

Implementation of the Whooping Crane Monitoring Protocol

Fall 2012



FINAL REPORT

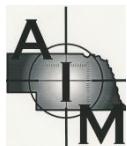
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18 May 2013



Implementation of the Whooping Crane Monitoring Protocol

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Prepared by
AIM Environmental Consultants and
Western Ecosystems Technology, Inc.

For
Committees of the
Platte River Recovery Implementation Program

18 May 2013

The team of Western Ecosystems Technology, Inc. (WEST) and AIM Environmental Consultants was awarded a contract (*Contract for Services Agreement between the Nebraska Community Foundation, PRRIP, and WEST* dated 1 September 2011) to assist the Governance Committee in implementing specific monitoring associated with the Platte River Recovery Implementation Program (PRRIP). The specific task was to implement the protocol developed by the Technical Advisory Committee entitled *Whooping Crane Monitoring Protocol - Migrational Habitat Use in the Central Platte River Valley* dated 31 May 2011 during the spring and fall migrations along with corresponding analysis.

Study Area and Methods

The study area was the Platte River reach between U.S. Highway 283 (near Lexington) and Chapman, Nebraska. This reach was about 90 miles long and included an area extending 3.5 miles either side of the outermost banks of the Platte River. Field work and aerial surveys were conducted from 9 October through 10 November 2012. Data sheets were provided by the PRRIP Executive Director's Office and all data were entered into a web-based Microsoft SharePoint database being developed for the PRRIP by Riverside Technology, Inc.

Two air services were contracted and aerial surveys were conducted along specified routes near sunrise as weather permitted. Flights were initiated no earlier than 30 minutes before sunrise and typically were completed within 2 hours. Start times were delayed for up to 2 hours when weather/visibility conditions dictated. Flights were cancelled due to unsafe weather or mechanical problems. Cessna 172's were equipped with GPS units and each had two observers to conduct the surveys. Waypoints for each survey route were programmed into the GPS units onboard the aircraft. Surveys were flown at an altitude of 750' and at a speed of about 100 mph.

The study area was divided into two legs. The east leg surveyed the Platte River reach between Chapman and the Minden (Highway 10) bridges and the west leg surveyed from the Minden to the Lexington (Highway 283) bridges. Each survey began flying upstream (east to

west) along the south side of the main river channel with both observers looking out the right side of the aircraft. This provided optimum light conditions such that observers looked away from the rising sun thereby minimizing glare off reflective surfaces. Start points were alternated for each leg to address the concern that one end of the river transect would always be flown earlier than the other end. On the east leg, day one began the survey at Chapman, flew the river west to Minden then flew a predetermined transect back to Chapman. Day two began at Wood River, flew the river to Minden, returned along a predetermined transect back to Chapman, then flew the rest of the river transect from Chapman to Wood River. The start points for the west leg were Minden and Odessa bridges. Day one began at Minden, flew the river west to Lexington then flew a predetermined transect back to Minden. Day two began at Odessa, flew the river to Lexington, returned along a predetermined transect back to Minden, then flew the rest of the river transect from Minden to Odessa. When the initial portion of the river transect was completed, one of 7 possible return transects was flown with observers looking out opposite sides of the aircraft: transects along the centerline of the main channel and 1, 2, and 3 miles north or south of the river respectively were flown with observers looking out opposite sides of the aircraft.

Four ground observers were stationed along the survey routes. Communication between the ground observers and the aircraft was accomplished through the use of two-way radios. Prior to the flight, the air crew was notified when whooping cranes were reported by the public to be within the survey area. In the event of a possible Whooping Crane sighting by the aircrrew, the ground person nearest the sighting was contacted and immediately dispatched to the location in an effort to confirm the identity of the white object. Efforts were made to photograph Whooping Cranes from the air using Nikon D90 digital cameras. In addition, a GPS reading of the location was taken by the air crew.

If a Whooping Crane was located by ground personnel, habitat use and activity monitoring commenced. Activity monitoring of the Whooping Crane or of a “focus” bird when more than one individual was present, was recorded every 15 minutes as one of the following categories: courtship, preening, defensive, feeding, alert, resting, or other activity as defined by the observer. These observations continued until the group was either lost from view or went to roost for the night. If a group was lost, observers spent a minimum of 2 hours attempting to re-locate the group. Each Whooping Crane sighting was assigned a unique number and later compared with the U.S. Fish and Wildlife Service’s (USFWS) sighting records in Grand Island.

