

Platte River Recovery Implementation Program

IMPLEMENTATION OF THE WHOOPING CRANE MONITORING PROTOCOL 2020 SPRING REPORT



Photo: Colleen Childers

**Prepared for: PRRIP Technical Advisory and Governance
Committees**

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Platte River Recovery Implementation Program

Implementation of the Whooping Crane Monitoring Protocol

Spring 2020 Report



PLATTE RIVER
RECOVERY IMPLEMENTATION PROGRAM

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Summary

The Platte River Recovery implementation Program (PRRIP) team conducted the whooping crane monitoring effort for the 2020 spring migration following the protocols detailed in the *Platte River Recovery Implementation Program – Whooping Crane Monitoring Protocol – rev. June 2017*.

The spring migration monitoring took place from March 6th through April 29th. Surveys were conducted using systematic flight transects along the Platte River from Chapman to Lexington. Systematic along with opportunistic sightings, resulted in 12 individual whooping cranes observed within the transect boundaries during the 55-day survey period. Survey methodology, results, and supporting data are included below.

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 Rebel T6s 760D camera and mobile phones for communication.

PRRIP documented information using data sheets, which included aerial flight logs, aerial observations, ground search efforts, and use site monitoring logs.

The area of study (Figure 1), often referred to as the Big Bend region stretches from the Highway 283 Platte River bridge near Lexington, Nebraska (40° 44' 08.15" N; 99° 44' 37.31" W) to the Platte River bridge near Chapman, Nebraska (40° 59' 07.06" N; 98° 08' 40.40" W) and focused on the Platte River channels and the adjacent wetlands, ponds, and waterways extending 3.5 miles on either side of the outermost channels. The total length of the sample 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 dataset analyzed.

Implementation and Methodology

Systematic aerial transects were flown daily, conditions permitting, at an air speed of approximately 100 MPH and an altitude of approximately 750 feet, unless conditions demanded higher altitudes. Two flights were initiated each morning, one from Grand Island (east route, in red on Fig. 1) and one from Kearney (west route, in green on Fig. 2). 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, unless the pilot cancelled the flight for the day prior to that using their best judgement. Two types of transects were flown to ensure coverage of both on-channel riverine and off-channel wetland habitat. On-channel river transects (OSE and OSW, in blue on Fig. 1) 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. Off-channel transects were designed to sample potential habitat further from the river, but within the 3.5-mile limit, as well as to serve as functional routes for planes to return to starting airports.

On day one, the east route started at the Platte River bridge near Chapman (Chapman bridge) and followed the river transect (OSE) to the Highway 10 bridge (Minden bridge) (Figure 1). 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 and return to the airport at Grand Island. On day two, the east route 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, from which point they returned to the Grand Island airport.

On day one, the west route started at the Minden bridge and followed the river transect (OSW) to the Highway 283 bridge (Lexington bridge) (Figure 1). The pilots would then follow the targeted Primary Wetland Return Transect (PWRTW) back to the Minden bridge, from which point they then returned to the airport. On day two, the west route 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 HWY 40 near the Platte River bridge, from which point they returned to the Kearney Airport.

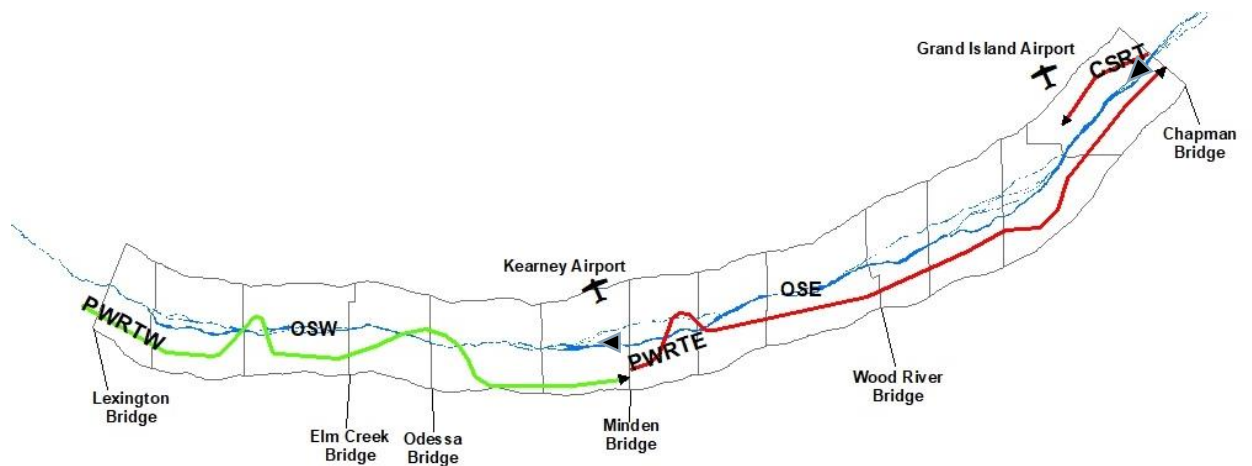


Figure 1. Day one east and west flight transects.

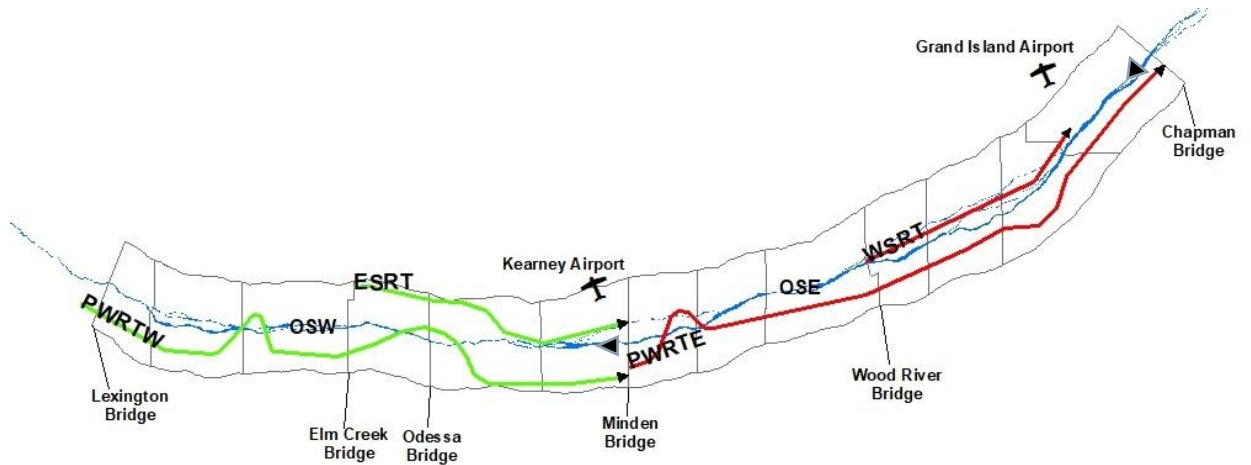


Figure 2. Day two flight transects.

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 they could maintain a relatively close proximity. If an aerial crew spotted a potential whooping crane(s), they would take photos of the object(s) and the surrounding area to later confirm the identity and location. If additional confirmation were 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 daily following the completion of both flights.

In addition to 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 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 were later translated from the completed data sheets directly to the PRRIP species database. Data were then subjected to Quality Assurance/Quality Control (QA/QC) checks by the EDO to ensure accuracy.

