

**IMPLEMENTATION OF THE WHOOPING CRANE  
MONITORING PROTOCOL  
2018 SPRING – FINAL REPORT**



Prepared by

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# **Implementation of the Whooping Crane Monitoring Protocol Spring 2018**

**Prepared by  
Ecological Solutions**

**For  
The Committees of the  
Platte River Recovery Implementation Program**

**Date 10/16/2018**

## **Summary**

The Ecological Solutions (ES) team conducted the whooping crane monitoring effort for the 2018 spring migration following the protocols detailed in the *Platte River Recovery Implementation Program – Whooping Crane Monitoring Protocol – rev. May 2015*.

The spring migration monitoring took place from March 6<sup>th</sup> through April 29<sup>th</sup>. Surveys were conducted using systematic flight transects along the Platte River from Chapman to Lexington. Systematic along with opportunistic sightings, resulted in 118 unique whooping cranes observed within the transect boundaries during the 55-day survey period. Below includes survey methodology, results, and supporting data.

## **Equipment/Materials, Personnel, and Study Area**

Two Cessna 172 aircrafts, crewed by a pilot and two observers, were used to make observations along predetermined flight transects. The pilot utilized a GPS unit to follow the pre-loaded route, as well as to mark any observed objects with a waypoint. The aerial observers utilized binoculars, a Canon EOS 6D camera equipped with a 24 x 105 mm lens, and mobile phones for communication.

Ecological Solutions documented information using data sheets provided by the Platte River Recovery Implementation Program (PRRIP) Executive Director's Office (EDO), which included aerial flight logs, aerial observations, ground search efforts, and use site monitoring logs.

The area of study stretched from the Highway 283 Platte River bridge near Lexington, Nebraska to the Platte River bridge near Chapman, Nebraska and focused on the Platte River channels and the adjacent wetlands, ponds, and waterways extending 3.5 miles out on each side of the outermost channels. The total length of the coverage area was approximately 90 miles and

was divided into two routes, an east route and a west route. Observations outside the study area were not included in the data.

## Implementation and Methodology

Systematic aerial transects were flown daily conditions permitting, at an air speed of approximately 100 MPH and an altitude of approximately 1,000 – 2,000 feet from March 6 – 12 due to collision risk with snow geese, thereafter at an altitude of approximately 750 feet unless conditions demanded higher altitudes. Two flights were initiated each morning, one from Grand Island (east route) and one from Kearney (west route). Planes were required to be at transect starting points ½ hour before sunrise. Flights were typically completed in less than two hours. In the event of adverse weather, crews were required to wait up to two hours after sunrise for conditions to improve before cancelling the flight, that is unless the pilot cancelled the flight for the day prior to that using their best judgement. River transects were flown east to west and the plane was oriented south of the southern-most river channel to reduce the effect of sun glare. Each riverine transect had two daily alternating starting points. The alternating starting points were implemented to allow different sections of the study area to be observed as early as possible in the flight times.

The east route day one started at the Platte River bridge near Chapman (Chapman bridge) and followed the river transect (OSE) to the Highway 10 bridge (Minden bridge). The pilots would then follow the targeted Primary Wetland Return Transect (PWRTE) back to the Chapman bridge, turn and follow the targeted Secondary Wetland Return Transect (CSRT) to the Highway 34 bridge. For the east route day two, flights would start at the Platte River bridge near Wood River (Wood River bridge) and follow the OSE to the Minden bridge, then follow the PWRTE back to the Chapman bridge. The pilots would then follow the OSE to the Wood River bridge, then return on the Secondary Wetland Return Transect (WSRT) that stretched from HWY 10 near Wood River to the Highway 34 – Platte River bridge.

The west route day one started at the Minden bridge and followed the river transect (OSW) to the Highway 283 bridge (Lexington bridge). The pilots would then follow the targeted Primary Wetland Return Transect (PWRTW) back to the Minden bridge. For the west route day two, flights would start at the Platte River bridge near Odessa (Odessa bridge) and follow the OSW to the Lexington bridge. They would turn and follow the PWRTW back to the Minden bridge and then return on the OSW to the Odessa bridge. Pilots would then follow the Secondary Wetland Return Transect (ESRT) from HWY 183 near Elm Creek to the HWY 40 near the Platte River bridge.

At the beginning of each transect and at turn around points, the aerial crews would relay their position via mobile phone to the nearby ground crews so the ground crews could maintain a relatively close proximity. If an aerial crew spotted any potential whooping crane(s), they would take photos of the object(s) and the surrounding area to confirm the identity and location. If additional confirmation was needed, they would contact the nearest ground observer, who would then position themselves to make a positive identification of the object without disturbance. If the object was determined to be a whooping crane(s), personnel at the EDO as well as the U.S.

Fish and Wildlife Service (USFWS) would be immediately notified so they could take appropriate measures to minimize disturbance if needed. Otherwise, they were notified of results of surveys on a daily basis following the completion of both flights.

In addition to the systematic flights, the aerial and ground crews also confirmed and reported opportunistic sightings. Immediately after receiving a report, depending on the situation, either a plane would be deployed from the airport and/or ground personnel would systematically survey the area until the cranes were located and confirmed, or sufficient search time was allocated to confirm the cranes had left and/or were not present in the immediate area.

Using metrics developed by the EDO, in conjunction with a Geographic Information System (GIS), and facilitated by the in-flight photos and/or GPS waypoints, UTM coordinates were determined for each crane or crane group and recorded with the rest of the data.

All data was later translated from the completed data sheets to the program database via electronic form on a web-based server using Microsoft SharePoint software that was developed for PRRIP by Riverside Technology, Inc. It was then subjected to Quality Assurance/Quality Control (QA/QC) checks by Ecological Solutions to insure accuracy.

## **Results**







































### **Confirmed Whooping Crane Sightings**

A total of 118 unique whooping cranes were confirmed during the 55-day monitoring effort. One hundred and four documented crane groups, comprised of 26 unique groups, were observed and each was given an individual crane group ID (e.g. 2018SP01 = year-season-number). A crane group consisted of any individual or group of whooping cranes observed once daily and would be re-labeled as a new group and given a new crane group ID the next day if they were still in the area. Use site #'s were notated either as a numerical value if the crane group was observed in a riverine, lacustrine, or palustrine environment or with the location's land cover classification (or "AIR" if in flight) at the time of sighting.











































Table 1 includes unique crane group icons, observation dates, the number of cranes in each group, crane group ID's, use site designations, the type of observation during each sighting instance, and total crane use days. All groups associated with a larger group were given the same icon as the larger group (e.g. – The 3:0 and 5:0 groups observed on 4/9 were observed as an 8:0 group on 4/10 with the blue/white icon indicating their association). To facilitate cross-referencing, the crane group icons can be found in Tables 1, 2, 3, 4 and 5 as well as the collective crane group location maps in Figures 7 - 17 and the individual crane group location maps, shown along with a photo of each unique crane group, in Figures 18 – 71.





























**TABLE 1. Observation data of each crane group during the 2018 spring survey including unique group identifier icons, the date of observation, the number cranes in each group, group ID's, use site designation, GPS locations, and the type of observation at time of sighting.**

SPRING	Unique Group Icon	Obs. Dates	# of Cranes Adult:Juv	Group ID #	Use Site #	UTMx	UTMy	Observation Type	See Figures
		3/7/18	1:0	2018SP01	1	545654	4514624	Systematic	18
		3/8/18	1:0	2018SP02	2	543695	4513845	Systematic	18, 19
		3/9/18	1:0	2018SP03	2	543695	4513845	Systematic	18
		3/10/18	1:0	2018SP04	2	543695	4513845	Systematic	18
		3/11/18	1:0	2018SP05	2	543695	4513845	Ground	18
		3/12/18	1:0	2018SP06	3	543648	4513912	Systematic	18
		3/13/18	1:0	2018SP07	3	543648	4513912	Systematic	18
		3/14/18	1:0	2018SP08	3	543648	4513912	Systematic	18
		3/16/18	1:0	2018SP09	4	542139	4513032	Ground	18
		3/17/18	1:0	2018SP10	5	541948	4513087	Ground	18
		3/18/18	1:0	2018SP11	2	543695	4513845	Ground	18
		3/19/18	1:0	2018SP12	3	543648	4513912	Ground	18
		3/20/18	1:0	2018SP13	6	543067	4513607	Systematic	18
		3/20/18	1:0	2018SP14	Ag/corn	504585	4502256	Ground	20-23
		3/21/18	1:0	2018SP15	7	508529	4501898	Systematic	20-23
		3/21/18	1:0	2018SP16	5	541948	4513087	Ground	18
		3/22/18	1:0	2018SP17	5	541948	4513087	Systematic	18
		3/22/18	1:0	2018SP18	8	515102	4504073	Systematic	20-24
		3/24/18	2:1	2018SP19	9	459353	4501104	Ground	25
		3/25/18	2:1	2018SP20	Ag/corn	457804	4502042	Ground	25
		3/25/18	1:0	2018SP21	Ag/corn	518819	4504822	Ground	20-23
		3/25/18	1:0	2018SP22	Ag/beans	543019	4510947	Ground	18
		3/25/18	11:0	2018SP23	Ag/corn	462103	4501981	Ground	27
		3/26/18	1:0	2018SP24	2	543695	5413845	Ground	18
		3/26/18	2:1	2018SP25	9	459353	4501104	Ground	25
		3/26/18	11:0	2018SP26	Ag/corn	461928	4501709	Ground	27
		3/27/18	1:0	2018SP27	3	543648	4513912	Systematic	18
		3/27/18	11:0	2018SP28	10	461540	4503904	Systematic	27,28
		3/27/18	2:1	2018SP29	9	459353	4501104	Ground	25
	1 	3/27/18	2:1	2018SP29a	11	457804	4502042	Systematic	25, 26
		3/28/18	2:1	2018SP30	AIR	459594	4500974	Ground	25
		3/28/18	1:0	2018SP31	12	541817	4512835	Systematic	18
		3/28/18	11:0	2018SP32	10	461540	4503904	Systematic	27
		3/28/18	1:0	2018SP33	13	511858	4503037	Systematic	20-23
		3/29/18	1:0	2018SP34	5	541948	4513087	Ground	18
		3/29/18	1:0	2018SP35	Ag/corn	515750	4502485	Ground	20-23
	2 	3/30/18	5:0	2018SP36	14	504921	4501171	Systematic	29, 30
		3/30/18	1:0	2018SP37	4	542139	4513032	Systematic	18

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SPRING	Unique Group Icon	Obs. Dates	# of Cranes Adult:Juv	Group ID #	Use Site #	UTMx	UTMy	Observation Type	See Figure
		3/30/18	1:0	2018SP38	15	515484	4504139	Systematic	20-23
		3/31/18	1:0	2018SP39	16	510578	4503017	Systematic	20-23
		4/2/18	2:0	2018SP40	Ag/beans	500063	4498552	Ground	31
		4/4/18	1:0	2018SP41	17	515247	4504037	Systematic	20-23
		4/4/18	2:0	2018SP42	18	505164	4501188	Systematic	31,32
		4/5/18	4:0	2018SP43	19	534264	4510698	Systematic	33, 34
		4/5/18	7:0	2018SP44	20	533757	4510698	Systematic	35, 36
		4/5/18	1:0	2018SP45	21	515267	4503987	Systematic	20-23
		4/5/18	16:0	2018SP46	22	514668	4503674	Systematic	37, 38
		4/5/18	4:0	2018SP47	23	514127	4503424	Systematic	39, 40
		4/5/18	3:0	2018SP48	24	507201	4501815	Systematic	41, 42
		4/6/18	8:0	2018SP49	Ag/corn	471476	4501883	Ground	43
		4/7/18	2:0	2018SP50	25	484395	4501202	Systematic	46, 47
		4/7/18	2:0	2018SP51	26	478925	4501533	Systematic	54, 55
		4/7/18	8:0	2018SP52	27	471395	4503839	Systematic	43, 45
		4/7/18	2:0	2018SP53	28	516671	4505049	Systematic	48, 49
		4/7/18	9:0	2018SP54	29	516604	4505003	Systematic	50, 51
		4/7/18	2:0	2018SP55	30	509760	4502410	Systematic	52, 53
		4/8/18	1:0	2018SP56	17	515247	4504037	Systematic	20-23
		4/8/18	2:0	2018SP57	31	479159	4501505	Opp. Air	48
		4/8/18	8:0	2018SP58	32	471603	4503755	Opp. Air	43
		4/8/18	9:0	2018SP59	Grassland	538125	4512093	Opp. Air	56, 57
		4/9/18	2:0	2018SP60	33	541528	4513044	Ground	56
		4/9/18	2:0	2018SP61	Ag/corn	481319	4500271	Ground	48
		4/9/18	1:0	2018SP62	34	515190	4504024	Opp. Air	20-23
		4/9/18	2:0	2018SP63	AIR	508023	4502120	Opp. Air	54, 55
		4/9/18	5:0	2018SP64	Ag/corn	471211	4501764	Systematic	43
		4/9/18	3:0	2018SP65	Grassland	470689	4500003	Ground	43
		4/10/18	8:0	2018SP66	35	471495	4503871	Systematic	43
		4/10/18	7:0	2018SP67	36	541028	4512749	Ground	56
		4/10/18	2:0	2018SP68	Ag/corn	481855	4500298	Ground	48
		4/10/18	1:0	2018SP69	8	515102	4504073	Systematic	20-23
		4/10/18	2:0	2018SP70	Ag/corn	537809	4509902	Systematic	56
		4/11/18	6:0	2018SP71	37	471534	4503783	Systematic	43
		4/11/18	4:0	2018SP72	38	517582	4505465	Systematic	58, 59
		4/11/18	3:0	2018SP73	39	517097	4505349	Systematic	60, 61
		4/11/18	4:0	2018SP74	40	517061	4505342	Systematic	62, 63
		4/11/18	1:0	2018SP75	41	515810	4504390	Systematic	20-23
		4/12/18	8:0	2018SP76	42	471503	4503804	Systematic	43
		4/12/18	1:0	2018SP77	Ag/corn	516514	4503285	Ground	20-23
		4/12/18	2:0	2018SP78	Ag/corn	516432	4504285	Ground	58
		4/13/18	6:0	2018SP79	43	471397	4503923	Ground	43
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	Unique Group Icon	Obs. Dates	# of Cranes Adult:Juv	Group ID #	Use Site #	UTMx	UTMy	Observation Type	See Figure
SPRING		4/13/18	1:0	2018SP80	Ag/wheat	515520	4504424	Ground	20-23
		4/16/18	6:0	2018SP81	44	471383	4503827	Systematic	43
		4/16/18	3:0	2018SP81a	45	470350	4502174	Systematic	43
		4/16/18	1:0	2018SP82	46	533539	4510471	Systematic	64, 65
		4/16/18	2:0	2018SP83	47	443256	4504626	Systematic	66, 67
		4/16/18	8:1	2018SP84	48	517555	4505444	Systematic	68
		4/16/18	1:0	2018SP85	49	512226	4502831	Systematic	20-23
		4/17/18	6:0	2018SP86	Ag/beans	470527	4501273	Ground	43, 45
		4/17/18	10:1	2018SP87	Ag/corn	516475	4504407	Ground	68, 69
		4/17/18	1:0	2018SP88	Ag/corn	514326	4502840	Ground	20-23
		4/18/18	3:0	2018SP89	Ag/corn	470332	4501058	Ground	43
		4/18/18	6:1	2018SP90	Ag/corn	516520	4504424	Ground	68
		4/18/18	2:0	2018SP91	Ag/corn	477456	4999951	Ground	70
		4/18/18	2:0	2018SP92	Ag/corn	516651	4504321	Ground	68
		4/18/18	1:0	2018SP93	Ag/corn	516708	4501758	Ground	20-23
		4/19/18	3:0	2018SP94	50	471526	4505349	Systematic	43
		4/19/18	2:0	2018SP95	51	517035	4505349	Systematic	68
		4/19/18	2:0	2018SP96	Ag/corn	477431	4500207	Ground	70
		4/19/18	1:0	2018SP97	52	510781	4503047	Systematic	20-23
		4/19/18	6:1	2018SP98	Ag/corn	516520	4504424	Systematic	68
		4/20/18	6:1	2018SP99	Ag/corn	516520	4504424	Ground	68
		4/20/18	1:0	2018SP100	49	512226	4502831	Ground	20-23
		4/20/18	2:0	2018SP101	Ag/corn	477198	4500281	Ground	70
		4/21/18	2:0	2018SP102	Ag/corn	477456	4499951	Ground	70
		4/22/18	2:0	2018SP103	53	477593	4502005	Ground	70, 71
		4/22/18	4:0	2018SP104	Ag/corn	514594	4504397	Ground	68
Crane Use Days			492						

<sup>1</sup> Same day, secondary use site observation of 2018SP29 – 2:1. Note the new use site #.