Whooping Crane movements, behavior, and diurnal habitat use were recorded when possible. All monitoring activities followed USFWS and Nebraska Game & Parks Commission guidelines to avoid disturbing the cranes. Martha Tacha, USFWS Coordinator for the Cooperative Whooping Crane Tracking Project, provided information on the latest incidental Whooping Crane sighting reports. Landowner permission was obtained prior to entering any private property.

Whooping Crane decoys were placed at 10 riverine locations, 10 cornfield locations, and 10 lowland grassland locations. All locations were randomly selected by personnel from the Executive Director’s Office (Table 1) for the purposes of determining aerial survey detection rates. The air crew did not know when or where the decoys were placed. Decoys were placed

prior to the flights and ground crew personnel were notified of their location. Observations of Whooping Crane decoys by the aircrew were reported to the ground crew for confirmation.

Topographic profiles were measured at Whooping Crane roost sites using a Trimble GeoXH6000 GPS. Three parallel transects 25m apart were established perpendicular to the general flow of the river at each site such that the middle transect crossed the observed crane use location. End points were determined when an obstruction greater than 1.5 m in height was encountered such that it formed a visual barrier to a crane. Photographs were taken from the roost site showing conditions upstream, downstream, left bank, and right bank. A laser level was used to obtain relative river bank, bed, and water surface elevation data. Stream flow data were collected from the U.S. Geological Survey (USGS) gauging stations located at Overton, Kearney, and Grand Island. Leica laser rangefinders were used to measure the length of sandbars and distance to visual obstructions >1.5m above the water surface. When a crane group used a roost site for multiple days, a single profile was collected to represent that site.

Results

Opportunistic Locates.—

We received 3 reports of Whooping Cranes from the public or PRRIP personnel. On the evening of October 10, Greg Wright of the Crane Trust observed 1 Whooping Crane (2012FA01) in flight with about 300 Sandhill Cranes over the river near the Crane Trust Headquarters below the Alda bridge. The morning of October 11, it was spotted by Greg Wright and later by AIM's flight crew, roosting on the river about 1 mile east of the Alda bridge.

On November 8, six Whooping Cranes were observed flying south past the Platte River about 1 mile west of Highway 10 at 12:05 PM by a local resident familiar with the species. No follow-up was conducted because they were believed to be migrating. No group of six Whooping Cranes were observed again on the Platte River in fall 2012.

David Baasch reported a group of Whooping Cranes (2012FA10) present on the Platte River near the J-2 return on November 9, but based on radio telemetry information had migrated south of the study area. Flights were cancelled on that date due to fog and the cranes departed from the area before AIM personnel conducted a flight to detect them. The crane group was later seen on a wetland outside of the study area.

Aerial Survey--

CONFIRMED WHOOPING CRANE SIGHTINGS-

Of a possible 33 morning flights scheduled per leg, the East Leg (Chapman – Minden) completed 24 (73%) flights while the West Leg (Minden – Lexington) completed 23 (70%). Adverse weather resulted in flight cancellations or delayed start times. Three flights were delayed over 90 minutes, 2 flights were delayed 10-15 minutes, 10 flights began 5-10 minutes late, and the remaining 32 flights began less than 5 minutes late. We recorded 5 confirmed

Whooping Crane sightings (ID# 02, 03, 04, 07, 09) while conducting the systematic transect surveys (Figures 1-3). Crane Group 07 was detected on both survey legs as the cranes crossed from one leg into the other prior to the plane's arrival and therefore was counted twice. These five crane groups were followed for a combined 9 use days and measurements were taken at five use sites.

INDEX OF USE-

We completed 94 (71%) aerial survey transects out of 132 transects scheduled (2 transects per flight). Six Whooping Crane sightings were made on these transects (note these consisted of 5 Whooping Crane groups). This resulted in an index of use (frequency of occurrence) of .064 sightings per transect. Four sightings occurred on the East Leg (OSE) and 2 sightings on the West Leg (OSW). On November 4, both legs recorded Crane Group 07 at different locations.