Results

Confirmed Whooping Crane Sightings

A total of 12 individual whooping cranes were confirmed during the 55-day monitoring effort, consisting of 8 single individuals plus one group of 4 individuals. A crane group was defined as any individual or group of whooping cranes observed once daily. These nine unique crane groups were registered forty-one times over the monitoring period. Each was given an individual crane group ID (e.g. 2020SP01 = year-season-number) at sighting, 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. Site #'s being used were noted 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, and the type of observation during each sighting instance. To facilitate cross-referencing, crane group icons are included in Tables 1, 2, 3, and 4 as well as on the collective crane group location maps in Figures 8-23 and the individual crane group location maps, shown along with a photo of each unique crane group.

Table 1. Data for each crane group observed during the 2020 spring survey, including unique group identifier icons, the date of observation, the number of 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
		3/7/20	1:0	2020SP01	AIR	549477	4512669	Systematic	6,8,9
		3/8/20	1:0	2020SP02	1	545474	4514631	Systematic	6,8,9
		3/8/20	1:0	2020SP03	2	545018	4514571	Systematic	6,10,11
		3/8/20	1:0	2020SP04	3	503546	4500945	Systematic	7,12,13
		3/8/20	0:1	2020SP05	n/a	545442	4513514	Ground	6,14,15
		3/10/20	0:1	2020SP06	n/a	544236	4508401	Ground	6,14,15
		3/10/20	1:0	2020SP07	n/a	543215	4508221	Ground	6,10,11
		3/11/20	1:0	2020SP08	n/a	508335	4499770	Ground	7,12,13
		3/12/20	1:0	2020SP09	4	548151	4515127	Systematic	6,10,11
		3/12/20	1:0	2020SP10	n/a	502148	4499530	Systematic	7,12,13
		3/13/20	1:0	2020SP11	5	548581	4515248	Systematic	6,10,11
		3/13/20	0:1	2020SP12	n/a	550082	4508547	Ground	6,14,15
		3/17/20	1:0	2020SP13	n/a	550119	4509849	Ground	6,10,11
		3/17/20	0:1	2020SP14	n/a	550152	4509123	Ground	6,14,15
		3/18/20	1:0	2020SP15	n/a	540909	4507175	Ground	6,10,11
		3/19/20	1:0	2020SP16	n/a	544095	4510503	Ground	6,10,11
		3/19/20	1:0	2020SP17	n/a	548105	4513599	Ground	6,8,9
		3/22/20	1:0	2020SP18	6	549280	4515226	Systematic	6,8,9
		3/22/20	1:0	2020SP19	5	548581	4515248	Systematic	6,10,11
		3/22/20	1:0	2020SP20	7	532213	4509740	Systematic	6,16
		3/22/20	1:0	2020SP21	8	519414	4506409	Systematic	7,17,18
		3/23/20	1:0	2020SP22	n/a	516469	4503880	Ground	7,17,18
		3/23/20	1:0	2020SP23	n/a	549229	4509922	Ground	6,10,11
		3/24/20	1:0	2020SP24	n/a	514571	4503308	Ground	7,17,187,1
		3/25/20	1:0	2020SP25	9	513937	4503328	Systematic	7,17,18
		3/25/20	1:0	2020SP26	AIR	513878	4503220	Systematic	7,17,18
		3/25/20	0:1	2020SP27	n/a	547996	4512286	Systematic	6,14,15
		3/25/20	1:0	2020SP28	10	549705	4515457	Systematic	6,10,11
		3/25/20	1:0	2020SP29	11	549020	4515257	Systematic	6,8,9
		3/26/20	0:1	2020SP30	n/a	547361	4513655	Ground	6,14,15
		3/26/20	1:0	2020SP31	n/a	546307	4512257	Ground	6,8,9
		3/27/20	1:0	2020SP32	12	513878	4503220	Ground	7,17,18
		3/27/20	1:0	2020SP33	n/a	538773	4506081	Ground	6,10,11
		3/28/20	1:0	2020SP34	n/a	549015	4513740	Ground	6,10,11
		3/30/20	0:1	2020SP35	13	548532	4515144	Systematic	6,14,15
		3/30/20	1:0	2020SP36	14	545543	4514641	Systematic	6,10,11
		3/30/20	1:0	2020SP37	15	540810	4512443	Systematic	6,8,9
		3/30/20	1:0	2020SP38	16	506476	4501517	Systematic	7,19,20
		3/31/20	1:0	2020SP39	17	506441	4501719	Systematic	7,19,20
		3/31/20	4:0	2020SP40	18	505833	4501306	Systematic	7,21
		4/1/20	0:1	2020SP41	n/a	549126	4507234	Ground	6,14,15

Proportion of Population

According to the surveys conducted by the U.S. Fish and Wildlife Service during the winter of 2019-2020, the Aransas – Wood Buffalo migratory whooping crane population was estimated as 506 birds (<https://www.fws.gov/WorkArea/DownloadAsset.aspx?id=6442456792>). The 12 individuals observed by the current monitoring effort constitutes approximately 2.37% of the migratory population using the Platte River survey area during the 2020 spring migration.

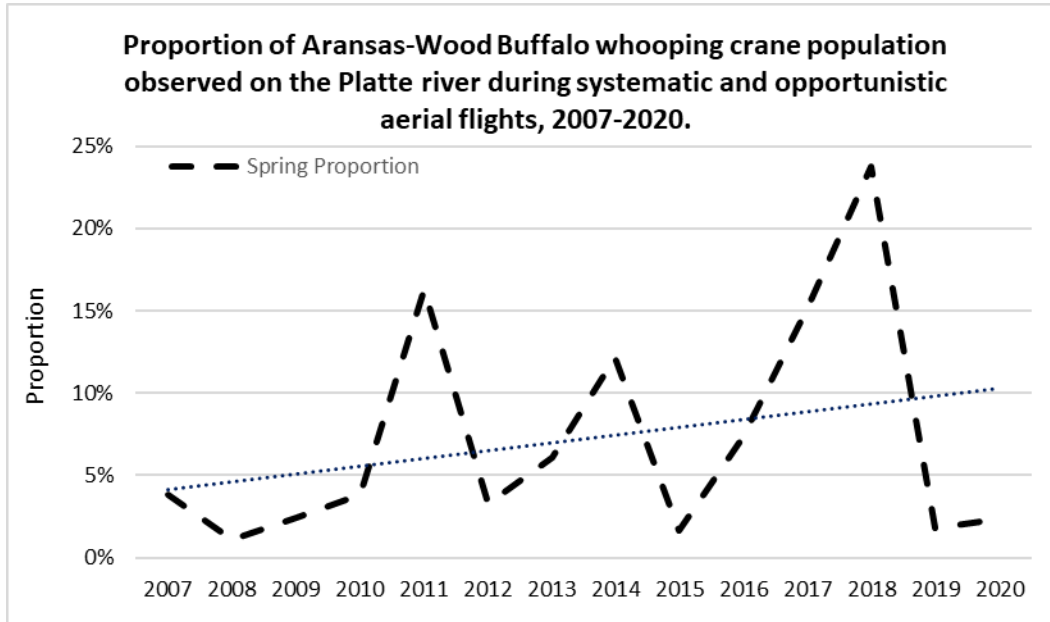


Figure 3. Proportion of the Aransas-Wood Buffalo Whooping Crane population observed (dashed line) using the central Platte River during spring migration seasons from 2007-2020, and the long-term trend of increased use over time (dotted line).

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 since the initiation of monitoring efforts in 2007 (Figure 3).

Streamflow and Unobstructed Channel Width at Whooping Crane Use Locations

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 2210 cubic feet per second (cfs) at Overton on 4/29/2020 to a high of 4070 cfs at Grand Island on 3/19/2020 during the survey period. At the specific crane group observation times, streamflow ranged from 2970 cfs – 3670 cfs.