<sup>2</sup> 2018SP36 was also observed opportunistically by the west aerial crew, as noted in the datasheets and database.

<sup>3</sup> 2018SP40 was an evening observation, therefore is assumed to have arrived on 4/2.

<sup>4</sup> Same day, secondary use site observation of part of the 2018SP81 – 6:0 group. Note the new use site #.

<sup>5</sup> The 2018SP84 – 8:1 group observed on 4/16 was joined by a 2:0 group on 4/17, forming the 2018SP87 – 10:1 group.

Crane use days were calculated by multiplying the number of individual cranes in each group by the number of days the group was observed or known to be in the area, plus one day, as each group was assumed to have been present the evening prior to the morning of the first observation. This resulted in a total of 492 crane use days during the spring survey. Whooping cranes were observed on 41 of the 55 days of the survey effort (74.5% of the days; Table 1).

According to the surveys conducted by the U.S. Fish and Wildlife Service during the winter of 2017 – 2018, the Aransas – Wood Buffalo migratory whooping crane population was

estimated to be 505 birds ([See the following web link for source](#)). The 118 individuals observed by this monitoring effort constitutes approximately 23.4% of the migratory population using the Platte River survey area during the 2018 spring migration.

<https://www.fws.gov/uploadedFiles/WHCR%20Update%20Winter%202017-2018.pdf>

Observed whooping crane use of the Great Bend region of the Platte River during spring systematic surveys of the associated habitat reach for the PRRIP has increased significantly ( $P=0.04$ ) since the initiation of monitoring efforts in 2001 (Figure 1).

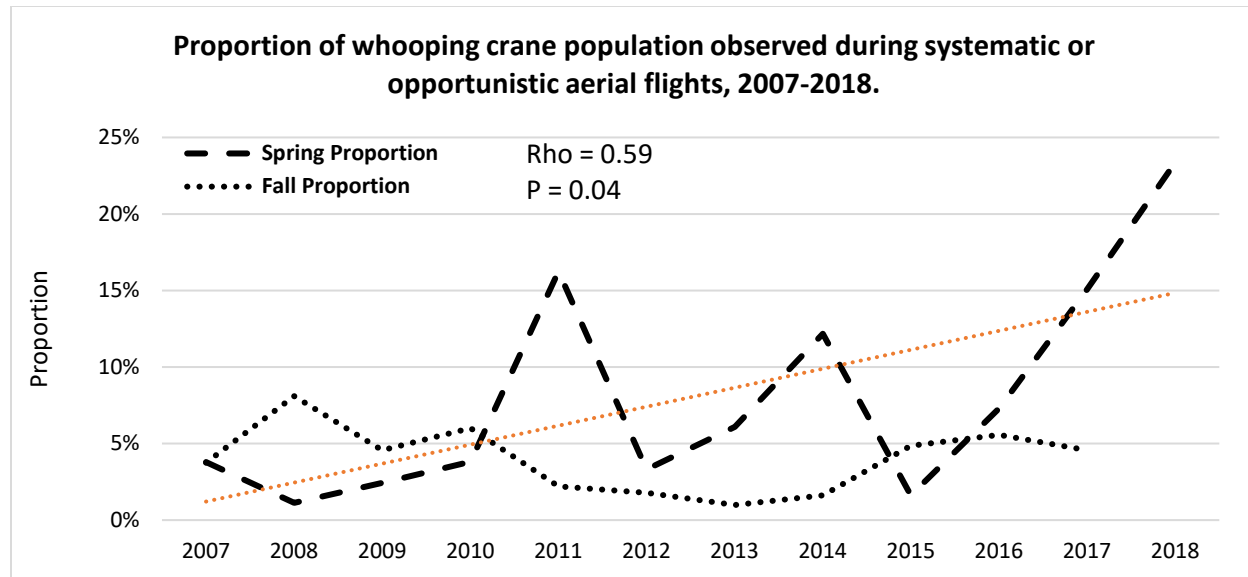


Figure 1. Observed use of the central Platte River during spring and fall migration seasons, 2001-2018.
































### Streamflow and Unobstructed Channel Width at Whooping Crane Use Locations






































According to USGS streamflow data, the Platte River streamflow was generally higher than the median daily levels (76 years at Overton, 16 years at Cottonwood, 10 years at Kearney, and 76 years at Grand Island). The intentional streamflow fluctuation is becoming apparent in the increasingly variable median daily streamflow statistics at the relatively short-termed Cottonwood station – 16 years, and Kearney station – 10 years (Figures 3 & 4) as opposed to the more static mean daily rates at the Overton and Grand Island stations – 76 years (Figures 2 & 5).

The discharge rates used in Table 2 were obtained from the USGS gauging station nearest in location and time of measurement to each associated crane group and time of observation. The discharge ranged from a low of 171 cfs at Cottonwood on 4/14 to a high of 2,580 cubic feet per second (cfs) at Grand Island on 3/06 during the survey period. At the specific crane group observation times, streamflow ranged from 892 cfs – 2360 cfs. Table 3 includes unobstructed






































channel width, as measured in GIS, at each in-channel use location. Unobstructed channel widths at riverine use sites ranged from 32 – 1,448 feet (average = 764 feet).

**TABLE 2. Associated crane group use sites and streamflow discharge (cfs) based on nearest gauging station.**

















Unique Group Icon	Date	Gauging station	Discharge (cfs)	Crane Group ID	Use Site #	# of Cranes Adults:Juv
	3/7/18	Grand Island	2,310	2018SP01	1	1:0
	3/8/18	Grand Island	2,160	2018SP02	2	1:0
	3/9/18	Grand Island	2,360	2018SP03	2	1:0
	3/10/18	Grand Island	2,310	2018SP04	2	1:0
	3/11/18	Grand Island	2,230	2018SP05	2	1:0
	3/12/18	Grand Island	1,960	2018SP06	3	1:0
	3/13/18	Grand Island	1,920	2018SP07	3	1:0
	3/14/18	Grand Island	1,780	2018SP08	3	1:0
	3/16/18	Grand Island	1,730	2018SP09	4	1:0
	3/17/18	Grand Island	1,200	2018SP10	5	1:0
	3/18/18	Grand Island	1,780	2018SP11	2	1:0
	3/19/18	Grand Island	1,130	2018SP12	3	1:0
	3/20/18	Grand Island	2,210	2018SP13	6	1:0
	3/21/18	Kearney	2,220	2018SP15	7	1:0
	3/21/18	Grand Island	2,160	2018SP16	5	1:0
	3/22/18	Grand Island	2,180	2018SP17	4	1:0
	3/22/18	Kearney	1,810	2018SP18	8	1:0
	3/26/18	Grand Island	1,850	2018SP24	2	1:0
	3/27/18	Grand Island	1,730	2018SP27	3	1:0
	3/27/18	Cottonwood	892	2018SP28	10	11:0
	3/28/18	Grand Island	1,730	2018SP31	12	1:0
	3/28/18	Cottonwood	938	2018SP32	10	11:0
	3/28/18	Kearney	1,690	2018SP33	13	1:0
	3/29/18	Grand Island	1,820	2018SP34	5	1:0
	3/30/18	Kearney	1,400	2018SP36	14	5:0
	3/30/18	Grand Island	1,710	2018SP37	4	1:0
	3/30/18	Kearney	1,400	2018SP38	15	1:0
	3/31/18	Kearney	1,710	2018SP39	16	1:0
	4/4/18	Kearney	2,120	2018SP41	17	1:0
	4/4/18	Kearney	2,140	2018SP42	18	2:0
	4/5/18	Grand Island	2,110	2018SP43	19	4:0
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Unique Group Icon	Date	Gauging station	Discharge (cfs)	Crane Group ID	Use Site #	# of Cranes Adults:Juv
	4/5/18	Grand Island	2,110	2018SP44	20	7:0
	4/5/18	Kearney	2,170	2018SP45	21	1:0
	4/5/18	Kearney	2,170	2018SP46	22	16:0
	4/5/18	Kearney	2,170	2018SP47	23	4:0
	4/5/18	Kearney	2,170	2018SP48	24	3:0
	4/7/18	Kearney	1,700	2018SP50	25	2:0
	4/7/18	Kearney	1,700	2018SP51	26	2:0
	4/7/18	Cottonwood	1,380	2018SP52	27	8:0
	4/7/18	Kearney	1,700	2018SP53	28	2:0
	4/7/18	Kearney	1,700	2018SP54	29	9:0
	4/7/18	Kearney	1,700	2018SP55	30	2:0
	4/8/18	Kearney	2,260	2018SP56	17	1:0
	4/8/18	Kearney	2,260	2018SP57	31	2:0
	4/8/18	Cottonwood	1,350	2018SP58	32	2:0
	4/9/18	Grand Island	1,920	2018SP60	33	2:0
	4/9/18	Kearney	2,120	2018SP62	34	1:0
	4/10/18	Cottonwood	1,380	2018SP66	35	8:0
	4/10/18	Grand Island	2,160	2018SP67	36	7:0
	4/10/18	Kearney	2,090	2018SP69	8	1:0
	4/11/18	Cottonwood	1,400	2018SP71	37	6:0
	4/11/18	Kearney	2,120	2018SP72	38	4:0
	4/11/18	Kearney	2,120	2018SP73	39	3:0
	4/11/18	Kearney	2,120	2018SP74	40	4:0
	4/11/18	Kearney	2,120	2018SP75	41	1:0
	4/11/18	Cottonwood	1,350	2018SP76	42	8:0
	4/13/18	Cottonwood	1,330	2018SP79	43	6:0
	4/16/18	Cottonwood	1,200	2018SP81	44	6:0
	4/16/18	Cottonwood	1,220	2018SP81a	45	3:0
	4/16/18	Grand Island	1,110	2018SP82	46	1:0
	4/16/18	Overton	2,070	2018SP83	47	2:0
	4/16/18	Kearney	2,140	2018SP84	48	8:1
	4/16/18	Kearney	2,140	2018SP85	49	1:0
	4/19/18	Cottonwood	1,180	2018SP94	50	3:0
	4/19/18	Kearney	2,230	2018SP95	51	2:0
	4/19/18	Kearney	2,190	2018SP97	52	1:0
	4/20/18	Kearney	2,170	2018SP100	49	1:0
	4/22/18	Kearney	2,130	2018SP103	53	2:0

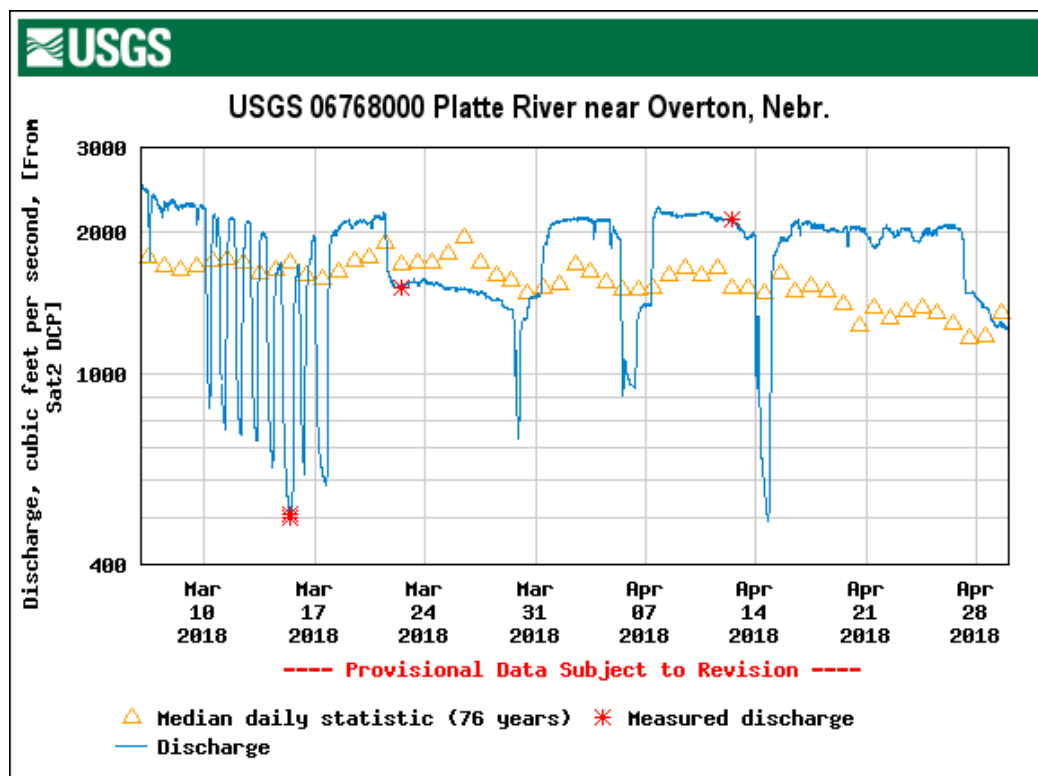
**TABLE 3. Unobstructed channel width at each in-channel crane use location.**