OPPORTUNISTIC FLIGHTS-

We conducted six opportunistic flights that totaled about 0.8 hours. Six opportunistic Whooping Crane sightings (ID# 01, 02, 03, 06, 08, 09) occurred when the plane deviated from the systematic survey's return transect at the request of the ground observer. This was done to assist the ground crew in determining whether to initiate a ground search during those instances when the cranes were not visible from the ground. No additional flights were deployed at other times of the day.

OTHER WHITE OBJECT SIGHTINGS-

No on-ground follow-ups were conducted on objects other than Whooping Cranes at the request of the aircrew.

Searcher Efficiency Trials.—

Whooping Crane decoys were placed at 30 locations between October 10 and November 7 (Table 1). The air observers detected a decoy at 8 (80%) riverine, 4 (40%) corn, and 0 (0%) grassland sites for an overall detectability rate of 40%.

Table 1. Random locations of decoys for detectability trials.

Decoy #	Date	Habitat	X	Y	Detected
1	10-Oct	Riverine	453611	4503614	Yes
2	12-Oct	Riverine	562824	4527740	Yes
3	16-Oct	Riverine	447672	4505010	Yes
4	17-Oct	Riverine	547240	4516460	Yes
5	26-Oct	Riverine	499132	4501062	Yes
6	30-Oct	Riverine	566632	4532195	Yes
7	31-Oct	Riverine	560904	4525521	Yes
8	6-Nov	Riverine	567506	4532913	No
9	7-Nov	Riverine	477266	4501886	No
10	29-Oct	Riverine	464400	4503659	Yes

11	12-Oct	Corn	570803	4538339	No
12	12-Oct	Corn	472599	4504432	Yes
13	21-Oct	Corn	527090	4508656	No
14	26-Oct	Corn	541844	4511499	No
15	26-Oct	Corn	445996	4503430	No
16	3-Nov	Corn	543483	4512824	Yes
17	26-Oct	Corn	477748	4500224	No
18	3-Nov	Corn	520751	4505010	Yes
19	3-Nov	Corn	487608	4500195	Yes
20	3-Nov	Corn	470703	4501675	No
21	14-Oct	Grassland	533049	4507989	No
22	15-Oct	Grassland	472548	4502802	No
23	15-Oct	Grassland	459209	4502604	No
24	30-Oct	Grassland	546181	4521281	No
25	21-Oct	Grassland	549849	4516352	No
26	1-Nov	Grassland	483018	4503047	No
27	1-Nov	Grassland	570264	4536600	No
28	1-Nov	Grassland	445450	4506760	No
29	3-Nov	Grassland	442058	4503289	No
30	7-Nov	Grassland	550197	4516222	No

Use-Site Characteristics, Diurnal Movements, and Activity.--

FLOW-

Streamflow measured at the USGS gauging stations located near Grand Island, Kearney, and Overton was well below the median streamflow for each site during the survey (Figures 4-6). Note all flow data are provisional and subject to revision. Table 2 depicts the minimum and maximum values for unit (instantaneous) flows at each station during the survey period.

Table 2. Discharge values (cfs) at USGS gauging stations (provisional data).

	Overton	Kearney	Grand Island
Minimum	154	18	38
Date	10/20	10/23	10/27
Maximum	1890	1850	589
Date	11/7	11/8	10/31

The streamflow when Whooping Cranes were observed on the river and when roost channel profiles were measured are shown in Table 3.

Table 3. Flow conditions during Whooping Crane use and channel profile measurements. (Discharge is at the Platte River gauging station near Kearney).

Use Site	Use Dates	Measured Dates	Discharge (cfs)	Discharge (cfs)
			Use	Measured
1	10/11	10/20	654	33
2	10/30-11/1	11/8	480	1520

3	11/2	11/8	331	1520
4	11/3-6	11/9	188	427
5	11/9	11/12	421	263

RIVERINE USE SITES-

We collected riverine channel profile data at 5 Whooping Crane use sites that represented 10 use dates. A total of 435 stations from 15 transects were surveyed (Figures 7-11). Photographs depicting the habitat at Whooping Crane use sites are shown in Figures 7-11.

DISTANCE TO VISUAL OBSTRUCTION, SUBSTRATE, AND WATER DEPTH-

Visual obstructions from Whooping Crane use sites are given in Table 4. Substrate was characterized as fine sand to small gravel. The average water depth at the Whooping Crane roost locations was -7.6 ± 1.1 inches.

Table 4. Location, visual obstruction distance (yds), and substrate at the Whooping Crane use sites.

