenticinctella</i>		1	
<i>Canarsia ulmiarrosorella</i>	Posturing Arta Moth	2	
<i>Catabena lineolata</i>	Common Looper	1	
<i>Catocala illecta</i>		1	
<i>Catocala whitneyi</i>	Four-lined cabera moth	1	
<i>Celypha cespitana</i>	Forage looper	8	
<i>Ceratonia undulosa</i>	Orange-headed Epicallima	4	
<i>Chionodes discoocellella</i>	Mead's flower moth	1	

<i>Chloridea subflexa</i>	Elm leaftier moth	5	
<i>Chlorochlamys chloroleucaria</i>	Fine-lined Sallow	11	
<i>Chlorochlamys phyllinaria</i>	Magdalen underwing	1	
<i>Choristoneura rosaceana</i>	Whitney's Underwing Moth	3	
<i>Chrysoteuchia topiarius</i>	Celypha moth	13	
<i>Cisseps fulvicollis</i>	Waved sphinx	1	
<i>Clepsis clemensiana</i>	Jaguar Flower Moth	1	
<i>Clepsis peritana</i>	Eyeringed Chionodes Moth	1	
<i>Coleophora mayrella</i>	Subflexus straw moth	1	
<i>Conchylodes octonalis</i>	Blackberry Looper	1	
<i>Condica videns</i>	Thin-lined Chlorochlamys Moth	2	
<i>Costaconvexa centrostrigaria</i>	Oblique-banded leaf roller	1	
<i>Crambodes talidiformis</i>	Cranberry Girdler	3	
<i>Crambus agitatellus</i>	Yellow-collared Scape Moth	6	
<i>Crambus leachellus</i>		1	
<i>Cycnia oregonensis</i>	Clemens' Clepsis Moth	2	
<i>Dargida diffusa</i>	Garden Tortrix	15	
<i>Deltote bellicula</i>	Metallic coleophora	1	1
<i>Desmia maculalis</i>	Eight-barred Conchylodes	2	
<i>Diatraea evanescens</i>	White-dotted groundling	5	
<i>Digrammia continuata</i>	Bent-line Carpet	1	
<i>Digrammia gnophosaria</i>	Verbena Moth	4	
<i>Digrammia ordinata</i>	Double-banded Grass-veneer	3	
<i>Digrammia subminiata</i>	Leach's grass-veneer	8	
<i>Donacaula melinellus</i>	Oregon cycnia	1	
<i>Ecdytolopha insiticiiana</i>	Wheat head armyworm	2	
<i>Ectropis crepuscularia</i>	Bog Deltote	3	
<i>Elachista orestella</i>	Grape Leafroller	1	
<i>Elaphria grata</i>		3	
<i>Elophila oblitalis</i>	Curve-lined Angle	4	
<i>Emmelina monodactyla</i>	Hollow-spotted angle	2	
<i>Endothenia nubilana</i>		1	
<i>Epiblema abruptana</i>	Dark-waved angle	13	
<i>Epiblema minutana</i>		1	
<i>Epiblema scudderiana</i>	Locust twig borer	5	2
<i>Epiblema strenuana</i>	Small engrailed	5	1
<i>Erinnyis ello</i>		2	
<i>Euacidalia sericearia</i>	Grateful Midget	11	
<i>Euchlaena johnsonaria</i>	Waterlily leafcutter	1	
<i>Euchlaena obtusaria</i>	Morning-glory Plume Moth	1	
<i>Euchromius ocella</i>	Cloudy Endothenia	9	
<i>Eucosma bilineana</i>	Abrupt Epiblema	3	1
<i>Eucosma glomerana</i>	Sparganothis fruitworm	1	