Unique Group Icon	Group ID #	Use Site #	UTMx	UTMy	Unobstructed Channel Width (ft)
	2018SP01	1	545654	4514624	616
	2018SP02-05, 11, 24	2	543695	4513845	832
	2018SP06-08, 12, 27	3	543648	4513912	832
	2018SP09, 37	4	542139	4513032	824
	2018SP10, 16-17	5	541948	4513087	1,015
	2018SP13	6	543067	4513607	716
	2018SP15	7	508529	4501898	896
	2018SP18, 69	8	515102	4504073	830
	2018SP19, 25, 29	9	459353	4501104	NA
	2018SP28, 32	10	461540	4503904	626
	2018SP29a	11	457804	4502042	NA
	2018SP31	12	541817	4512835	673
	2018SP33	13	511858	4503037	788
	2018SP36	14	504921	4501171	906
	2018SP38	15	515484	4504139	463
	2018SP39	16	510578	4503017	361
	2018SP41, 56	17	515247	4504037	830
	2018SP42	18	505164	4501188	817
	2018SP43	19	534264	4510698	997
	2018SP44	20	533757	4510698	799
	2018SP45	21	515267	4503987	830
	2018SP46	22	514668	4503674	569
	2018SP47	23	514127	4503424	628
	2018SP48	24	507201	4501815	978
	2018SP50	25	484395	4501202	582
	2018SP51	26	478925	4501533	524
	2018SP52	27	471395	4503839	968
	2018SP53	28	516671	4505049	999
	2018SP54	29	516604	4505003	999
	2018SP55	30	509760	4502410	577
	2018SP57	31	479159	4501505	417
	2018SP58	32	471603	4503755	968
	2018SP60	33	541528	4513044	551
	2018SP62	34	515190	4504024	520
	2018SP66	35	471495	4503871	968
	2018SP67	36	541028	4512749	1,448
	2018SP71	37	471534	4503783	968
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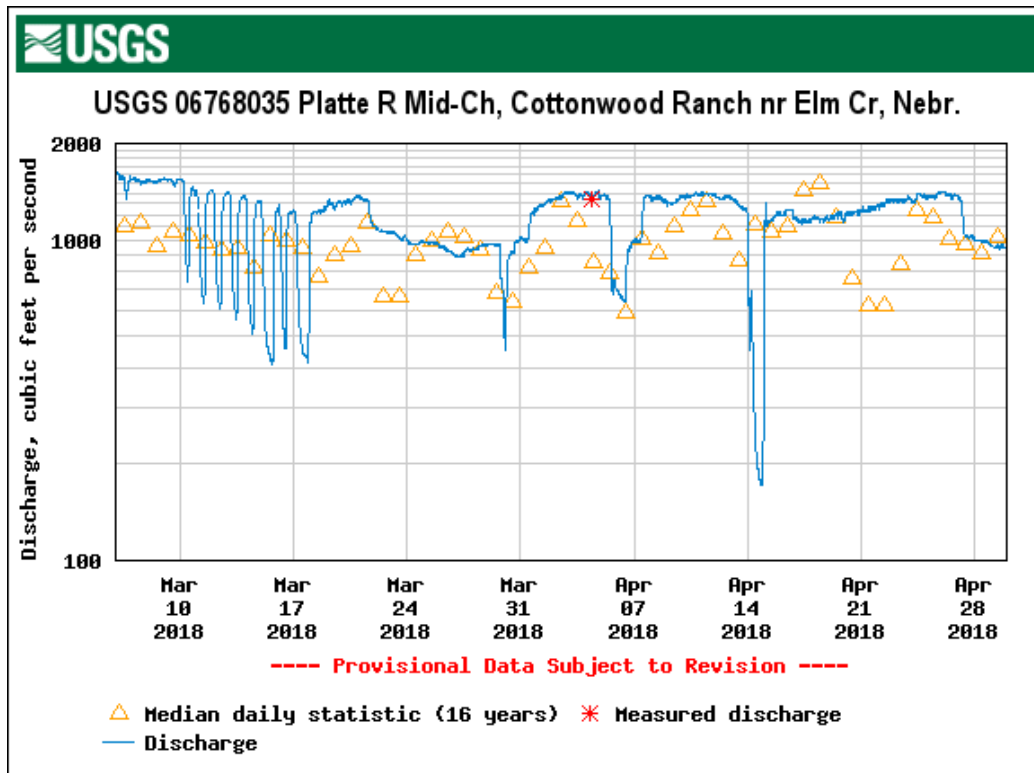


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Unique Group Icon	Group ID #	Use Site #	UTMx	UTMy	Unobstructed Channel Width (ft)
	2018SP72	38	517582	4505465	512
	2018SP73	39	517097	4505349	621
	2018SP74	40	517061	4505342	925
	2018SP75	41	515810	4504390	556
	2018SP76	42	471503	4503804	968
	2018SP78	43	471397	4503923	968
	2018SP81	44	471383	4503827	968
	2018SP81a	45	470350	4502174	32
	2018SP82	46	533539	4510471	546
	2018SP83	47	443256	4504626	476
	2018SP84	48	517555	4505444	512
	2018SP85, 100	49	512226	4502831	703
	2018SP94	50	471526	4503788	968
	2018SP95	51	517035	4505349	925
	2018SP97	52	510781	4503047	295
	2018SP103	53	477593	4502005	625

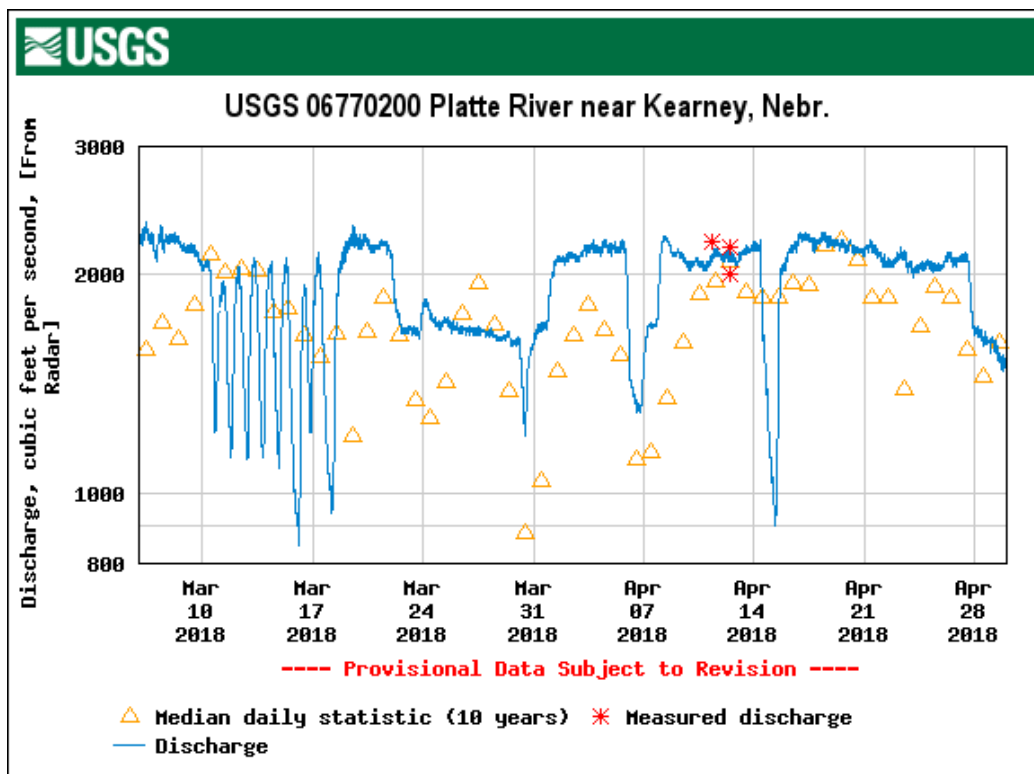
**Figure 2**



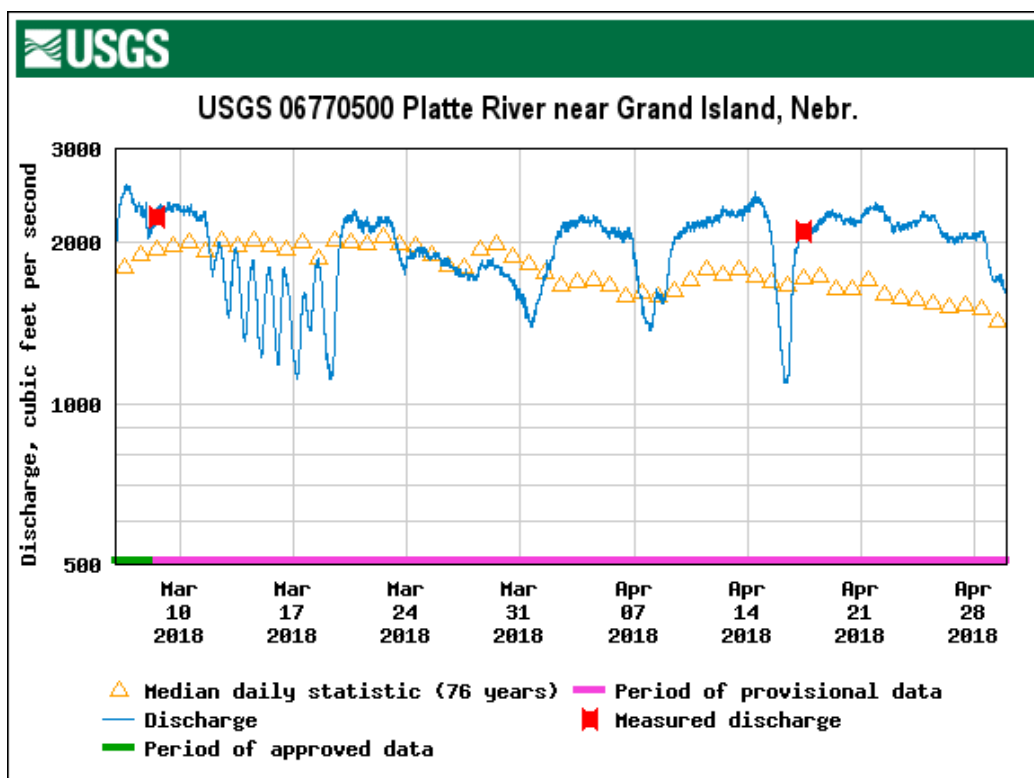
**Figure 3**



**Figure 4**



**Figure 5**































### USFWS/PRRIP Data Comparison

This section will only be referencing USFWS ID #'s. Table 4 compares the USFWS whooping crane sighting data (provided by Matt Rabbe – USFWS whooping crane lead) to the PRRIP survey effort. Included are the icons associated with each unique crane group, the date(s) the group was observed, the number of individuals in the group and each agency's identification numbers assigned to the respective groups.

The difference in ID #'s is due to the USFWS data operating on an "initial sighting" basis of identification, whereas PRRIP assigns a new crane group ID number each day observed.

There were four instances where crane groups (18A-05, 27, 47, and 48; Table 4) were reported directly to USFWS, and therefore are not included in the PRRIP data. Groups 18A-01, 07, 15, 16, 34, 39, and 40 were reported to USFWS on dates prior to ES/EDO staff observations. Of note, 18A-01 was observed prior to the scheduled start of the PRRIP survey, and 18A-15, 16, and 34 were observed on days that flights were cancelled due to inclement weather. Groups 18A-15, 16, 30, 39, 40, 46, 51, and 59 either split into smaller groups, joined up with one or more other groups, and/or re-joined with a previous, larger group. The observed group variations can be noted by cross-referencing matching icons and/or PRRIP ID #'s in Table 1.

**TABLE 4. USFWS/PRRIP Whooping Crane Group ID Comparisons**













Unique Group Icon	Date	# of WC Ad:Juv	USFWS ID #	PRRIP ID #
	2/28 – 3/30	1:0	18A-01	2018SP01-13, 16, 17, 22, 24, 27, 31, 34 & 37
	3/20 – 4/20	1:0	18A-03	2018SP14, 15, 18, 21, 33, 35, 38, 39, 41, 45, 56, 62, 69, 75, 77, 80, 85, 88, 93, 97 & 100
N/A	3/21 – 3/22	3:0	18A-05	N/A
	3/24 – 3/28	2:1	18A-06	2018SP19, 20, 25, 29, 29a & 30
	3/20 – 3/28	11:0	18A-07	2018SP23, 26, 28 & 32
	3/29 – 3/30	2:0	18A-15	2018SP36
	3/29 – 3/30	3:0	18A-16	2018SP36
	4/02 – 4/04	2:0	18A-20	2018SP40 & 42
	4/05 – 4/05	7:0	18A-23	2018SP44
	4/05 – 4/05	4:0	18A-24	2018SP43
	4/05 – 4/05	16:0	18A-25	2018SP46
	4/05 – 4/05	4:0	18A-26	2018SP47
N/A	4/05 – 4/05	2:0	18A-27	N/A
	4/05 – 4/05	3:0	18A-28	2018SP48
	4/06 – 4/19	8:0	18A-30	2018SP49, 52, 58, 64-66, 71, 76, 79, 81, 81a, 86, 89 & 94
	4/07 – 4/07	9:0	18A-32	2018SP54
	4/07 – 4/07	2:0	18A-33	2018SP53
	4/06 – 4/09	2:0	18A-34	2018SP55 & 63
	4/07 – 4/07	2:0	18A-35	2018SP50
	4/07 – 4/10	2:0	18A-36	2018SP51, 57, 61, & 68
	4/07 – 4/10	7:0	18A-39	2018SP59 & 67
	4/07 – 4/10	2:0	18A-40	2018SP59, 60 & 70
	4/11 – 4/11	4:0	18A-41	2018SP74
	4/11 – 4/11	3:0	18A-42	2018SP73
	4/11 – 4/12	4:0	18A-46	2018SP72 & 78
N/A	4/11 – 4/11	1:0	18A-47	N/A
N/A	4/12 – 4/12	14:0	18A-48	N/A
	4/16 – 4/16	2:0	18A-50	2018SP83
	4/16 – 4/22	8:1	18A-51	2018SP84, 87, 90, 92, 95, 98, 99 & 104
	4/16 – 4/16	1:0	18A-52	2018SP82
	4/17 – 4/17	2:0	18A-59	2018SP87
	4/18 – 4/22	2:0	18A-81	2018SP91, 96 & 101-103

## Ground Search Effort and Opportunistic Observations




















There were 83 instances where ground crews either independently observed a WC group or they acted on a confirmation request to verify either a public sighting or a white object spotted by aerial crews within the survey area during the 55-day monitoring effort. In Table 5, the “miles driven” column indicates the total miles driven in the effort to locate a potential crane group, starting from the location of the last reported sighting or known location based on previous days’ observations, then continuing until the crane group or white object is located and identified or a reasonable amount of effort has been put forth. In 19 instances the crane groups were observed by air crews and confirmed by ground crews. There were 50 instances in which crane groups were observed by ground crews only, with 16 of those representing roost or use sites (Table 1). There were ten instances of same-day repeated group sightings. They were: 2018SP14 on 3/20, 2018SP30 on 3/28, 2018SP59 on 4/8, 2018SP60 on 4/9, 2018SP67 on 4/10, 2018SP79 on 4/13, 2018SP81 on 4/16, 2018SP98 on 4/19, 2018SP99 on 4/20, and 2018SP100 on 4/20. The remaining eleven ground searches resulted in no whooping crane observation or confirmations.