Table 2. Associated crane group use sites and streamflow discharge (cfs) based on nearest gauging station and time of observation.





































Unique Group Icon	Date	Gauging station	Discharge (cfs)	Crane Group ID	Use Site #	# of Cranes Adults:Juv
	3/8/2020	Grand Island	3,380	2020SP02	1	1:0
	3/8/2020	Grand Island	3,380	2020SP03	2	1:0
	3/8/2020	Kearney	2,970	2020SP04	3	1:0
	3/12/2020	Grand Island	3,430	2020SP09	4	1:0
	3/13/2020	Grand Island	3,350	2020SP11	5	1:0
	3/22/2020	Grand Island	3,580	2020SP18	6	1:0
	3/22/2020	Grand Island	3,580	2020SP19	5	1:0
	3/22/2020	Grand Island	3,580	2020SP20	7	1:0
	3/22/2020	Kearney	3,100	2020SP21	8	1:0
	3/25/2020	Kearney	3,000	2020SP25	9	1:0
	3/25/2020	Grand Island	3,530	2020SP28	10	1:0
	3/25/2020	Grand Island	3,530	2020SP29	11	1:0
	3/27/2020	Kearney	3,100	2020SP32	12	1:0
	3/30/2020	Grand Island	3,670	2020SP35	13	0:1
	3/30/2020	Grand Island	3,670	2020SP36	14	1:0
	3/30/2020	Grand Island	3,670	2020SP37	15	1:0
	3/30/2020	Kearney	3,380	2020SP38	16	1:0
	3/31/2020	Kearney	3,490	2020SP39	17	1:0
	3/31/2020	Kearney	3,490	2020SP40	18	4:0

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 346 – 1,232 feet (average = 737 feet).

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)
	2020SP02	1	545474	4514631	346
	2020SP03	2	545018	4514571	955
	2020SP04	3	503546	4500945	918
	2020SP09	4	548151	4515127	587
	2020SP11, 19	5	548581	4515248	563
	2020SP18	6	549280	4515226	649
	2020SP20	7	532213	4509740	403
	2020SP21	8	519414	4506409	1,021
	2020SP25	9	513937	4503328	835
	2020SP28	10	549705	4515457	527
	2020SP29	11	549020	4515257	417
	2020SP32	12	513878	4503220	493
	2020SP35	13	548532	4515144	526
	2020SP36	14	545543	4514641	440
	2020SP37	15	540810	4512443	1,207
	2020SP38	16	506476	4501517	1,232
	2020SP39	17	506441	4501719	1,168
	2020SP40	18	505833	4501306	983

Figures 4-6 display discharges during the spring 2020 monitoring period at USGS river gauges located at Grand Island, Kearney, and Overton.

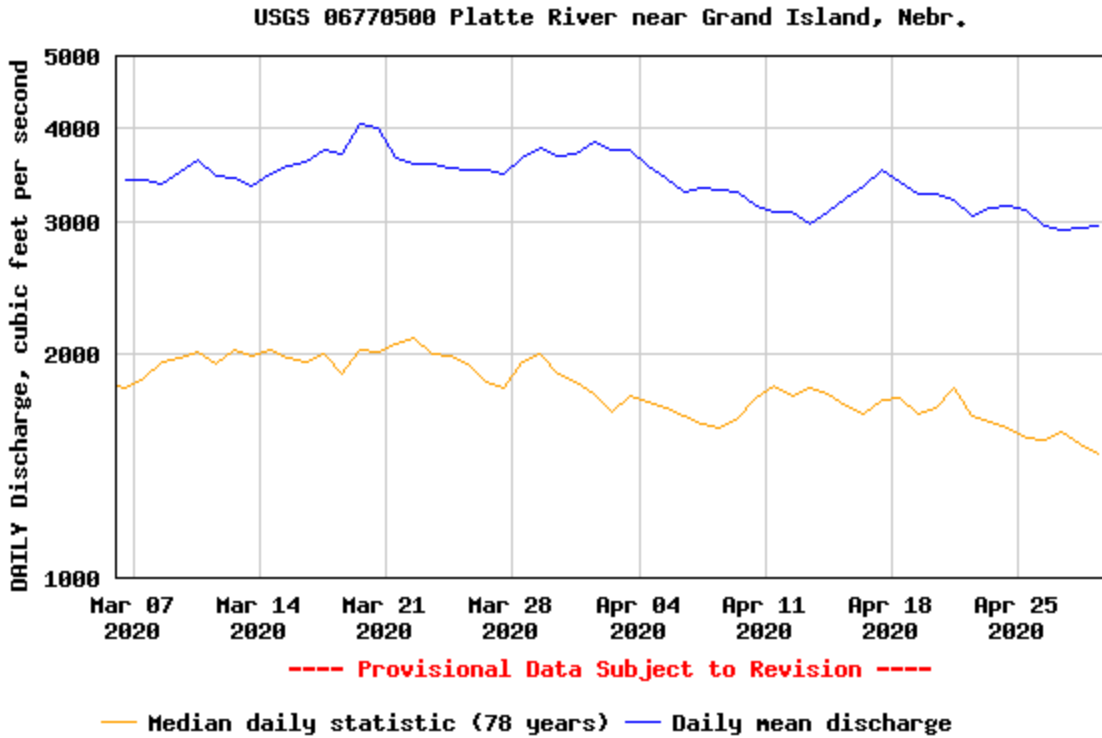


Figure 4. Daily mean discharge (blue line) at the Grand Island gauge during the 55-day monitoring period along with the median daily statistic for the last 78 years (yellow line).

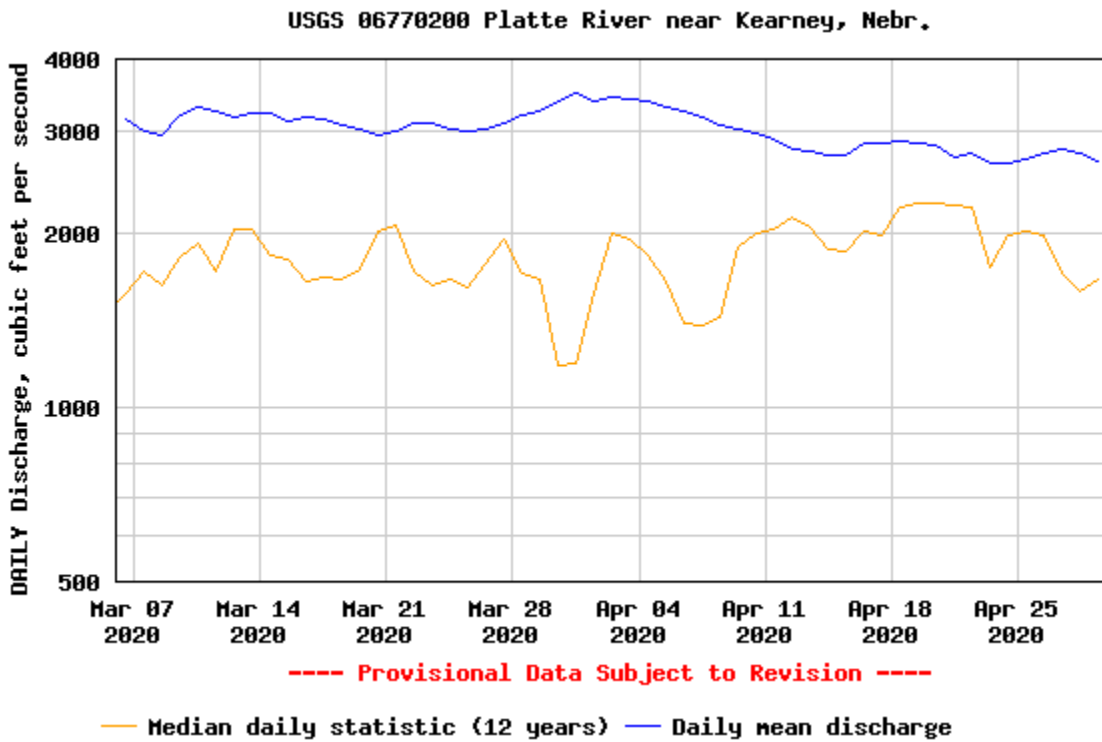


Figure 5. Daily mean discharge (blue line) at the Kearney gauge during the 55-day monitoring period along with the median daily statistic for the last 12 years (yellow line).