<i>Eucosma grindeliana</i>	Unicorn caterpillar moth	1	
<i>Eucosma influana</i>		1	1
<i>Eucosma parmatana</i>	Western bean cutworm	1	
<i>Eucosma radiatana</i>	Goldenrod gall moth	1	
<i>Eudryas unio</i>	Ragweed borer	1	
<i>Eumacaria madopata</i>	Ello Sphinx	2	
<i>Eupithecia miserulata</i>		4	
<i>Eusarca confusaria</i>	Johnson's euchlaena	1	
<i>Eustixia pupula</i>	Obtuse euchlaena	3	
<i>Euxoa auxiliaris</i>	Belted grass veneer	2	
<i>Feltia Jaculifera</i>	Soft-lined Wave	3	
<i>Fissicrambus mutabilis</i>	Two-lined eucosma	4	
<i>Frechinia laetalis</i>		3	
<i>Furcula cinerea</i>		1	
<i>Gabara subnivosella</i>		11	
<i>Galgula partita</i>		3	
<i>Garella nilotica</i>		2	
<i>Glaphyria sesquistrialis</i>	Pearly Wood-nymph	4	
<i>Globia oblonga</i>		1	
<i>Gluphisia septentrionis</i>	Brown-bordered Geometer	10	
<b>Grand Total</b>		<b>803</b>	
<i>Grapholita tristrigana</i>	Common eupithecia	1	
<i>Gynnidomorpha romonana</i>	Confused eusarca	1	
<i>Haematopsis grataria</i>	Spotted peppergrass moth	11	
<i>Hahncappsia pergivalis</i>	Army Cutworm Moth	1	
<i>Haimbachia albescens</i>	Dingy cutworm	2	
<i>Haploa reversa</i>	Changeable grass veneer	1	
<i>Helicoverpa zea</i>		8	
<i>Heliiothis phloxiphaga</i>	Gray Furcula	1	
<i>Hellinsia inquinatus</i>		2	
<i>Homoeosoma electellum</i>	Orange holomelina	4	
<i>Homophoberia apicosa</i>	The wedgeling	6	
<i>Honora mellinella</i>	Snowy urola	1	
<i>Hyles lineata</i>	Black-olive Caterpillar Moth	11	
<i>Hypena manalis</i>	White-roped Glaphyria	3	1
<i>Hypena scabra</i>	Oblong Sedge Borer	2	
<i>Hypoprepia fucosa</i>	Common gluphisia	1	
<i>Hypsopygia costalis</i>		2	
<i>Hypsopygia intermedialis</i>	Three-lined Grapholita	1	
<i>Idia aemula</i>		3	
<i>Idia lubricalis</i>	Chickweed Geometer	1	
<i>Iridopsis defectaria</i>		1	
<i>Lacinipolia renigera</i>	Silvered Haimbachia moth	11	

<i>Leptostales ferruminaria</i>	Reversed Haploa Moth	1	1
<i>Lesmone detrahens</i>	Corn earworm	2	
<i>Leucania adjuta</i>	Darker-spotted Straw Moth	2	
<i>Leucania amygdalina</i>		2	
<i>Leucania insueta</i>		1	
<i>Leucania phragmitidicola</i>	Sunflower moth	4	
<i>Leuconycta diptheroides</i>	Black wedge spot	1	
<i>Lochmaeus bilineata</i>		1	
<i>Loxostege cereralis</i>	White-lines sphinx	10	
<i>Loxostege munroalis</i>	Flowing-line snout	4	
<i>Loxostegopsis merrickalis</i>	Green Cloverworm	3	
<i>Lygropia rivulalis</i>	Painted Lichen Moth	2	
<i>Macaria coortaria</i>	Clover hayworm	1	
<i>Macaria pustularia</i>	Red-shawled Moth	1	
<i>Macrochilo orciferalis</i>	Common idia	1	
<i>Magusa divaricata</i>	Celery Leaf-tier	1	
<i>Maliattha synochitis</i>	Glossy black idia	2	
<i>Maliattha synochitis</i>		1	
<i>Manduca quinque-maculatus</i>	Brown-shaded Gray Moth	2	
<i>Marimatha nigrofimbria</i>	Virginian tiger moth	1	
<i>Mellilla xanthometata</i>	Bristly cutworm	7	
<i>Meropleon ambifusca</i>	Tampa Moth	3	
<i>Meroptera civatella</i>	Light-ribboned Wave	1	
<i>Metanema inatomaria</i>	Detracted Owlet	3	
<i>Microcrambus elegans</i>	Adjutant wainscot	1	
<i>Microtheoris ophionalis</i>	Northern Linen Wainscot	2	
<i>Microtheoris vibicalis</i>		3	2
<i>Mimoschinia rufofascialis</i>	Phragmites wainscot	7	
<i>Mompha eloisella</i>	Green leuconycta	2	
<i>Mythimna unipuncta</i>	Double-lined Prominent	10	
<i>Nematocampa resistaria</i>	Alfalfa Webworm	1	
<i>Neodactria luteolellus</i>	Beet Webworm moth	10	
<i>Nephelodes minians</i>	Banded scythris	10	
<i>Nephrogramma reniculalis</i>	Merrick's pyralid	1	
<i>Nomophila nearctica</i>	Bog lygropia	10	
<i>Occidentalia comptulatalis</i>	Four-spotted Speranza	1	
<i>Ogdoconta cinereola</i>	Lesser Maple Spanworm	7	
<i>Oligia obtusa</i>	Bronzy macrochilo	1	1
<i>Orthonama obstipata</i>	Variable narrow-wing	2	
<i>Ostrinia penitalis</i>	Blak-dotted maliattha	8	
<i>Palpita magniferalis</i>	Blak-dotted maliattha	3	
<i>Papaipema baptisiae</i>	Evergreen bagworm	1	
<i>Parapediasia teterrellus</i>	Five-spotted Hawk Moth	1	