As can be noted in Table 5, the crane groups represented with the blue/white, orange/black, and orange/yellow icons varied in number of individuals from day to day. This illustrates how these groups split up, joined and/or rejoined. A unique group icon was assigned to all groups that were a part of or the entirety of a common crane group.

**TABLE 5. Ground search effort and opportunistic observations.**

Unique Group Icon	Date	Source	WC Confirmed Ad:Juv	Miles Driven	Aerial/Ground Effort
N/A	3/7	Air crew	None	13	Both
	3/9	Known	1:0	1	Both
	3/10	Known	1:0	1	Both
	3/11	Known	1:0	1	Ground
	3/12	Known	1:0	1	Both
N/A	3/15	Known	None	20	Ground
	3/16	Known	1:0	1	Ground
	3/17	Known	1:0	1	Ground
	3/18	Known	1:0	1	Ground
	3/19	Known	1:0	1	Ground
	3/20	Known	1:0	1	Both
	3/20	USFWS	1:0	1	Ground
	3/20	USFWS	1:0	3	Ground
N/A	3/21	Known	None	22	Ground
	3/21	Public	1:0	1	Ground
N/A	3/22	ES staff	None	36	Ground
N/A	3/23	Air crew	None	25	Ground
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	3/24	PRRIP	2:1	1	Ground
	3/25	Known	2:1	2	Ground
	3/25	Known	1:0	1	Ground
	3/25	Known	1:0	4	Ground
	3/25	Public	11:0	1	Ground
	3/26	Known	2:1	4	Ground
	3/26	Known	1:0	1	Ground
	3/26	Known	11:0	3	Ground
	3/27	Known	1:0	1	Both
	3/27	Known	2:1	2	Ground
	3/27	Known	11:0	2	Both
	3/28	Known	2:1	1	Both
	3/28	Known	2:1	1	Both
	3/28	Known	1:0	1	Both
	3/29	Known	1:0	1	Ground
N/A	3/29	Known	None	29	Ground
	3/29	Known	1:0	1	Ground
	3/30	Air crew	5:0	1	Both
	4/2	Public	2:0	5	Ground
N/A	4/3	Known	None	35	Ground
N/A	4/5	Public	None	39	Ground
	4/5	Known	3:0	1	Both
	4/6	PRRIP	8:0	1	Ground
	4/7	Known	8:0	1	Both
	4/8	Known	9:0	23	Both
	4/8	Known	9:0	1	Both
	4/9	Known	2:0	1	Ground
	4/9	Known	2:0	3	Ground
	4/9	Known	5:0	1	Both
	4/9	Known	3:0	2	Ground
	4/9	Known	2:0	7	Ground
	4/10	Known	7:0	1	Ground
	4/10	Known	2:0	2	Ground
	4/10	Known	8:0	7	Both
	4/10	Known	7:0	1	Ground
	4/11	Known	6:0	3	Both
	4/12	Known	1:0	1	Ground
	4/12	Known	2:0	1	Ground
N/A	4/12	Public	None	65	Ground
	4/13	Known	6:0	3	Ground
	4/13	Known	6:0	2	Ground
	4/13	Known	1:0	1	Ground
	4/16	Known	3:0	5	Both
	4/16	Known	3:0	26	Both
	4/17	Known	6:0	2	Ground
Continued on next page					

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	4/17	Known	10:1	1	Ground
	4/17	Known	1:0	1	Ground
	4/18	Known	3:0	2	Ground
	4/18	Known	6:1	1	Ground
	4/18	Known	2:0	1	Ground
	4/18	Known	1:0	1	Ground
	4/18	Known	2:0	1	Ground
N/A	4/18	Known	None	10	Ground
	4/19	Known	2:1	1	Both
	4/19	Known	4:0	1	Both
	4/19	Known	3:0	2	Both
	4/19	Known	2:0	2	Ground
	4/20	Known	1:0	1	Ground
	4/20	Known	2:0	10	Ground
	4/20	Known	4:1	5	Ground
	4/20	Known	2:0	2	Ground
	4/20	Known	1:0	1	Ground
	4/21	Known	2:0	4	Ground
N/A	4/21	Known	None	20	Ground
	4/22	Known	2:0	1	Ground
	4/22	Known	4:0	40	Ground

## Incidental Take

The USFWS requests information and documentation of any human activity that occurred in the proximity of Whooping Cranes that could constitute “take” as defined by the Endangered Species Act i.e. “...to harass, harm, pursue, hunt, shoot, wound, kill, capture, or collect, or attempt to engage in any such conduct”. Because harassment interrupts essential feeding or sheltering behaviors, the definition includes disturbance of Whooping Cranes sufficient to result in cranes taking flight.

### LETHAL OR CRIPPLING TAKE

There were no observations of crippling or lethal take of Whooping Cranes this season as a result of the monitoring conducted by ES.

### HARASSMENT

Ecological Solutions staff did not observe or engage in any activity that could be construed as harassment as defined by USFWS.

### PUBLIC DISTURBANCE

Ecological Solutions staff did not observe any incident of public disturbance of whooping cranes.



## Observation Efficiency Trials

Twenty-five whooping crane decoys were randomly placed by PRRIP personnel along the aerial transects. Flight crews spotted 7 in wetted channel (70.0%), 1 in corn/ag (20.0%), 0 in lowland grassland (0.0%), and 3 in open water pit/pond/lake (60.0%), for an overall spotting efficiency of 44.0% (Table 6).

**TABLE 6. Observation Efficiency Trials Using Whooping Crane Decoys**

Decoy	Date Placed	Date Tested	UTMx	UTMy	Type	Detected
1	3/7/2018	3/8/2018	446654	4504971	Wetted channel	YES
2	3/7/2018	3/8/2018	516514	4505004	Wetted channel	NO
3	3/8/2018	3/9/2018	438692	4508285	Wetted channel	YES
4	3/12/2018	3/13/2018	559170	4522485	Wetted channel	YES
5	3/14/2018	3/15/2018	561728	4526881	Wetted channel	NO
6	3/21/2018	3/22/2018	467438	4503704	Wetted channel	YES
7	3/22/2018	3/23/2018	564910	4530034	Wetted channel	YES
8	4/9/2018	4/10/2018	444123	4504168	Wetted channel	NO
9	4/11/2018	4/12/2018	554475	4503975	Wetted channel	YES
10	4/11/2018	4/16/2018	550990	4516100	Wetted channel	YES
11	3/6/2018	3/8/2018	564794	4535478	Ag - corn	NO
12	3/6/2018	3/7/2018	483154	4499330	Ag - corn	NO
13	4/11/2018	4/16/2018	536936	4507467	Ag - corn	NO
14	4/16/2018	4/19/2018	547020	4512093	Ag - corn	NO
15	4/18/2018	4/19/2018	455036	4505166	Ag - corn	YES
16	3/6/2018	3/7/2018	460011	4501470	Grassland-lowland	NO
17	3/8/2018	3/9/2018	500558	4502054	Grassland-lowland	NO
18	3/12/2018	3/13/2018	524429	4506663	Grassland-lowland	NO
19	4/19/2018	4/23/2018	545283	4514067	Grassland-lowland	NO
20	4/23/2018	4/24/2018	486228	4503128	Grassland-lowland	NO
21	3/12/2018	3/13/2018	569859	4533704	Open water pit/pond/lake	YES
22	3/13/2018	3/14/2018	569225	4532892	Open water pit/pond/lake	YES
23	4/18/2018	4/19/2018	499487	4496390	Open water pit/pond/lake	YES
24	4/18/2018	4/19/2018	564504	4535926	Open water pit/pond/lake	NO
25	4/19/2018	4/22/2018	500329	4496093	Open water pit/pond/lake	NO

## Flight Statistics and Sighting Frequency

Of the 110 scheduled flights, there were 61 instances when crews were able to depart the airport, of which 56 were completed, resulting in an overall completion of 50.9% (Table 7). Fifty flights were cancelled or incomplete due to inclement weather, three to mechanical issues, and one to logistical issues.

**TABLE 7. Flight Completion Rates**

	East	West	Totals
COMPLETED	27	29	56
CANC./INCOMP.	28	26	54
SEASON TOTAL	55	55	110
% COMPLETED	49.1%	52.7%	50.9%

## FLIGHT RESULTS

Of the 302 scheduled systematic transects, 156 (51.6%) were completed. During this time, 56 whooping crane groups were observed from the air while conducting systematic flights for an overall sighting-per-transect frequency of 18.5% (Table 8). Fifty crane groups were observed by ground crews only (See Table 5), so were not included in this chart. Five additional crane groups (2018SP57-59, 62 and 63) were observed during opportunistic flights.

**TABLE 8. Whooping Crane Sighting Frequency per Transect**

		Transects			# WC Groups <sup>1</sup>	Frequency
		Completed	Cancel/Incomp.	TOTAL		
SPRING	0SE, 0SW <sup>2</sup>	56	54	110	52	47.3%
	PWRTE, PWRTW <sup>3</sup>	57	53	110	4	3.6%
	WSRT/CSRT, ESRT <sup>4</sup>	43	39	82	0	0.0%
TOTALS		156	146	302	56	18.5%

<sup>1</sup>These groups may or may not consist of crane(s) observed on previous days. See crane group ID designation on page 4 under “Confirmed Whooping Crane Sightings”.

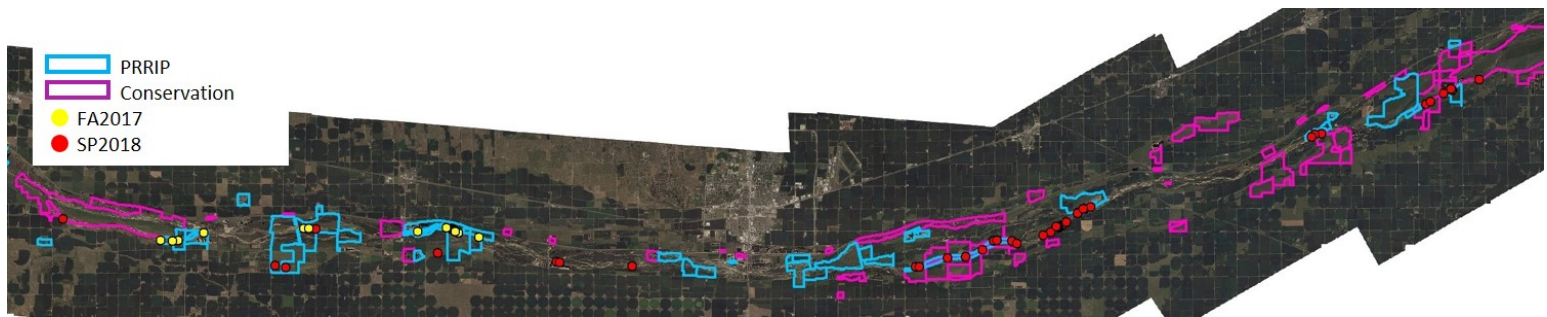
<sup>2</sup>Primary Transect (Riverine), (East – 0SE, West – 0SW)

<sup>3</sup>Primary Return transect, (East – PWRTE, West – PWRTW)

<sup>4</sup>Secondary Return transect, (East – WSRT and CSRT, West – ESRT)