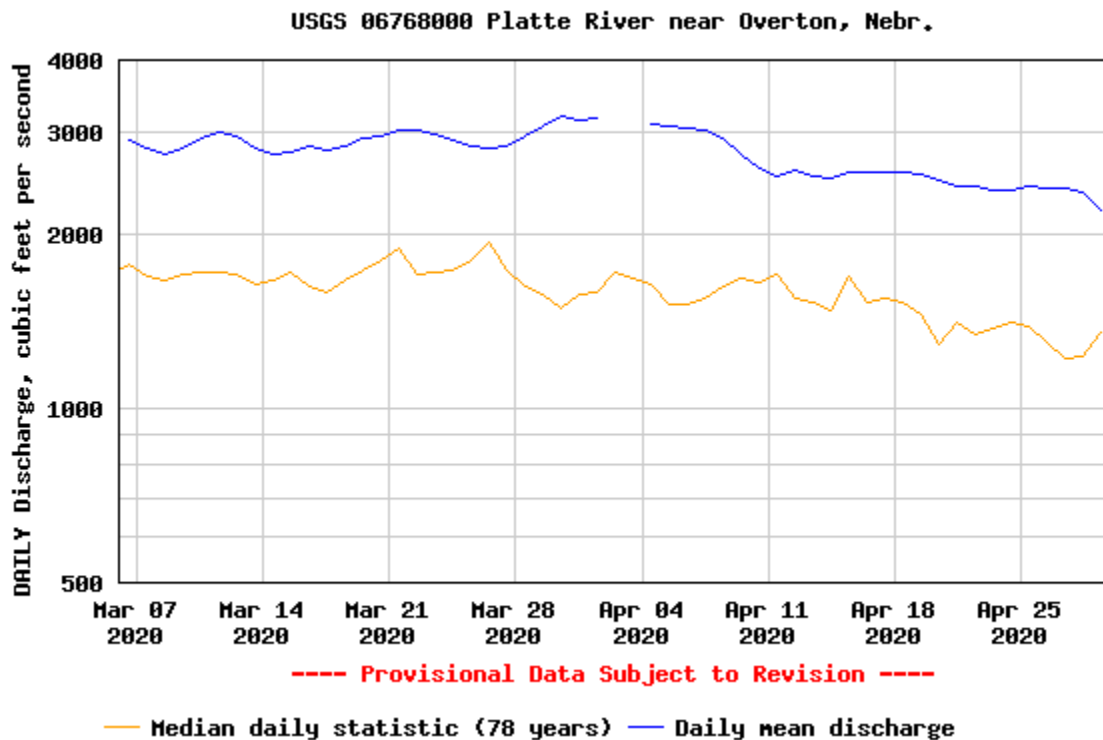


Figure 6. Daily mean discharge (blue line) at the Overton gauge during the 55-day monitoring period along with the median daily statistic for the last 78 years (yellow line).










USFWS/PRRIP Data Comparison

Table 4 compares the USFWS whooping crane sighting data (provided by Matt Rabbe – USFWS whooping crane lead) to the PRRIP survey effort on all reported observations in the Big Bend corridor. 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 two instances (20A-01 and 20A-02) where USFWS reported crane groups before PRRIP observed them due to survey start date. In addition, crane group 20A-08 was reported by USFWS for 6 more days than by PRRIP. This was due to weather cancellations and plane/pilot sharing with Crane Trust related to COVID-19.

Table 4. USFWS/PRRIP whooping crane (WC) group ID comparisons and crane use days.


















Unique Group Icon	Dates Present	# of WC Ad:Juv	USFWS ID #	PRRIP ID #	Use Days = Days Present*Cranes + 1 day per crane.			
					Days Observed	Days Present	Cranes	Use Days
	3/7-3/30	1:0	20A-02	2020SP01, 02, 17, 18, 29, 31, 37	7	24	1	25
	3/8-3/30	1:0	20A-03	2020SP03, 07, 09, 11, 13, 15, 16, 19, 23, 28, 33, 34, 36	13	23	1	24
	3/8-3/12	1:0	20A-04	2020SP04, 08, 10	3	5	1	6
	3/8-4/1	0:1	20A-01	2020SP05, 06, 12, 14, 27, 30, 35, 41	8	25	1	26
	3/22-3/22	1:0	20A-06	2020SP20	1	1	1	2
	3/22-3/27	1:0	20A-05	2020SP21, 22, 24, 25, 32	3	6	1	7
	3/25-3/25	1:0	20A-08	2020SP26	1	1	1	2
	3/30-3/31	1:0	20A-09	2020SP38, 39	2	2	1	3
	3/31-3/31	4:0	20A-16	2020SP40	1	1	4	8
PRRIP Crane Use Days								103

Crane use days were calculated by multiplying the number of individual cranes in each group by the number of days the group was present, plus one day per crane, 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 103 crane use days during the spring survey. Whooping cranes were observed on 19 of the 55 days of the survey effort (34.5% of the days; Table 1).

Ground Search Effort and Opportunistic Observations

There were 19 instances where ground crews independently observed a whooping crane group as well as 4 other instances where they acted on a confirmation request to verify a white object spotted by aerial crews within the survey area during the 55-day monitoring effort (Table 5). 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 was located and identified or a reasonable amount of effort has been put forth. Of the 41 sightings of 9 unique whooping crane groups, 19 of these were made by ground crews without the aid of aerial support (Table 1).

Table 5. Ground search effort for whooping cranes (WC) in response to either aerial sighting by plane (plane) or without aerial support based upon previous known locations (known), ground crew sighting alone (ground), or public reports (public).

Unique Group Icon	Date	Source	WC Confirmed Ad:Juv	Miles Driven	Aerial/Ground Effort
	3/8	Plane	1:0	3	Both
	3/8	Known	0:1	1	Ground
N/A	3/10	Known	None	60	Ground
	3/10	Known	0:1 & 1:0	76	Ground
N/A	3/11	Known	None	124	Ground
	3/11	Known	1:0	36	Ground
	3/12	Known	1:0	63	Both
	3/13	Ground	0:1	1	Ground
	3/17	Known	1:0 & 0:1	160	Ground
N/A	3/17	Known	None	40	Ground
N/A	3/18	Known	None	68	Ground
	3/18	Known	1:0	1	Ground
	3/19	Known	1:0 & 1:0	84	Ground
N/A	3/20	Plane	None	10	Both
	3/23	Known	1:0 & 1:0	81	Ground
	3/24	Known	1:0	1	Ground
	3/25	Plane	4:0	1	Both
	3/26	Known	0:1 & 1:0	1	Ground
	3/27	Known	1:0 & 1:0	1	Ground
	3/28	Known	1:0	23	Ground
	3/30	Plane	0:1	10	Both
	4/1	Known	0:1	1	Ground
N/A	4/4	Public	None	39	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 PRRIP.