<i>Parapoynx badiusalis</i>	Black-bordered Lemon	3	
<i>Pediasia trisecta</i>	Orange wing	12	
<i>Pelochrista argentialbana</i>	Hackberry leafroller	1	
<i>Pelochrista galenapunctana</i>	Newman's brocade	1	
<i>Pelochrista heathiana</i>	Poplar bud borer moth	2	
<i>Pelochrista matutina</i>	Pale metanema	3	
<i>Pelochrista robinsonana</i>	Elegant Grass-veneer	7	
<i>Pelochrista scintillana</i>	Yellow-veined Moth	7	1
<i>Pelochrista vagana</i>	Whip-marked Snout Moth	3	
<i>Peoria roseotinctella</i>	Rufous-banded crambid	2	
<i>Peridroma saucia</i>	Red-streaked Mompha	7	
<i>Perigea xanthioides</i>	Armyworm Moth	1	1
<i>Peripasta caeculalis</i>	Horned spanworm	2	
<i>Phalaenostola larentioides</i>	Mottled Grass-veneer	5	
<i>Phalaenostola metonalis</i>	Bronzed cutworm	1	
<i>Photedes defecta</i>	Kidney Moth	1	
<i>Photedes inops</i>	Twin-spotted sphinx	8	
<i>Phragmatobia fuliginosa</i>	Lucerne Moth	7	
<i>Platytes vobisne</i>		2	1
<i>Plutella xylostella</i>	Common pinkband	1	
<i>Polygrammodes flavidalis</i>	Obtuse sedge borer	8	
<i>Ponometia candefacta</i>	The Gem	13	
<i>Ponometia semiflava</i>	American Lotus Borer	1	
<i>Ponometia tortricina</i>	Splendid Palpita	2	1
<i>Prionoxystus robiniae</i>	Indigo stem borer	1	
<i>Proxenus miranda</i>	Bluegrass Webworm Moth	13	
<i>Psamatodes abydata</i>	Brown sallow	1	
<i>Pseudeustrotia carneola</i>	Chestnut-marked Pondweed Moth	4	
<i>Pyrausta signatalis</i>	Sod Webworm	1	
<i>Pyrharctia isabella</i>		2	
<i>Rachiplusia ou</i>	Fall armyworm	2	
<i>Raphia frater</i>		4	
<i>Resapamea stipata</i>		7	
<i>Saucrobotys futilalis</i>		5	
<i>Schinia jaguarina</i>	Robinson's pelochrista moth	1	
<i>Schinia meadi</i>	Spangled pelochrista	1	
<i>Schizura unicornis</i>		2	
<i>Sciota celtidella</i>		2	
<i>Sciota fernaldi</i>	Variiegated Cutworm	2	
<i>Scopula inductata</i>	Red groundling moth	3	
<i>Scythris trivinctella</i>	Wavy-lined emerald	1	
<i>Sitochroa chortalis</i>	Titian Peale's Crambid	2	
<i>Smerinthus jamaicensis</i>	Black-banded owlet	2	