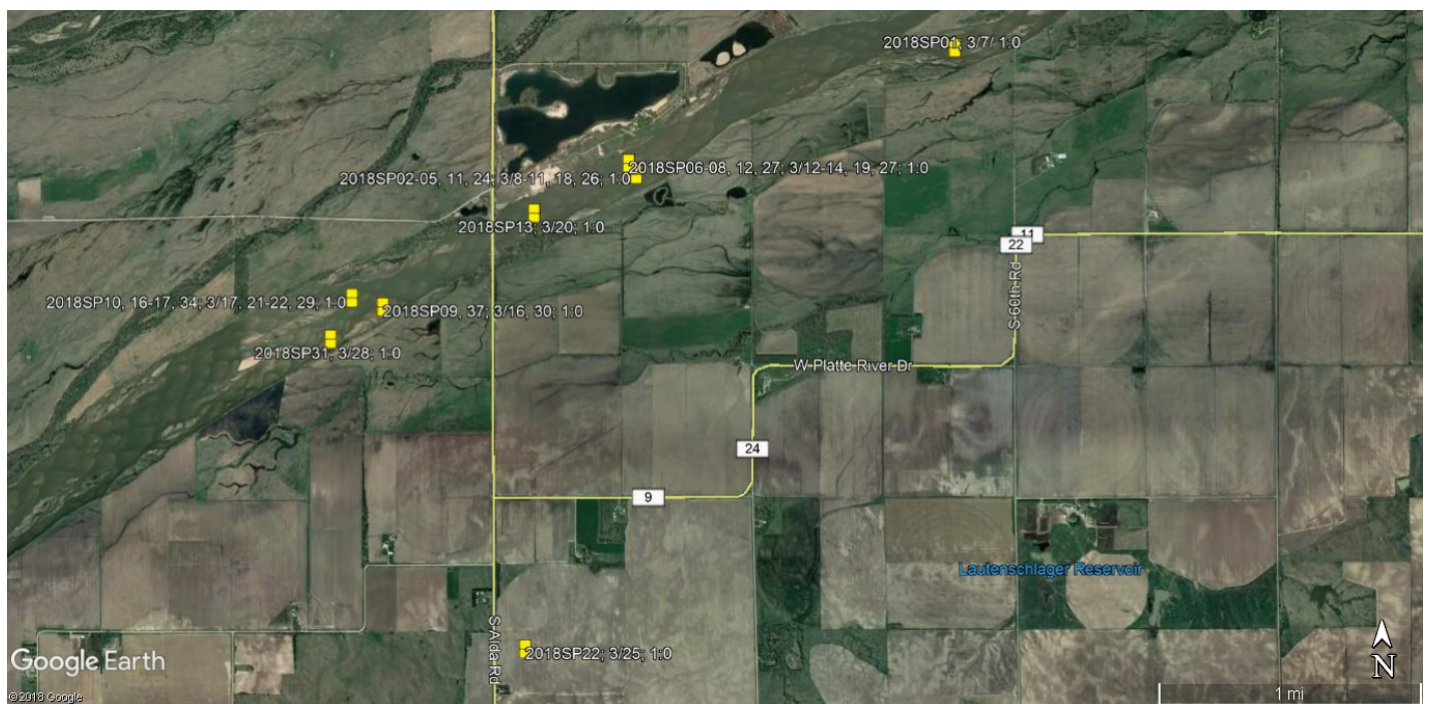
## Supplements

QA/QC of database was performed by ES  
Original datasheets – Retained at PRRIP



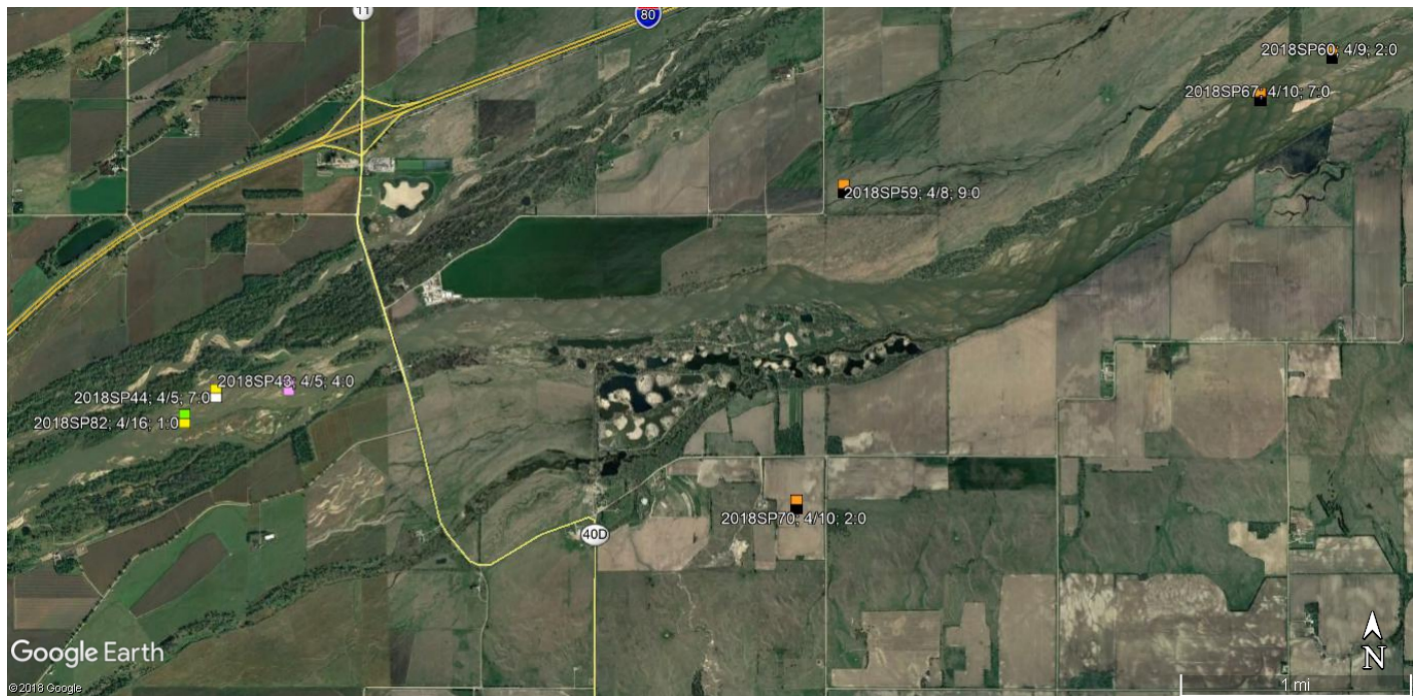
**FIGURE 6.** The distribution of initial whooping crane group observations during the 2017 fall survey (yellow) and 2018 spring survey (red) in relation to the PRRIP lands (highlighted in blue) and all other conservation lands (highlighted in purple).

**FIGURE 7.** Observed whooping crane locations. 1 of 11 collective crane group maps. See Table 1 for color icon coding and details.





**FIGURE 8.** Observed whooping crane locations. 2 of 11 collective crane group maps. See Table 1 for icon color coding and details.

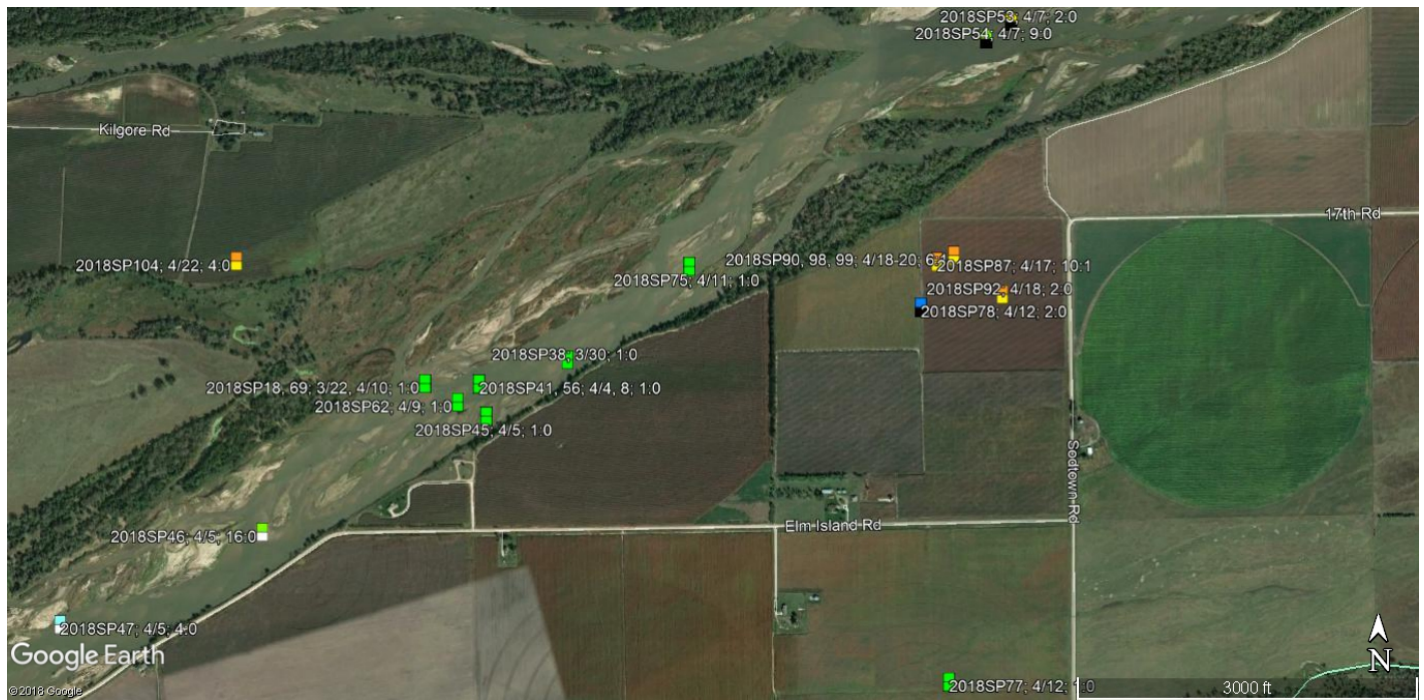


**FIGURE 9.** Observed whooping crane locations. 3 of 11 collective crane group maps. See Table 1 for icon color coding and details.

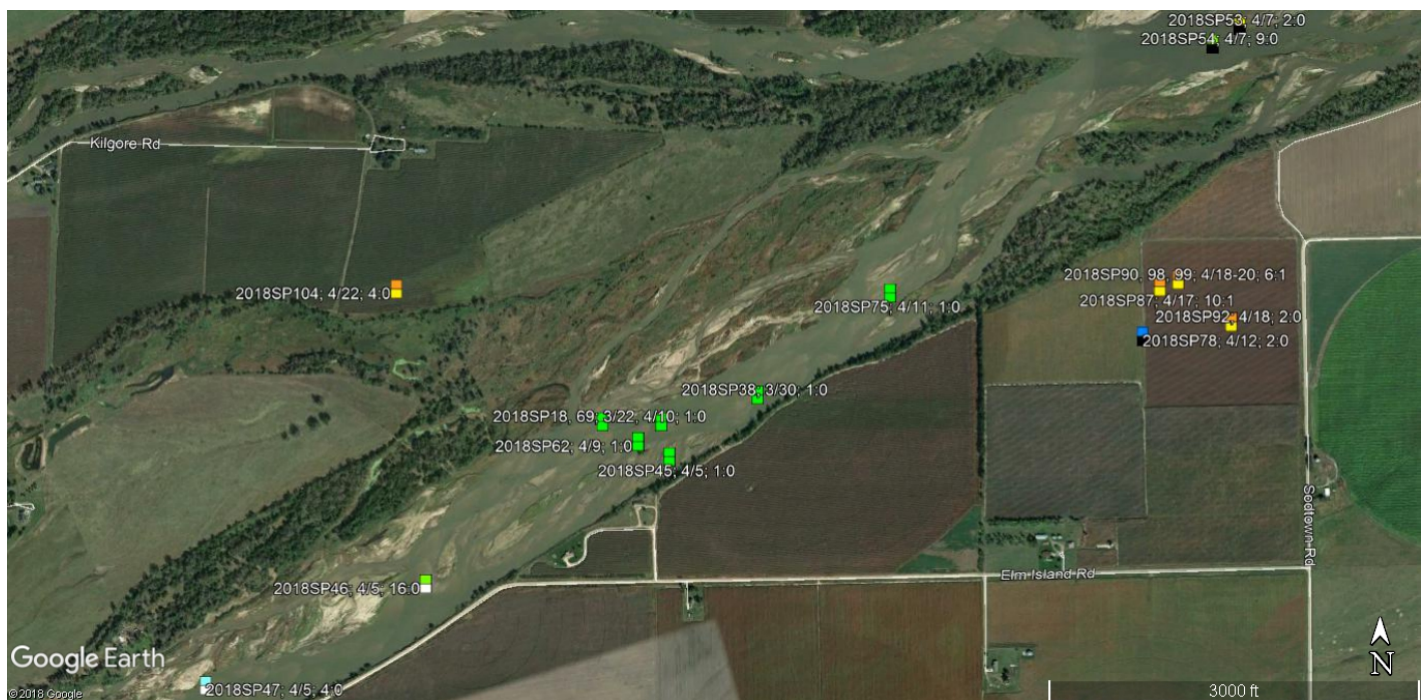




**FIGURE 10.** Observed whooping crane locations. 4 of 11 collective crane group maps. See Table 1 for icon color coding and details.

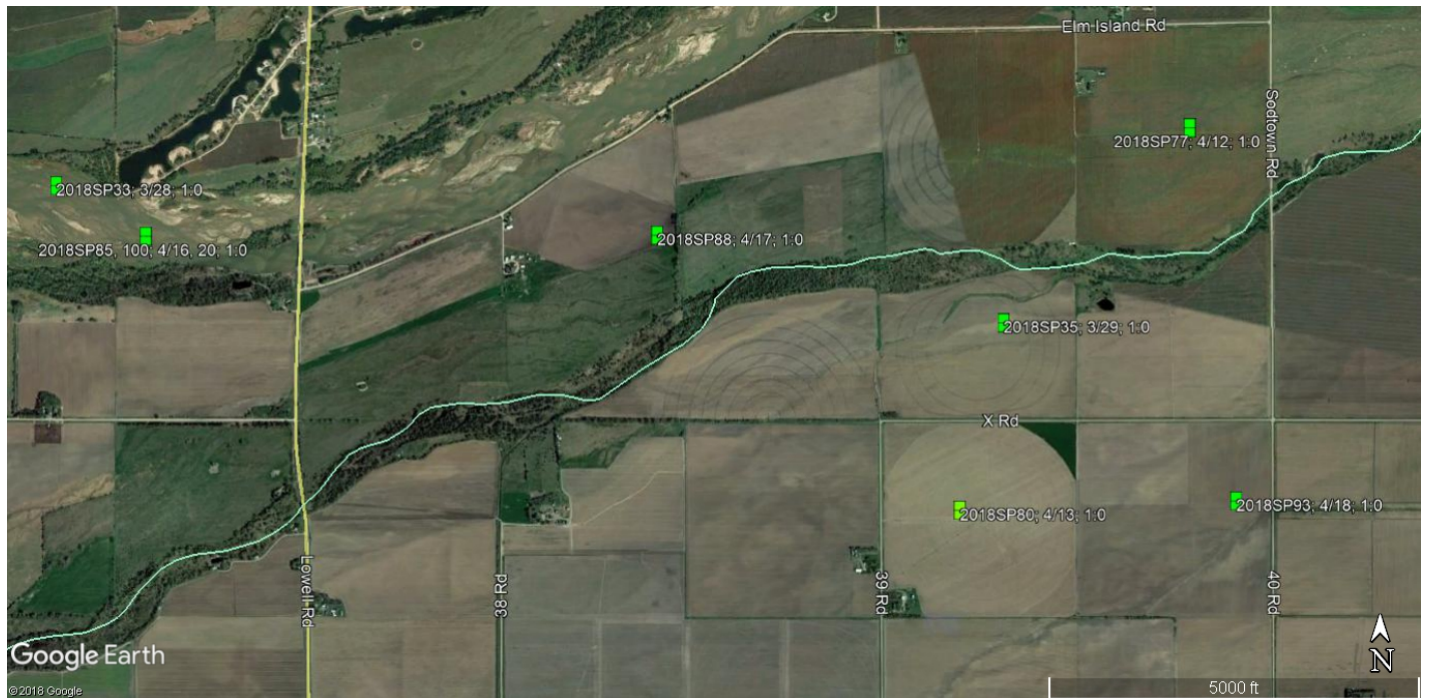


**FIGURE 11.** Observed whooping crane locations. 5 of 11 collective crane group maps. See Table 1 for icon color coding and details.