Use Site ID	UTMx	UTMy	Roost Depth (in)	VO Upstream Distance	VO Right Distance	VO Downstream Distance	VO Left Distance	Fine Sand (%)	Small Gravel (%)	Coarse Sand (%)	Large Gravel (%)
1	544224	4514138	6.12	102	22	70	194	100	0	0	0
2	506998	4501711	8.28	69	51	78	234	35	0	65	0
3	507505	4501913	8.16	107	86	111	217	30	0	70	0
4	502085	4501339	6.72	70	72	86	50	70	5	25	0
5	443194	4504755	8.52	39	18	49	40	10	30	10	50

Distance to nearest visual obstructions averaged 265 feet (95% CI: 167, 362). Average distance to visual obstructions across the 23 migration seasons monitored from 2001 to 2012 averaged 471 feet (95% CI: 442, 501) from a sample of 302 use locations. Distance to nearest visual obstructions (i.e. the closest obstruction at each site, not the average of the four measurements at each site) averaged 136 feet (95% CI: 63, 210). Distance to nearest visual obstructions across the 23 migration seasons monitored from 2001 to 2012 averaged 253 feet (95% CI: 232, 273) from a sample of 302 use locations.

Roost depth for roosts detected in water across the 22 use observations in Fall 2012 averaged 7.89 inches (95% CI: 7.5, 8.2). Roost depth across the 22 migration seasons monitored from 2001 to 2012 averaged 6.6 inches (95% CI: 6.02, 7.19) for the 232 roosts detected in water. There were no roosts observed in Fall 2012 above the water surface. For roosts on sandbars above the water surface across the 22 migration seasons monitored from 2001 to 2012, the average height was 2.9 inches (95% CI: 2.0, 3.8) for the 44 roosts detected.

UNOBSTRUCTED WIDTH-

Table 5 depicts unobstructed width as measured along the middle transect at the riverine use sites.

Table 5. Unobstructed width at use sites (units in feet).

Use Site ID	Unobstructed Width
1	643
2	845
3	899
4	394
5	153

Unobstructed width across the 22 use observations in Fall 2012 averaged 778 feet (95% CI: 689, 866). Unobstructed width across the 21 migration seasons monitored from 2001 to 2012 averaged 788 feet (95% CI: 745, 832) from a sample of 202 use locations.

When unobstructed width is first averaged across use sites for a given crane group (using the USFWS crane group ID) and then averaged across the 3 crane groups, the average unobstructed channel width for Fall 2012 averaged 553 feet (95% CI: 150, 956).

DIURNAL USE LOCATIONS-

Diurnal movements and activity data was collected when possible. Whooping Crane movements ranged within 3.5 miles of nocturnal roost sites. We documented diurnal use locations during 9 days of observation (Figures 1-3, Table 6). These locations were sites where activity data was collected or where the cranes were visible from the ground during daylight hours.

Table 6. Whooping Crane diurnal use locations.

Use Date	Crane Group ID	County	UTMx	UTMy	Habitat
10/11/2012	2012FA01	Hall	544224	4514138	Wetted Channel
10/11/2012	2012FA01	Hall	544191	4514130	Wetted Channel
10/30/2012	2012FA02	Buffalo	506998	4501711	Wetted Channel
10/30/2012	2012FA02	Buffalo	507313	4502061	Ag - Corn
10/30/2012	2012FA02	Buffalo	507583	4501877	Wetted Channel
10/31/2012	2012FA03	Buffalo	507740	4501852	Wetted Channel
10/31/2012	2012FA03	Buffalo	507505	4501913	Wetted Channel
10/31/2012	2012FA03	Buffalo	507313	4502061	Ag - Corn