<i>Sparganothis sulfureana</i>	Pale phalaenostola	9	
<i>Spilosoma virginica</i>	Narrow-winged Borer	2	
<i>Spodoptera frugiperda</i>		3	
<i>Spodoptera ornithogalli</i>	Spartina borer	2	
<i>Stegea eripalis</i>	Ruby Tiger Moth	3	
<i>Striacosta albicosta</i>	Platytes Moth	9	
<i>Sympistis stabilis</i>	Diamondback moth	1	
<i>Synchlora aerata</i>	Ironweed Root Moth	1	
<i>Tampa dimediatella</i>	Olive-shaded bird dropping moth	1	
<i>Tarache abdominalis</i>	The half yellow	1	
<i>Tarache aprica</i>		4	
<i>Tetanolita floridana</i>	Carpenter worm	4	
<i>Thaumatopsis pexellus</i>		1	
<i>Thopeutis forbesellus</i>	Miranda moth	2	
<i>Thyridopteryx ephemeraeformis</i>	Exposed Bird Dropping Moth	1	
<i>Tolyte velleda</i>	Yellow-striped Armyworm Moth	1	
<i>Trachea delicata</i>	Dot-lined angle	1	
<i>Udea rubigalis</i>	Pink-barred Pseudeustrotia	5	
<i>Urola nivalis</i>	Raspberry Pyrausta	7	
<i>Vaxi auratellus</i>	Curve-lined vaxi	3	1
<i>Virbia aurantiaca</i>	Isabella Tiger Moth	1	
<i>Xanthophysa psychialis</i>	Gray looper	2	
<i>Xenotemna pallorana</i>	The brother	4	
<i>Xylomia chagnoni</i>	Four-lined Borer Moth	1	
Unknown Species		115	

## 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. These data are all integrated into our long-term research and monitoring plan and will be used to develop models and plans 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 U.S. 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 in 2022

1. Baasch, D.M., A.J. Caven, J.G. Jorgensen, M. Rabbe, A.H. Medaries, M.R. Schaaf, B.L. Ostrom, J.D. Weise, J.M. Malzahn, T.J. Smith. 2022. Record-sized flock of Whooping Cranes observed staging in the central Platte River valley during autumn 2021. *Waterbirds: International Journal of Waterbird Biology*.
2. Baasch, D.M., A.C. Caven, J.G. Jorgensen, R. Grosse, M. Rabbe, D.M. Varner. 2022. Whooping Crane Use Patterns in Relation to an Ecotope Classification in the Central Platte River Valley, Nebraska, USA. *Avian Conservation and Ecology* 17(2).
3. Baasch, D.M., A.M. Hegg, J.F. Dwyer, A.J. Caven, W.E. Taddicken, C.A. Worley, A.H. Medaries, C.G. Wagner, P.G. Dunbar, & N.D. Mittman. 2022. Mitigating avian collisions with power lines through illumination with ultraviolet light. *Avian Conservation and Ecology* 17(2):9. <http://www.ace-eco.org/vol17/iss2/art9/>
4. Caven, A.J. 2022. Western Prairie Fringed Orchid Management, Ecology, and Decline at Mormon Island. *Transactions of the Nebraska Academy of Sciences* 42:1-8.
5. Caven, A.J., M.M. Mosier, K.J. Stoner, B. Taddicken, B. Krohn, A. Gramza, C.R. Allen, M. Carter, M. Koch, K.D. Schroeder, S. Bailey, R. Walters, B.C. Chaffin, E. Gnuse, A. Jones, and K. Bird, 2022. A Long-Term Vision for an Ecologically Sound Platte River.
6. Caven, A.J., A.T. Pearse, D.A. Brandt, M.J. Harner, G.D. Wright, D.M. Baasch, E.M. Brinley Buckley, K.L. Metzger, M.R. Rabbe, and A.E. Lacy. 2022. Whooping crane stay length in relation to stopover site characteristics. *Proceedings of the North American Crane Workshop* 15:6-33.
7. Caven, A.J., and J.D. Wiese. 2022. Reinventory of the Vascular Plants of Mormon Island Crane Meadows after Forty Years of Restoration, Invasion, and Climate Change. *Heliyon* 8:e09640.
8. Caven, A.J., J.D. Wiese, B.L. Ostrom, K.C. King, J.M. Malzahn, D.M. Baasch, and B. Krohn. 2022. Landscape-level long-term biological research and monitoring plan for the Crane Trust. Zea Books, University of Nebraska-Lincoln Libraries, Lincoln, NE, USA, 117.
9. Luz-Ricca, E., K. Landolt, B.A. Pickens, and M. Koneff. 2022. Automating sandhill crane counts from nocturnal thermal aerial imagery using deep learning. *Remote Sensing in Ecology and Conservation*. doi: 10.1002/rse2.301
10. Ostrom, B. 2022. Monitoring Avian Populations with Acoustic Indices in the Central Platte River Valley. Thesis. University of Nebraska at Kearney, Kearney, Nebraska, USA. 78 p.
11. Wiese, J.D. 2022. A comprehensive bison management and research plan for the Crane Trust. M.E.M. Thesis. Western Colorado University.