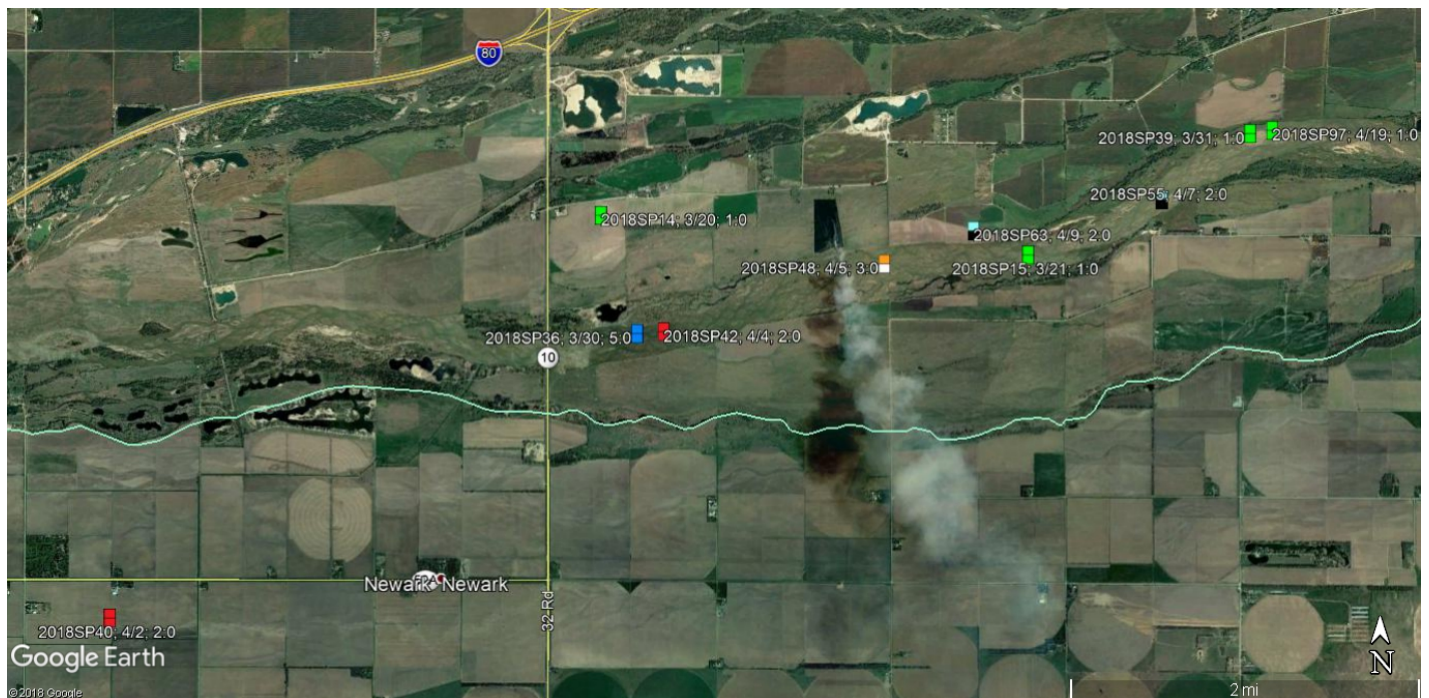




**FIGURE 12.** Observed whooping crane locations. 6 of 11 collective crane group maps. See Table 1 for icon color coding and details.



**FIGURE 13.** Observed whooping crane locations. 7 of 11 collective crane group maps. See Table 1 for icon color coding and details.

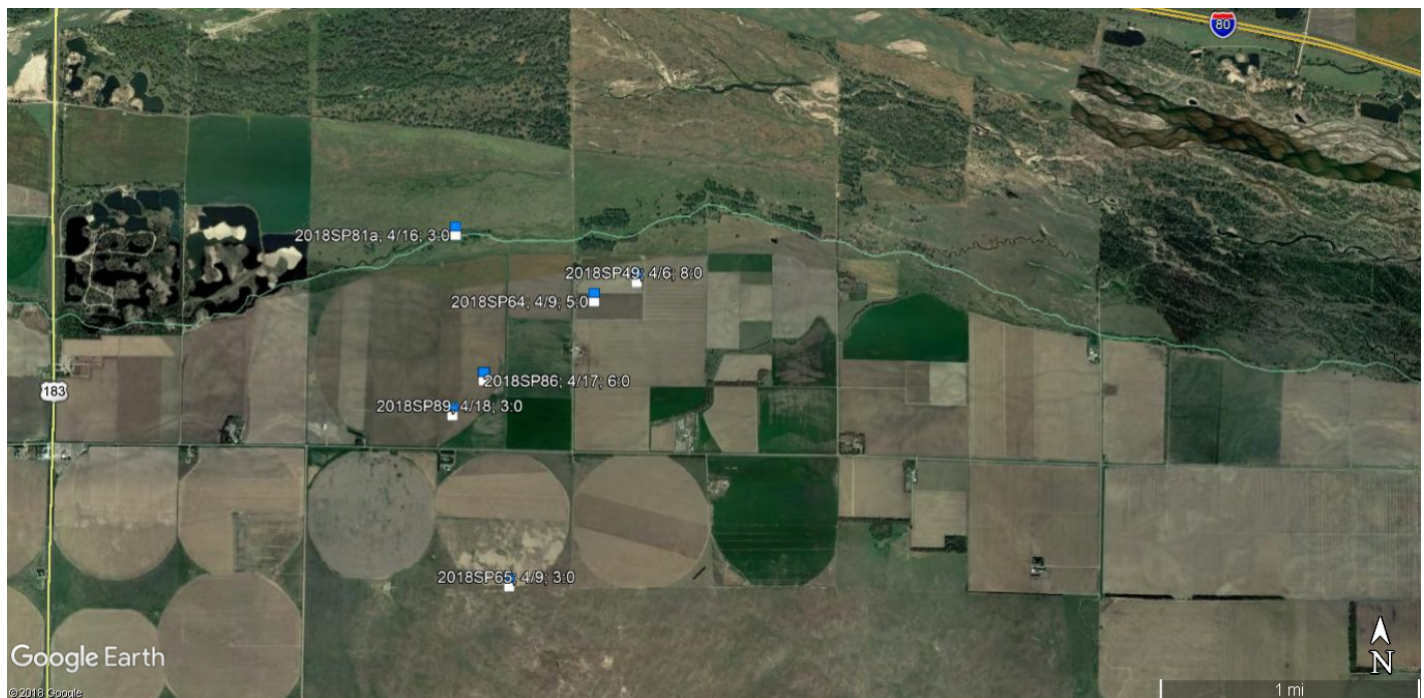




**FIGURE 14.** Observed whooping crane locations. 8 of 11 collective crane group maps. See Table 1 for icon color coding and details.



**FIGURE 15.** Observed whooping crane locations. 9 of 11 collective crane group maps. See Table 1 for icon color coding and details.





**FIGURE 16.** Observed whooping crane locations. 10 of 11 collective crane group maps. See Table 1 for icon color coding and details.

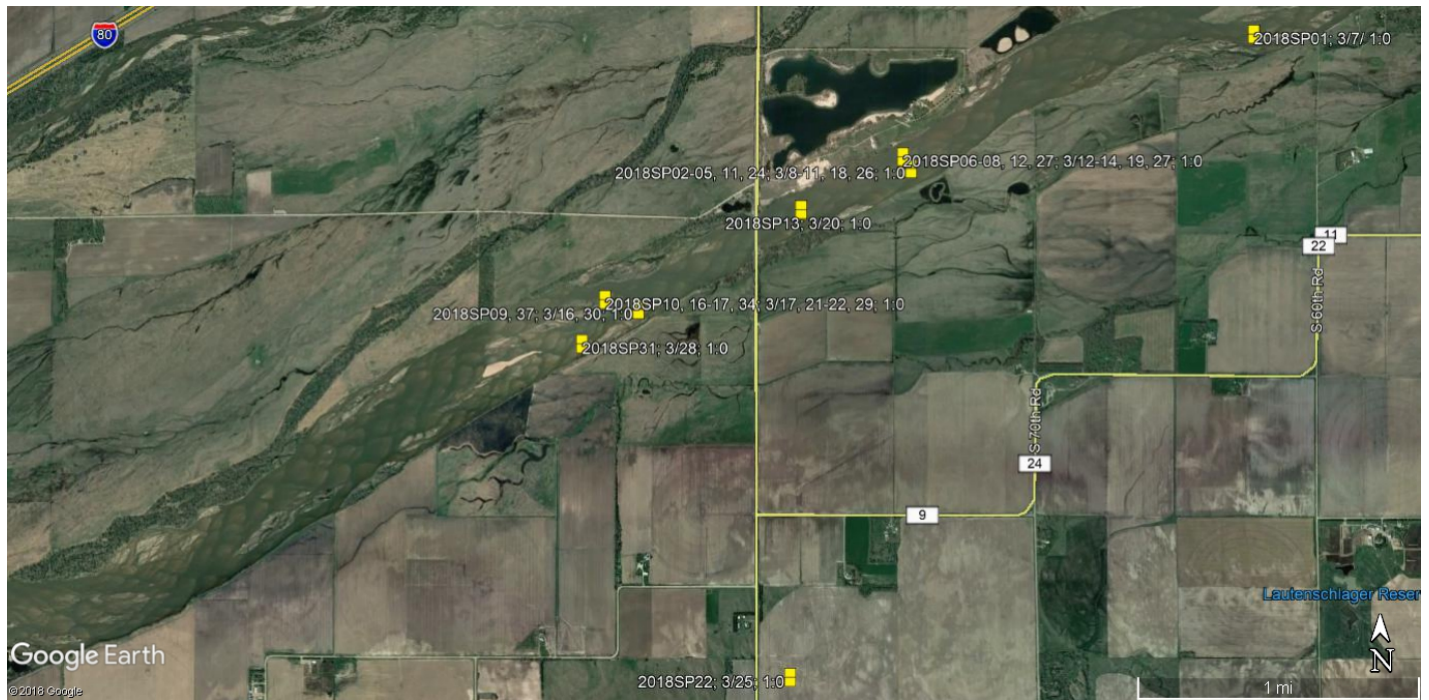


**FIGURE 17.** Observed whooping crane locations. 11 of 11 collective crane group maps. See Table 1 for icon color coding and details.





**FIGURE 18.** Observed locations of the 1:0 crane group designated with ID #'s: 2018SP01-13, 16, 17, 22, 24, 27, 31, 34, & 37. This group was observed in the survey area 2/28-3/30.

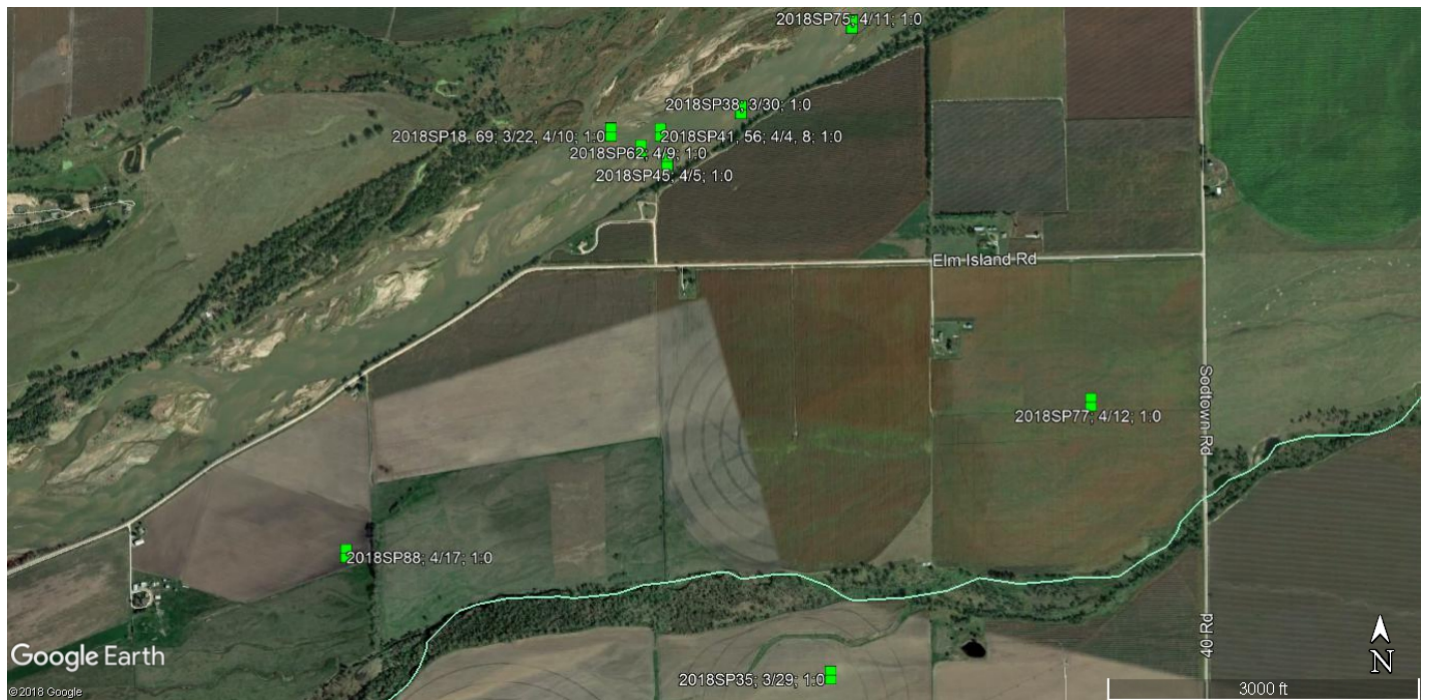


**FIGURE 19.** This photo was taken during a systematic observation of the 1:0 crane group 2018SP02 at Use Site 2 on 3/8 in the main channel of the Platte River.





**FIGURE 20.** Map 1 of 4 of observed locations of the 1:0 crane group designated with ID #'s: 2018SP14, 15, 18, 21, 33, 35, 38, 39, 41, 45, 56, 62, 69, 75, 77, 80, 85, 88, 93, 97, & 100. This group was observed in the survey area 3/20-4/20.



**FIGURE 21.** Map 2 of 4 of observed locations of the 1:0 crane group designated with ID #'s: 2018SP14, 15, 18, 21, 33, 35, 38, 39, 41, 45, 56, 62, 69, 75, 77, 80, 85, 88, 93, 97, & 100. This group was observed in the survey area 3/20-4/20.





**FIGURE 22.** Map 3 of 4 of observed locations of the 1:0 crane group designated with ID #'s: 2018SP14, 15, 18, 21, 33, 35, 38, 39, 41, 45, 56, 62, 69, 75, 77, 80, 85, 88, 93, 97, & 100. This group was observed in the survey area 3/20-4/20.



**FIGURE 23.** Map 4 of 4 of observed locations of the 1:0 crane group designated with ID #'s: 2018SP14, 15, 18, 21, 33, 35, 38, 39, 41, 45, 56, 62, 69, 75, 77, 80, 85, 88, 93, 97, & 100. This group was observed in the survey area 3/20-4/20.



**FIGURE 24.** This photo was taken during a systematic observation of the 1:0 crane group 2018SP18 on 3/22 at use site 8 in the main channel of the Platte River.





**FIGURE 25.** Observed locations of the 2:1 crane group designated with ID #'s: 2018SP19, 20, 25, 29, 29a, & 30. This group was observed in the survey area 3/24-3/28.