10/31/2012	2012FA03	Buffalo	506724	4501835	Wetted Channel
10/31/2012	2012FA03	Buffalo	507508	4501913	Wetted Channel
11/1/2012	2012FA04	Buffalo	507505	4501913	Wetted Channel
11/1/2012	2012FA04	Buffalo	507313	4502061	Ag - Corn
11/1/2012	2012FA04	Buffalo	506724	4501835	Wetted Channel
11/1/2012	2012FA04	Buffalo	506724	4501835	Wetted Channel
11/1/2012	2012FA04	Buffalo	507313	4502061	Ag - Corn
11/1/2012	2012FA04	Buffalo	506724	4501835	Wetted Channel
11/2/2012	2012FA05	Buffalo	507508	4501913	Wetted Channel
11/2/2012	2012FA05	Buffalo	507313	4502061	Ag - Corn
11/3/2012	2012FA06	Buffalo	506575	4501764	Wetted Channel
11/3/2012	2012FA06	Buffalo	507924	4502125	Ag - Corn
11/4/2012	2012FA07	Buffalo	507508	4501913	Wetted Channel
11/4/2012	2012FA07	Buffalo	502083	4501339	Wetted Channel
11/4/2012	2012FA07	Buffalo	507924	4502125	Ag - Corn
11/5/2012	2012FA08	Buffalo	502083	4501339	Wetted Channel
11/6/2012	2012FA09	Buffalo	507313	4502061	Ag - Corn
11/6/2012	2012FA09	Buffalo	507505	4501913	Wetted Channel

CRANE-USE DAYS

Crane-use days were calculated by multiplying the number of Whooping Cranes by the number of days present. For this calculation, we assumed that a Whooping Crane observed during the morning aerial survey was present the previous day. Whooping Cranes were believed to be present in the study area 13 (39%) of the 33 days of the survey. We documented the presence of 2 Whooping Crane groups that contained 4 individuals. Totals do not include the radioed group that was undetected. A total of 29 crane-use days by 4 individuals was recorded (Table 7).

Table 7. Whooping Crane dates of occurrence and crane-use days.

Crane Group	Number of Cranes (ad:juv)	Dates of Occurrence	# of days present	Crane-Use Days
2012FA01	1:0	October 10-11	2	2
2012FA02-09	2:1	Oct 29 – Nov 6	9	27
2012FA10*	5:1	November 8-9	2	12
TOTAL**	3:1		11	29

*This radioed group was detected by GPS only and group composition was based on a report from the public south of the study area on November 9.

**Total does not include undetected radioed group.

LAND-COVER CLASS-

Wetted Channel and Ag-Corn were the cover-types used by Whooping Cranes during the day. All nocturnal roost locations were in Wetted Channel. There were 26 locations documented; 31% of the locations were in corn and 69% in wetted channel (Table 6).

Land cover class usage across the 12 fall migration seasons monitored from 2001 to 2012 resulted in 261 observations with 62% in wetted channel, 30% of observations in corn, 5% in soybeans, 1% in emergents, 1% in other land cover types, 1% in alfalfa, and less than 1% in upland grasses.

ACTIVITY-

About 80.5 hours of continuous and instantaneous use (time budget) data of Whooping Cranes was collected by ground personnel during 9 days of observation. Ninety-one percent (76.25 hrs) of the observations were in Wetted Channel and 9% (4.25 hrs) were in Ag-Corn. Adult plumaged cranes were the focus of observations in the family group. “Alert” was the most frequent activity observed in Ag-Corn while “feeding” was most frequent in Wetted Channel. (Table 8).

Table 8. Whooping Crane activity by habitat.

Habitat	Activity	# of Points	Total Points	Percent
Wetted Channel	Alert	37	258	14
Wetted Channel	Courtship	1	258	<1
Wetted Channel	Defensive	2	258	1
Wetted Channel	Feeding	155	258	60
Wetted Channel	NA	9	258	3
Wetted Channel	Preening	28	258	11
Wetted Channel	Resting	26	258	10
Ag - Corn	Alert	11	27	41
Ag - Corn	Feeding	10	27	37
Ag - Corn	NA	6	27	22

Search Effort.--

A ground search was initiated on 1 occasion at the request of the manager. A total of 1.2 hours was expended in this effort and 25 miles were driven. The Whooping Crane group (2012FA01) was found.

Program ID and U.S. Fish & Wildlife Service ID Comparisons.--

Table 9 compares the Program numbering system with the USFWS database (Martha Tacha, personal communication). Three groups of Whooping Cranes were present in the study area during the survey.

Table 9. Comparison of Program Crane ID and USFWS Crane ID.

Program Crane ID (Prefix 2012FA)	Program Name	USFWS Crane ID	Dates of Occurrence	# of cranes
01	Wild Rose Single	12B-04	10/10-11	1:0
02-09	Rowe radioed family	12B-14	10/29-11/6	2:1
10	J-2 radioed group	NA*	11/9	5:1

* Radioed cranes not reported by the public are not assigned a USFWS ID number and are denoted as NA.