HARASSMENT

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

PUBLIC DISTURBANCE

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

Observation Efficiency Trials

A total of 10 whooping crane decoy sets (2-3 decoys per set) were placed by PRRIP personnel in 10 locations along the aerial transects, randomly within the channel or along off channel conservation lands. Flight crews spotted 4 decoy sets placed in a wetted channel (80.0%) and 2 in lowland grassland (40.0%), for an overall spotting efficiency of 60.0% (Table 6)*.

Table 6. Observation efficiency trials using whooping crane decoys.

Decoy	Date Placed	Date Tested	UTMx	UTMy	# Decoys	Type	Detected
1	3/20/20	3/21/20	496336	4501198	3	Wetted Channel	Yes
2	4/6/20	4/7/20	496763	4500573	3	Wetted Channel	Yes
3	4/20/20	4/21/20	456811	4502925	3	Wetted Channel	Yes
4	3/30/20	4/1/20	460094	4503855	2	Wetted Channel	Yes
5	4/1/20	4/2/20	444875	4505461	2	Wetted Channel	No
6	3/23/20	3/25/20	472879	4503284	2	Lowland Grassland	No
7	3/23/20	3/25/20	442927	4505609	2	Lowland Grassland	Yes
8	3/25/20	3/29/20	443338	4505700	2	Lowland Grassland	Yes
9	3/30/20	4/1/20	447436	4504730	2	Lowland Grassland	No
10	4/8/20	4/9/20	460907	4504084	3	Lowland Grassland	No

*Decoys were only placed on the west side for this season. Due to COVID-19, PRRIP staff were needed to man the east plane and therefore would be aware of decoy placements.

Flight Statistics and Sighting Frequency

Of the 110 scheduled flights, there were 60 instances when crews were able to depart the airport, of which 59 were completed, resulting in an overall completion of 53.6% (Table 7). One flight was cancelled due to mechanical issues, 4 flights were cancelled due to COVID-19 and having to share a plane/pilot with the Crane Trust, and the remaining 46 cancellations were weather related.

Table 7. Flight completion rates.

	East	West	Totals
COMPLETED	28	31	59
CANC./INCOMP.	27	24	51
SEASON TOTAL	55	55	110
% COMPLETED	50.9%	56.3%	53.6%

FLIGHT RESULTS

Of the 302 scheduled systematic transects, 166 (54.9%) were completed. Of the 41 sightings of 9 unique whooping crane groups, 22 of these were observed from the air while conducting systematic flights (Table 1) for an overall sighting-per-transect frequency of 7.2% (Table 8). Transects are illustrated in Figures 1 and 2.

Table 8. Whooping crane (WC) sighting frequency per transect.

	Transects			# WC Groups ¹	Frequency	
	Completed	Cancel/Incomp.	TOTAL			
Spring	OSE, OSW ²	60	50	110	19	17.2%
	PWRTE, PWRTW ³	59	51	110	3	2.7%
	WSRT/CSRT, ESRT ⁴	47	35	82	0	0%
TOTALS		166	136	302	22	7.2%

¹These 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”.

²Primary Transect (Riverine), (East – OSE, West – OSW)

³Primary Return transect, (East – PWRTE, West – PWRTW)

⁴Secondary Return transect, (East – WSRT and CSRT, West – ESRT)

Supplements

QA/QC of database was performed by PRRIP staff.

Original datasheets – Retained at PRRIP

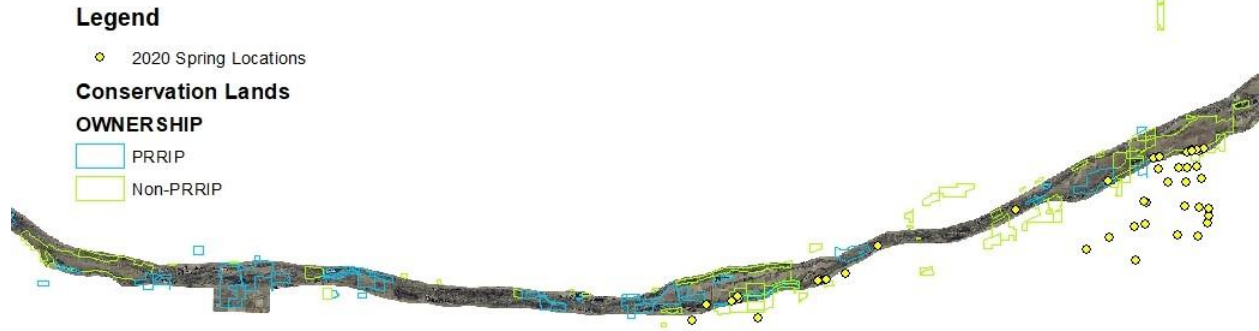


Figure 7. The distribution of initial whooping crane group observations (yellow points) during the 2020 spring survey in relation to the PRRIP lands (highlighted in blue) and all other conservation lands (highlighted in green).

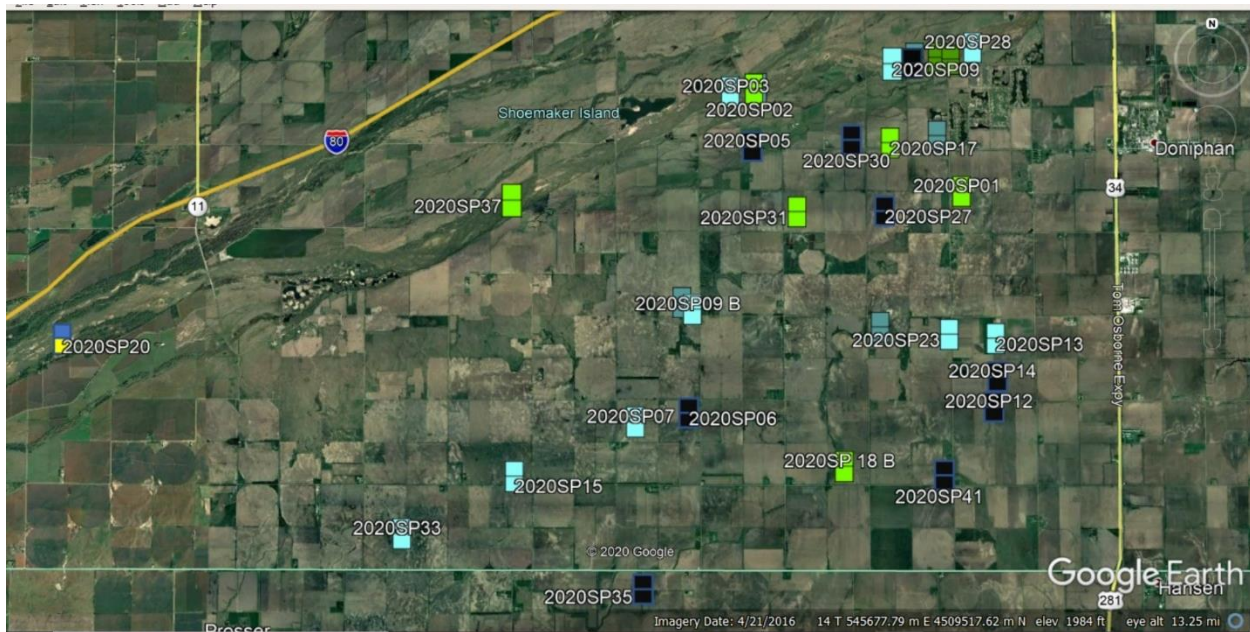


Figure 8. Observed whooping crane locations. 1 of 2 collective crane group maps. See Table 1 for color icon coding and details.