**FIGURE 26.** This photo was taken during a systematic observation of the 2:1 crane group 2018SP29a at use site 11 on 3/27 in a small wetland on the east end of the Morse property.





**FIGURE 27.** Observed locations of the 11:0 crane group designated with ID #'s: 2018SP23, 26, 28, & 32. This group was observed in the survey area 3/20-3/28.



**FIGURE 28.** This photo was taken during the systematic observation of the 11:0 crane group 2018SP28 at use site 10 on 3/27 in the main channel of the Platte River.





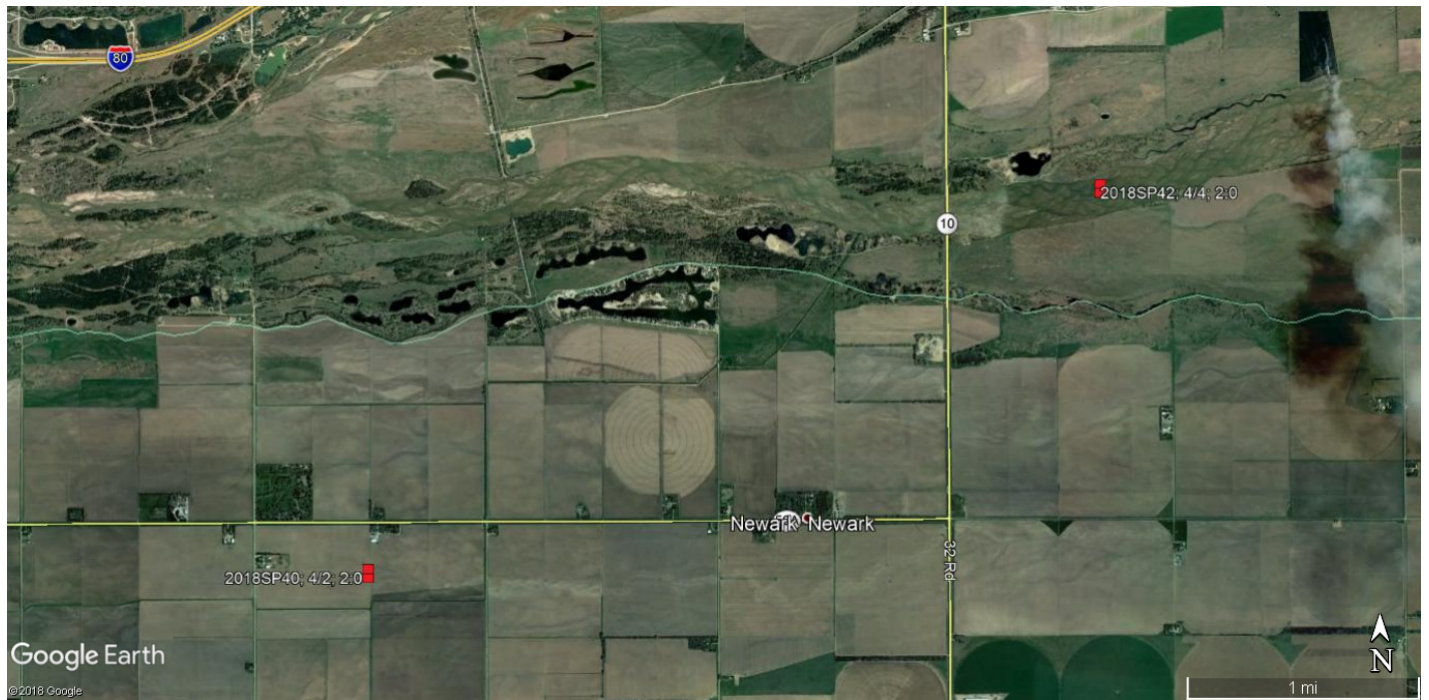
**FIGURE 29.** Observed location of the 5:0 crane group designated with ID # 2018SP36. This group was observed in the survey area 3/29-30.



**FIGURE 30.** This photo was taken during a systematic observation of the 5:0 crane group 2018SP36 use site 14 on 3/30 in the main channel of the Platte River.



**FIGURE 31.** Observed locations of the 2:0 crane group designated with ID #'s: 2018SP40 & 42. This group was observed in the survey area 4/02-4/04.

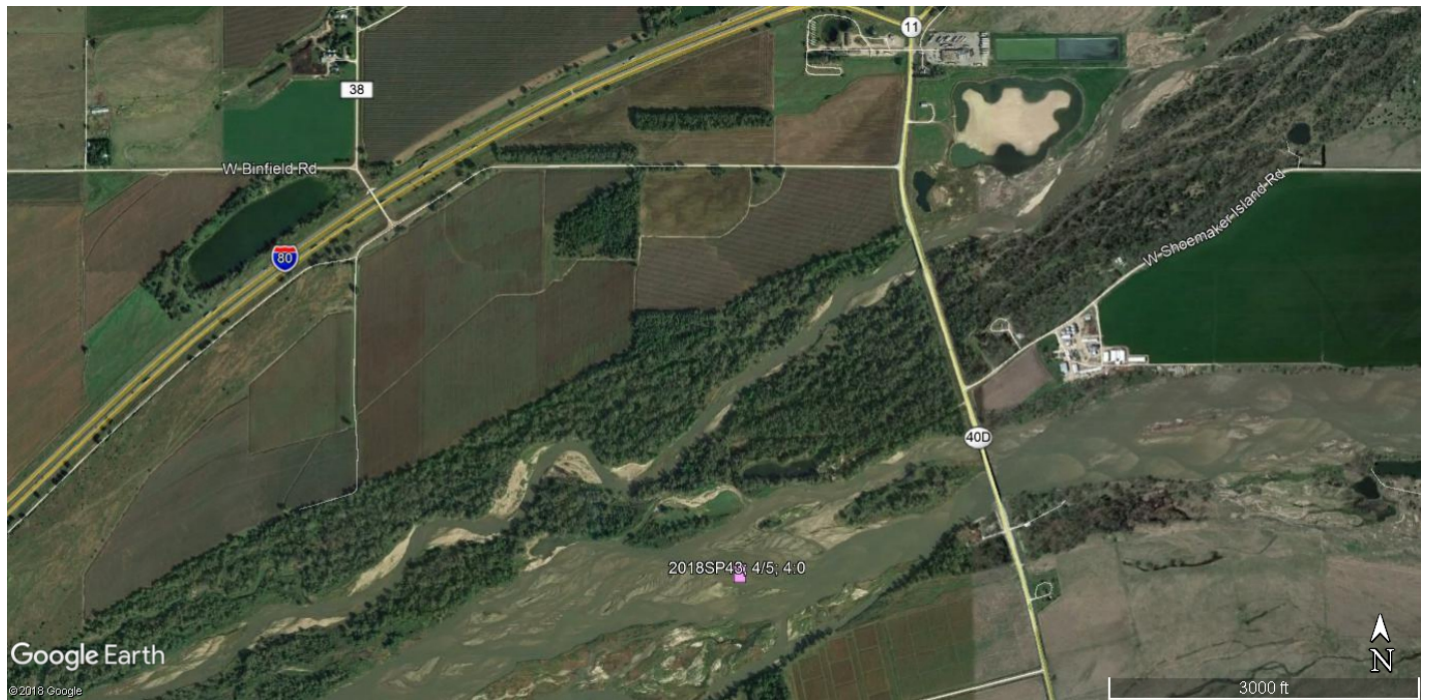


**FIGURE 32.** This photo was taken during a systematic observation of the 2:0 crane group 2018SP42 use site 18 on 4/04 in the main channel of the Platte River.





**FIGURE 33.** Observed location of the 4:0 crane group designated with ID # 2018SP43. This group was observed in the survey area on 4/05.

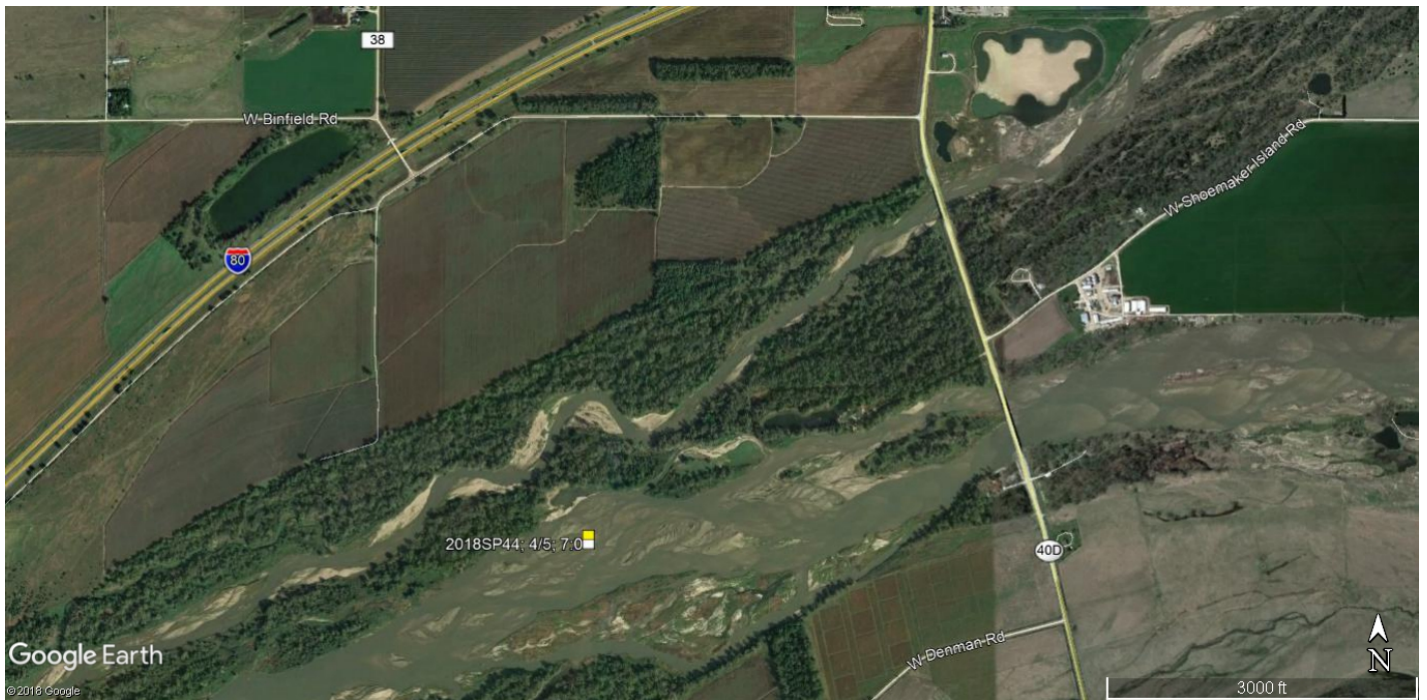


**FIGURE 34.** This photo was taken during a systematic observation of the 4:0 crane group 2018SP43 use site 19 on 4/05 in the main channel of the Platte River.





**FIGURE 35.** Observed location of the 7:0 crane group designated with ID # 2018SP44. This group was observed in the survey area on 4/05.

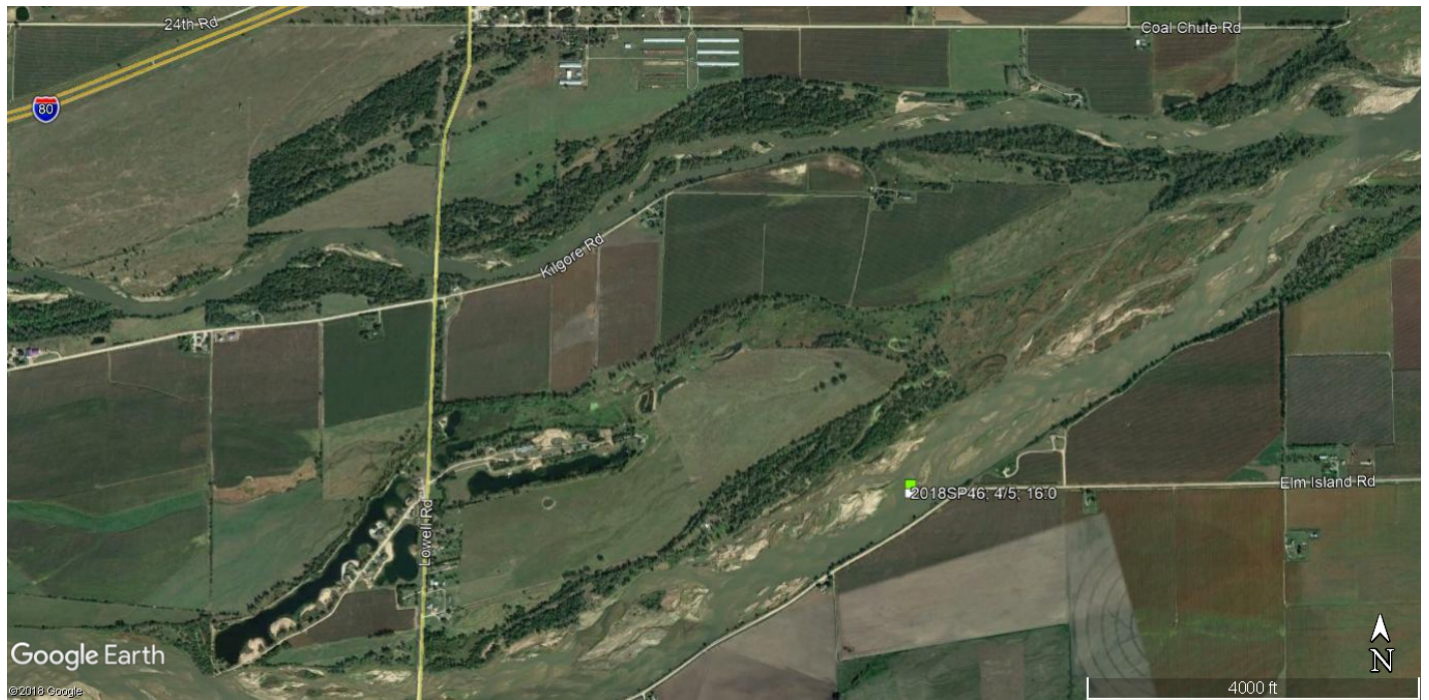


**FIGURE 36.** This photo was taken during a systematic observation of the 7:0 crane group 2018SP44 use site 20 on 4/05 in the main channel of the Platte River.





**FIGURE 37.** Observed location of the 16:0 crane group designated with ID # 2018SP46. This group was observed in the survey area on 4/05.



**FIGURE 38.** This photo was taken during a systematic observation of the 16:0 crane group 2018SP46 use site 22 on 4/05 in the main channel of the Platte River.