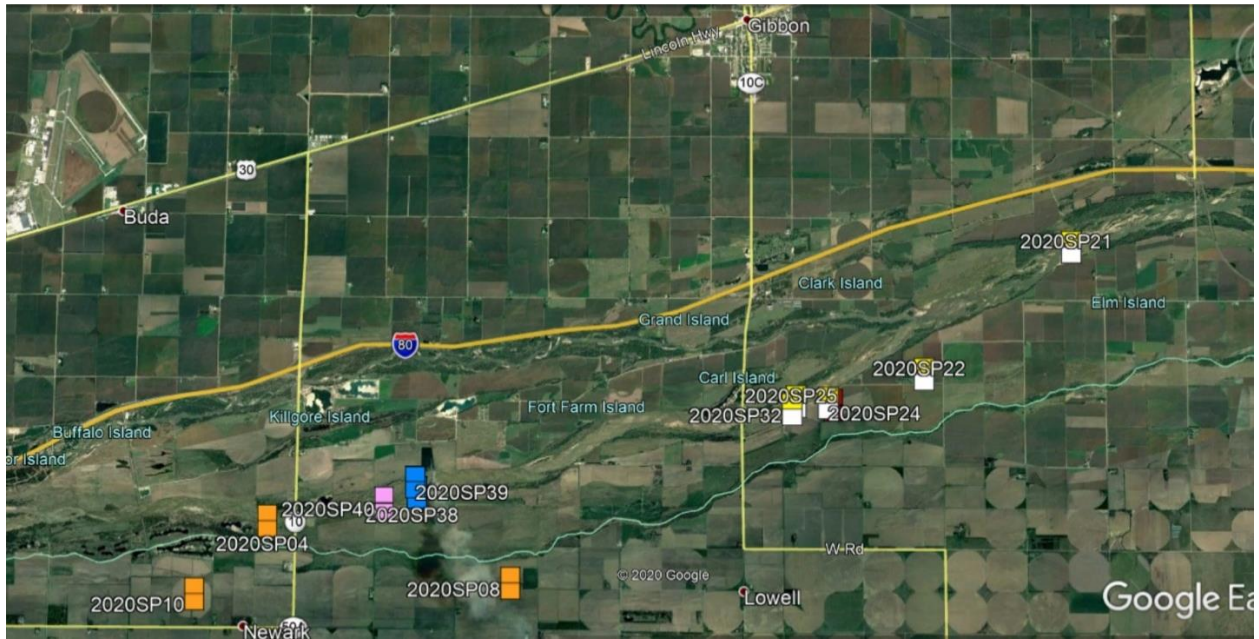


Figure 9. Observed whooping crane locations. 2 of 2 collective crane group maps. See Table 1 for icon color coding and details.

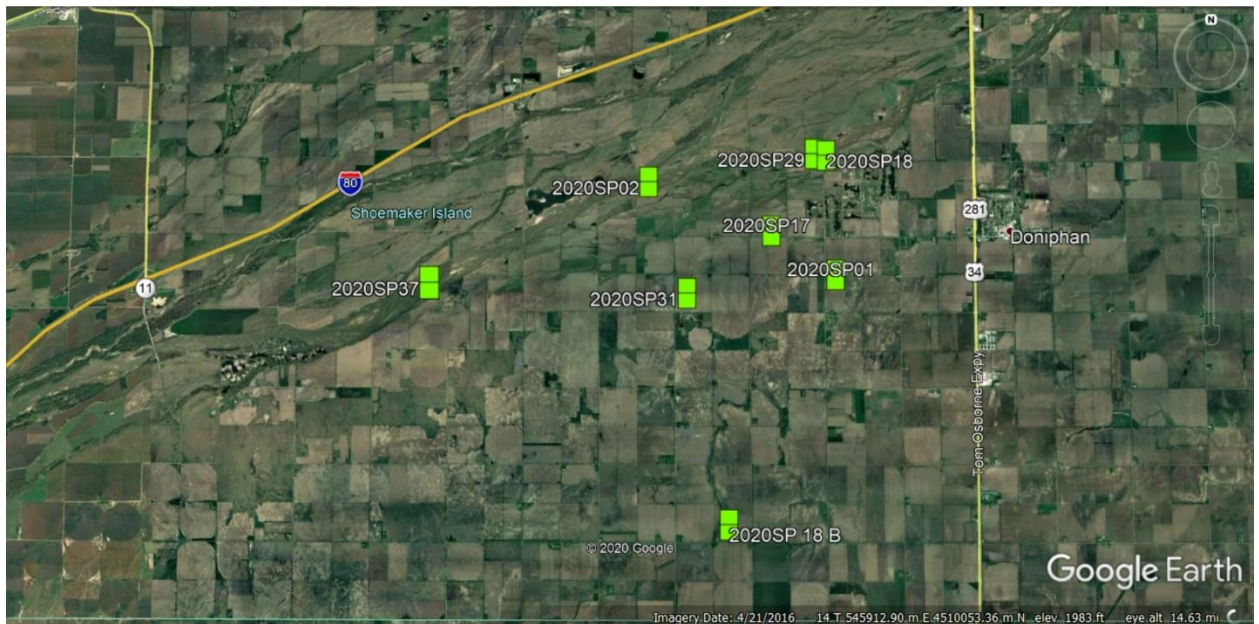


Figure 10. Observed locations of the 1:0 crane group designated with ID #: 2020SP01, 02, 17, 18, 29, 31, & 37. This group was observed in the survey area from 3/7-3/30.



Figure 11. Photo taken during a systematic observation of the 1:0 crane group 2020SP29 on 3/25/20 at use site 11 in the main channel of the Platte River (see Fig. 10 above for location).

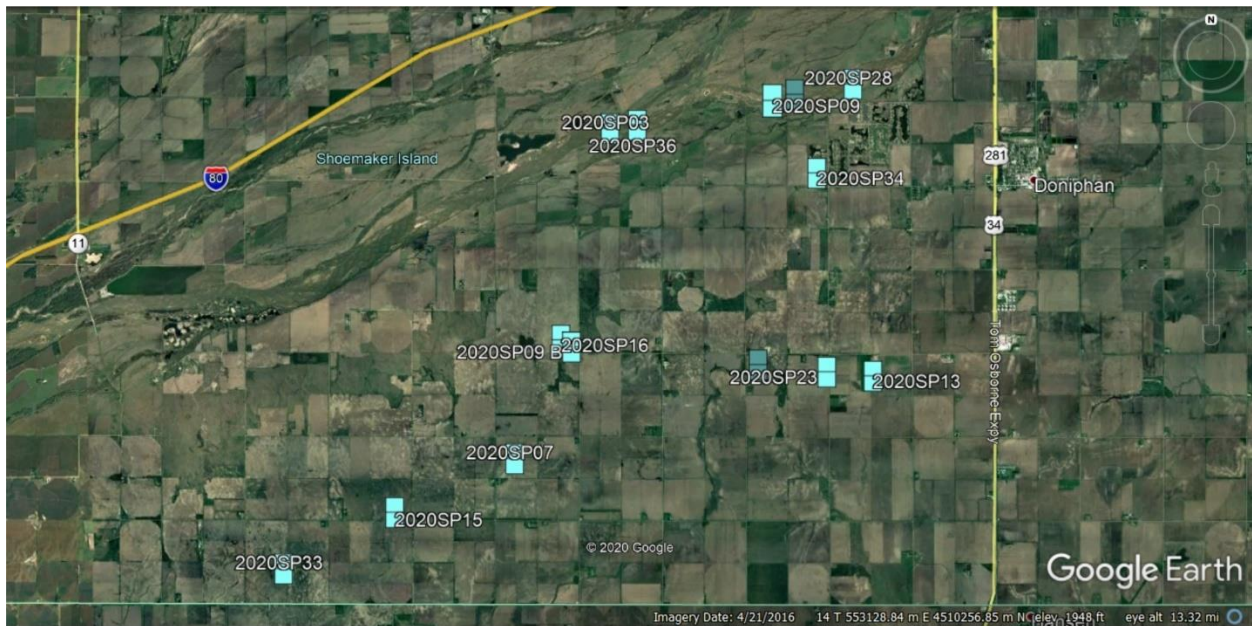


Figure 12. Observed locations of the 1:0 crane group designated with ID #: 2020SP03, 07, 09, 11, 13, 15, 16, 19, 23, 28, 33, 34, & 36. This group was observed in the survey area from 3/8-3/30.



Figure 13. Photo taken during a systematic observation of the 1:0 crane group 2020SP11 at use site 5 on 3/13/20 in the main channel of the Platte river (see Fig. 12 above for location).

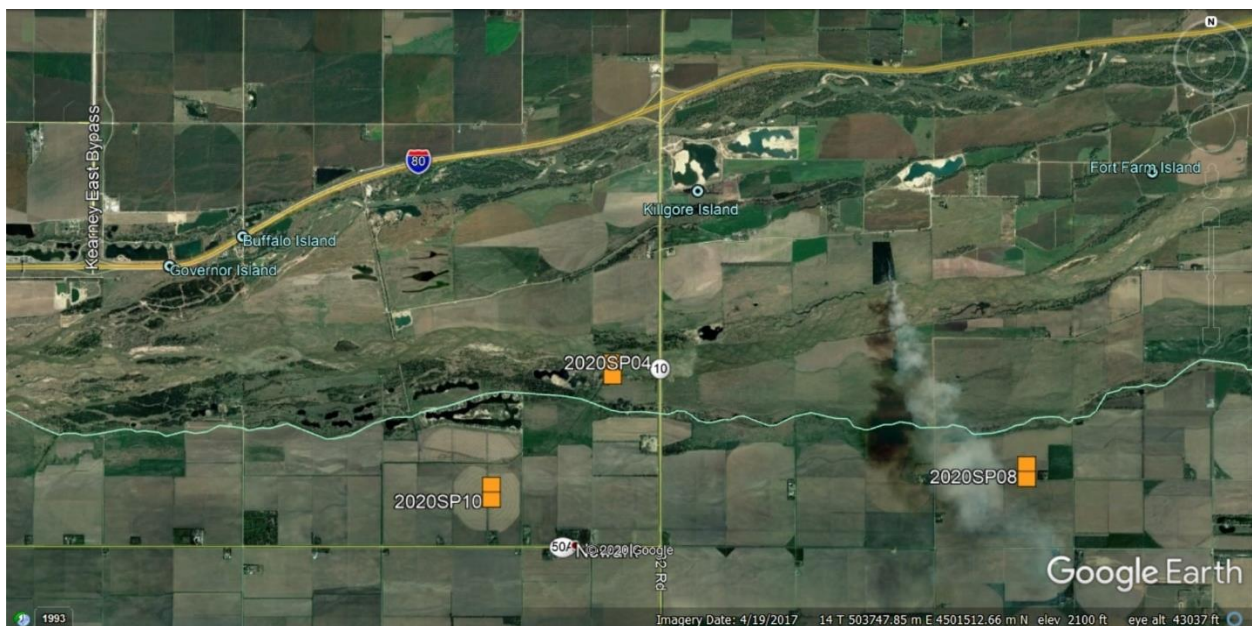


Figure 14. Observed locations of the 1:0 crane group designated with ID #'s: 2020SP04, 08, & 10. This group was observed in the survey area from 3/8-3/12.



Figure 15. Photo taken during the systematic observation of the 1:0 crane group 2020SP04 at use site 3 on 3/8/20 in the main channel of the Platte River (see Fig. 14 above for location).

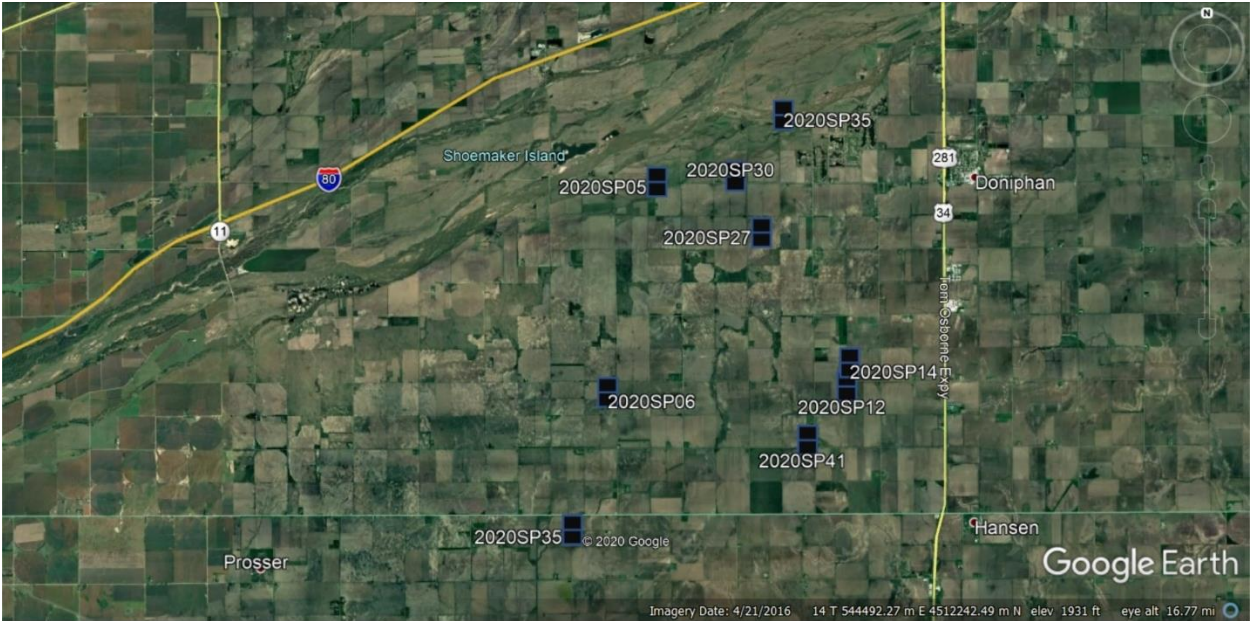


Figure 16. Observed location of the 0:1 crane group designated with ID #: 2020SP05, 06, 12, 14, 27, 30, 35, & 41. This group was observed in the survey area from 3/8-4/1.



Figure 17. Photo taken during a ground observation of the 0:1 crane group 2020SP12 in a field on 3/13 (see Fig. 16 above for location). Photo Credit: Colleen Childers



Figure 18. Observed locations of the 1:0 crane group designated with ID #'s: 2020SP20. This group was observed in the survey area on 3/22/20.