**FIGURE 39.** Observed location of the 4:0 crane group designated with ID # 2018SP47. This group was observed in the survey area on 4/05.



**FIGURE 40.** This photo was taken during a systematic observation of the 4:0 crane group 2018SP47 use site 23 on 4/05 in the main channel of the Platte River.





**FIGURE 41** Observed location of the 3:0 crane group designated with ID # 2018SP48. This group was observed in the survey area on 4/05.



**FIGURE 42.** This photo was taken during a systematic observation of the 3:0 crane group 2018SP48 use site 24 on 4/05 in the main channel of the Platte River.





**FIGURE 43.** Observed locations of the 8:0 crane group designated with ID #'s: 2018SP49, 52, 58, 64-66, 71, 76, 79, 81, 81a, 86, 89 & 94. This group also separated into smaller groups (See Table 1) and was observed in the survey area 4/06-4/19.



**FIGURE 44.** Observed locations of the 8:0 crane group designated with ID #'s: 2018SP49, 52, 58, 64-66, 71, 76, 79, 81, 81a, 86, 89 & 94. This group also separated into smaller groups (See Table 1) and was observed in the survey area 4/06-4/19.



**FIGURE 45.** This photo was taken during a systematic observation of the 8:0 crane group 2018SP52 use site 27 on 4/07 in the main channel of the Platte River.





**FIGURE 46.** Observed location of the 2:0 crane group designated with ID # 2018SP50. This group was observed in the survey area on 4/07.



**FIGURE 47** This photo was taken during a systematic observation of the 2:0 crane group 2018SP50 use site 25 on 4/07 in the main channel of the Platte River.





**FIGURE 48.** Observed location of the 2:0 crane group designated with ID # 2018SP53. This group was observed in the survey area on 4/07.



**FIGURE 49.** This photo was taken during a systematic observation of the 2:0 crane group 2018SP53 use site 28 on 4/07 in the main channel of the Platte River.





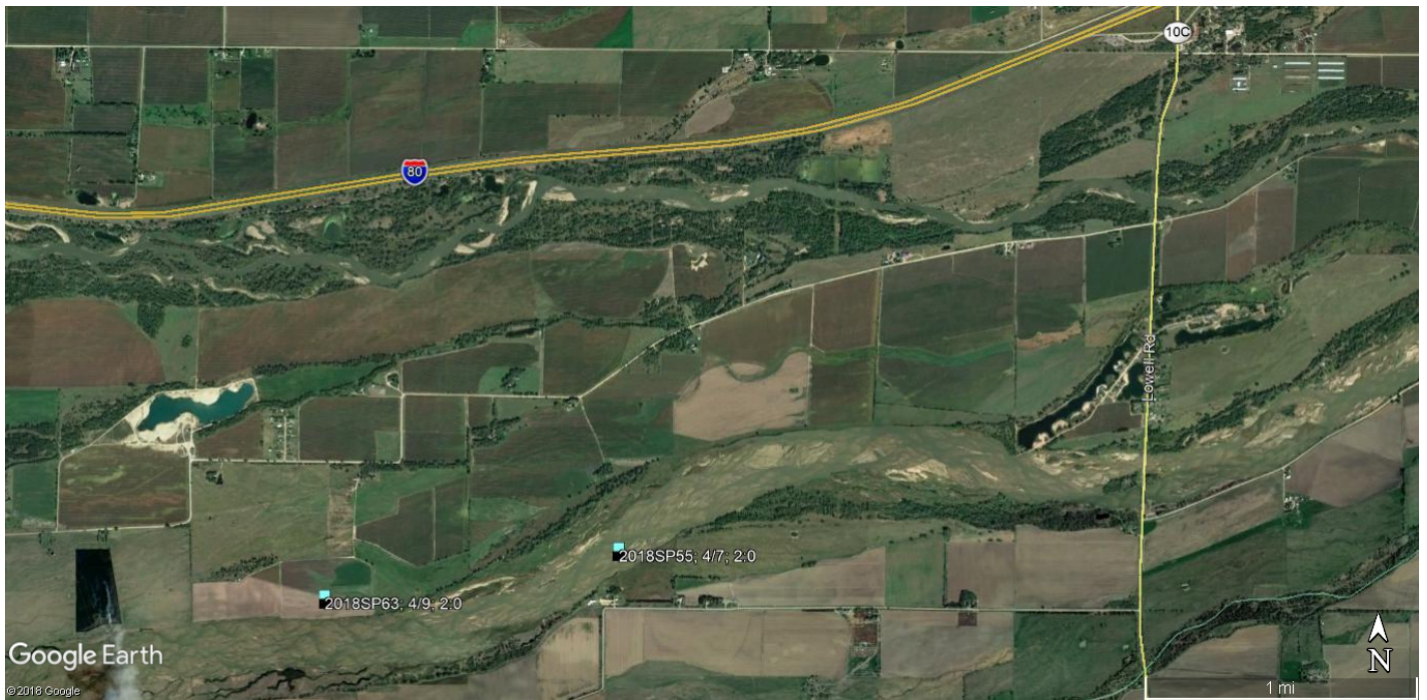
**FIGURE 50.** Observed location of the 9:0 crane group designated with ID # 2018SP54. This group was observed in the survey area on 4/07.



**FIGURE 51.** This photo was taken during a systematic observation of the 9:0 crane group 2018SP54 use site 29 on 4/07 in the main channel of the Platte River.



**FIGURE 52.** Observed locations of the 2:0 crane group designated with ID #'s: 2018SP55 & 63. This group was observed in the survey area 4/06-4/09.

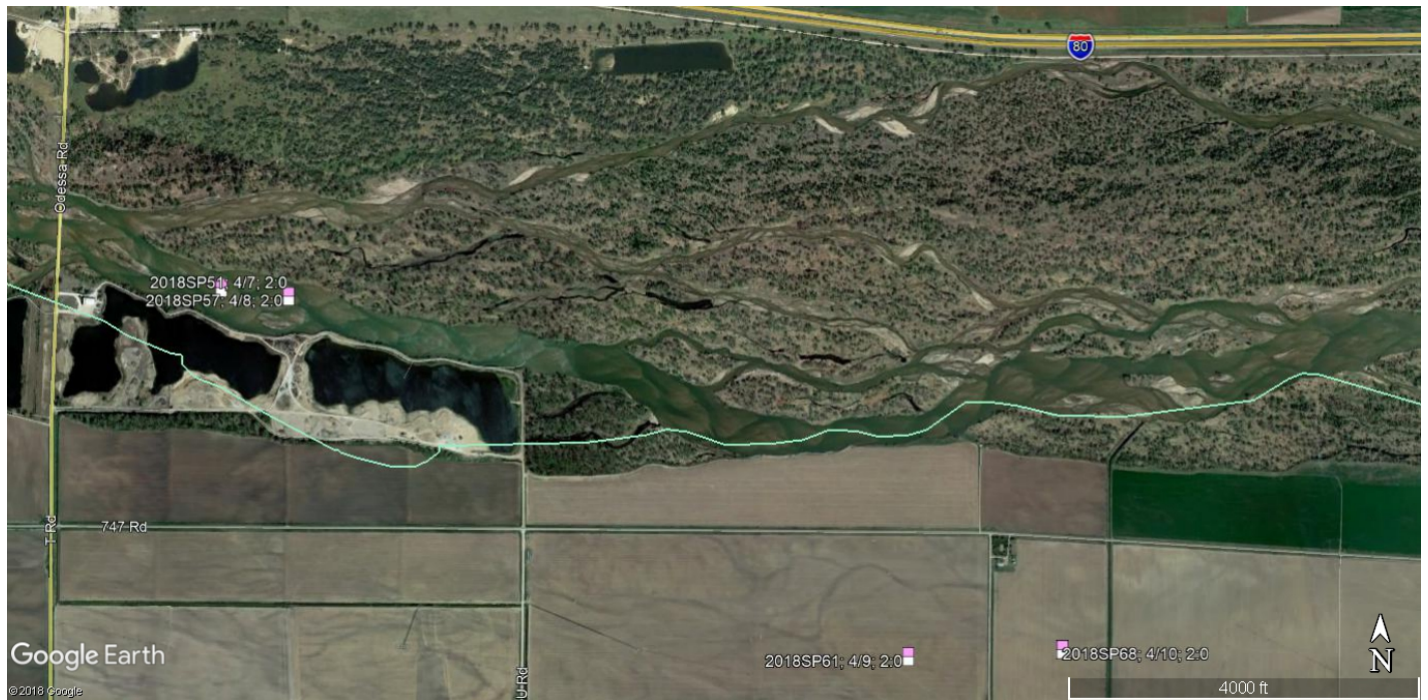


**FIGURE 53.** This photo was taken during a systematic observation of the 2:0 crane group 2018SP55 use site 30 on 4/07 in the main channel of the Platte River.





**FIGURE 54.** Observed locations of the 2:0 crane group designated with ID #'s: 2018SP51, 57, 61 & 68. This group was observed in the survey area 4/07-4/10.



**FIGURE 55.** This photo was taken during a systematic observation of the 2:0 crane group 2018SP51 use site 26 on 4/07 in the main channel of the Platte River.





**FIGURE 56.** Observed locations of the 9:0 (also observed as a 7:0 & 2:0 group) crane group designated with ID #'s: 2018SP59, 60, 67 & 70. This group was observed in the survey area 4/07-4/10.



**FIGURE 57.** This photo was taken during a ground observation of the 9:0 crane group 2018SP59 on 4/07 in a cornfield.





**FIGURE 58.** Observed locations of the 4:0 crane group designated with ID #'s: 2018SP72 & 78. This group was observed in the survey area 4/11-4/12.



**FIGURE 59.** This photo was taken during a systematic observation of the 4:0 crane group 2018SP72 use site 38 on 4/11 in the main channel of the Platte River.



**FIGURE 60.** Observed location of the 3:0 crane group designated with ID # 2018SP73. This group was observed in the survey area on 4/11.



**FIGURE 61.** This photo was taken during a systematic observation of the 3:0 crane group 2018SP73 use site 39 on 4/11 in the main channel of the Platte River.





**FIGURE 62.** Observed location of the 4:0 crane group designated with ID # 2018SP74. This group was observed in the survey area on 4/11.



**FIGURE 63.** This photo was taken during a systematic observation of the 4:0 crane group 2018SP74 use site 40 on 4/11 in the main channel of the Platte River.





**FIGURE 64.** Observed location of the 1:0 crane group designated with ID # 2018SP82. This group was observed in the survey area on 4/16.



**FIGURE 65.** This photo was taken during a systematic observation of the 1:0 crane group 2018SP82 use site 46 on 4/16 in the main channel of the Platte River.





**FIGURE 66.** Observed location of the 2:0 crane group designated with ID # 2018SP83. This group was observed in the survey area on 4/16.

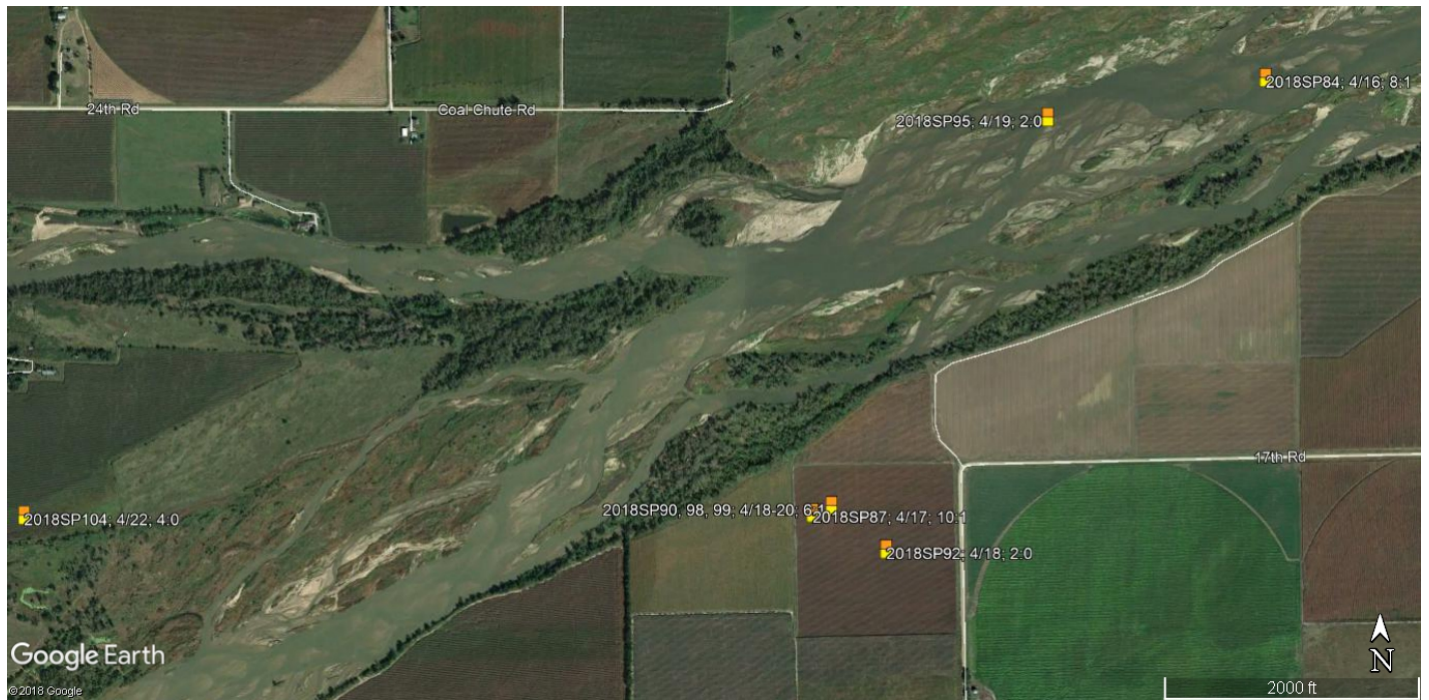


**FIGURE 67.** This photo was taken during a systematic observation of the 2:0 crane group 2018SP83 use site 47 on 4/16 in the main channel of the Platte River.





**FIGURE 68.** Observed locations of the 10:1 crane group designated with ID # 2018SP83. This group also separated into smaller groups (See Table 1) and was observed in the survey area 4/16-4/22.



**FIGURE 69.** This photo was taken during a ground observation of the 10:1 crane group 2018SP87 on 4/16 in a cornfield. Just a portion of one crane can be seen on the far right of the photo.





**FIGURE 70.** Observed locations of the 2:0 crane group designated with ID #'s: 2018SP91, 96 & 101-103. This group was observed in the survey area on 4/18-4/22.



**FIGURE 71.** This photo was taken during a ground observation of the 2:0 crane group 2018SP103 use site 53 on 4/22 in the main channel of the Platte River. The cranes can be seen behind the right side of the flock of pelicans.