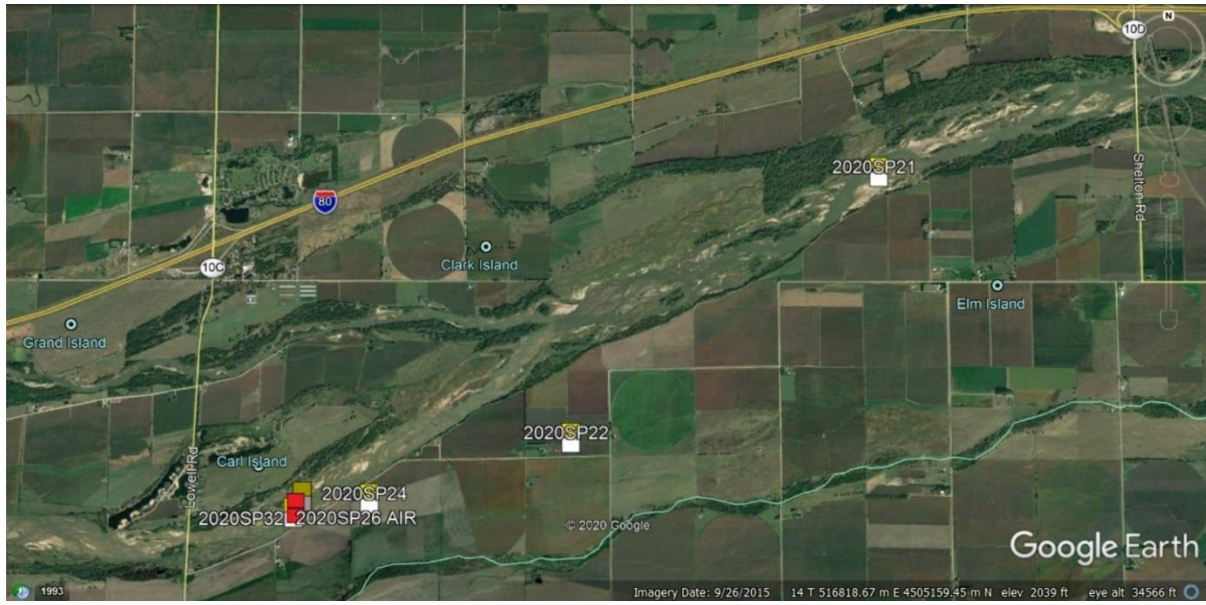


Figure 19. Observed locations of the two 1:0 crane groups designated with ID #'s: 2020SP25 & 2020SP26. These groups were observed in the survey area on 3/25/20.



Figure 20. Photo taken during a systematic observation of the two 1:0 crane groups 2020SP25 & 26 use site 9 and the other in flight on 3/25 in the main channel of the Platte River (see Fig. 19 above for location).

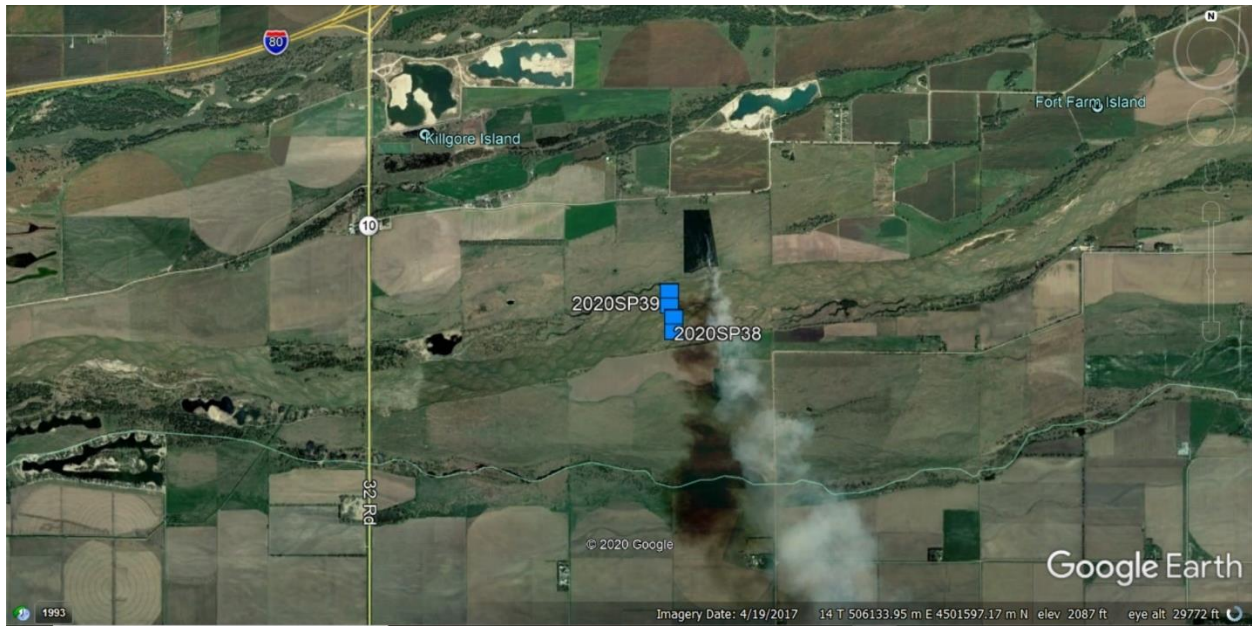


Figure 21. Observed location of the 1:0 crane group designated with ID # 2020SP38 & 39. This group was observed in the survey area on 3/30-3/31.



Figure 22. 2020SP38 use site 16 on 3/30 in the main channel of the Platte River (see Fig. 21 above for location). Photo taken during a systematic observation of the 1:0 crane group.

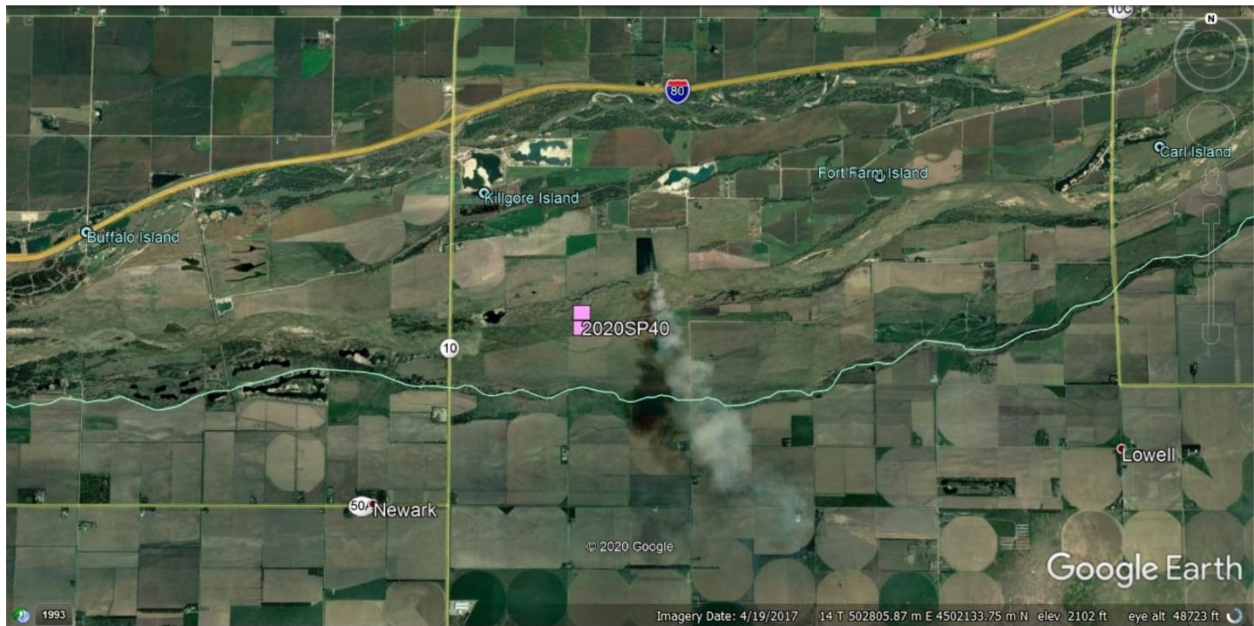


Figure 23. Observed location of the 4:0 crane group designated with ID # 2020SP40. This group was observed in the survey area on 3/31/20.