Summary of Confirmed Sightings in the U.S.--

The number of confirmed Whooping Crane sightings in Nebraska was 11 including those contained herein (Martha Tacha, personal communication). As of 3 December 2012, there were 64 confirmed sightings in the United States as follows: North Dakota- 17; South Dakota- 9; Nebraska- 11; Kansas- 20; Oklahoma- 4; Colorado-1; and Texas- 2.

Radio-marked Whooping Cranes and Platte River Use.—

About 30 GPS radios attached to Whooping Cranes were active prior to the 2012 fall migration. AIM personnel detected a 2:1 family group that included a radio-marked juvenile (L: radio/white/green; R: gray/white) on October 30 and monitored it until it migrated on November 6. AIM personnel, however, did not detect a radio-marked Whooping Crane that was known to be on the river near the J-2 return on November 9. The aerial survey was cancelled on that date due to fog.

Modeling of the historical time-series of Whooping Crane abundances predicted 272 (95% CI = 253–298) individuals for winter 2011–2012 and 273 (95% CI = 250–301) for winter 2012–2013 (<http://www.fws.gov/nwrs/threecolumn.aspx?id=2147512080>). This estimate is calculated from survey results from Whooping Crane abundance surveys involving new survey methodology and is not directly comparable to past population estimates. Table 10 depicts the percent of the population stopping on the Platte River. Note that the radioed groups not detected by AIM personnel were not included in this estimate.

Table 10. A comparison of the Whooping Crane population change and the percent of that population stopping on the Platte River.

Year	SPRING				FALL			
	WC Pop January 2012	# Platte	Crane-Use Days	% Using Platte	WC Pop January 2013	# Platte	Crane-Use Days	% Using Platte
2012	272	1	9	0.4	273	4	41	1.5

Incidental Take.—

The USFWS requested 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-

AIM’s monitoring effort did not result in any crippling or lethal take of Whooping Cranes this season.

HARASSMENT-

AIM and Program personnel did not observe or engage in any activity that could be construed as “harassment” as defined by USFWS. During the systematic aerial survey on October 31, the airplane approached to about 1500’ of three Whooping Cranes in the river when they, along with 16 American White Pelicans departed and flew downstream. All were alert prior to their departure and it is unknown if they responded to disturbance from coyotes, humans, or another source. Two vehicles were parked 230 yards NW of the cranes and there were people in viewing blinds on both sides of the river. They landed back in the river 850 yards downstream. It was not determined what prompted the birds to fly.

PUBLIC DISTURBANCE-

AIM personnel observed one instance of potential public disturbance of Whooping Cranes this season. At 6:32 PM on October 30, a vehicle approached the Whooping Cranes in a cornfield, causing them to fly. They flew west along the river eventually out of sight.

Discussion

Local movements of the radioed family at Rowe Sanctuary were surprising. The first four nights they roosted on Rowe Sanctuary (Use Sites 2 and 3) and spent the entire day in the same vicinity (Figure 2). The next four nights they flew about 3.5 miles west to roost (Use Site 4) yet their diurnal use area did not change. The unobstructed width at Use Site 4 was about $\frac{1}{2}$ that of Use Sites 2 and 3 (Table 5) yet they selected this narrower location over what most biologists would consider more “optimum” conditions prevalent at Rowe Sanctuary. We have no explanation for this shift in roost location. A similar occurrence in spring 2011 was documented and involved a group of 6 Whooping Cranes leaving Rowe Sanctuary and selecting a palustrine wetland 25 mi west of Rowe.

Supplements

Data entry into Sharepoint was done by AIM and subsequent QAQC was done by AIM/WEST. Complete QAQC has not been completed pending uploading of transect information.

Original Data Sheets

CD containing an electronic copy of the final report and photographs.

Figure 1. Whooping Crane Use Site 1 located about 1 mile east of the Alda bridge in Hall County. Crane Group 2012FA01 used this site.



Figure 2. Whooping Crane Use Sites 2-4 near the Minden bridge in Buffalo County. Crane Groups 2012FA02-09 (USFWS 12B-14) used these sites. Yellow dots indicate diurnal use area in corn and blue bars indicate the reach of river used by the cranes during the day (lower figure).

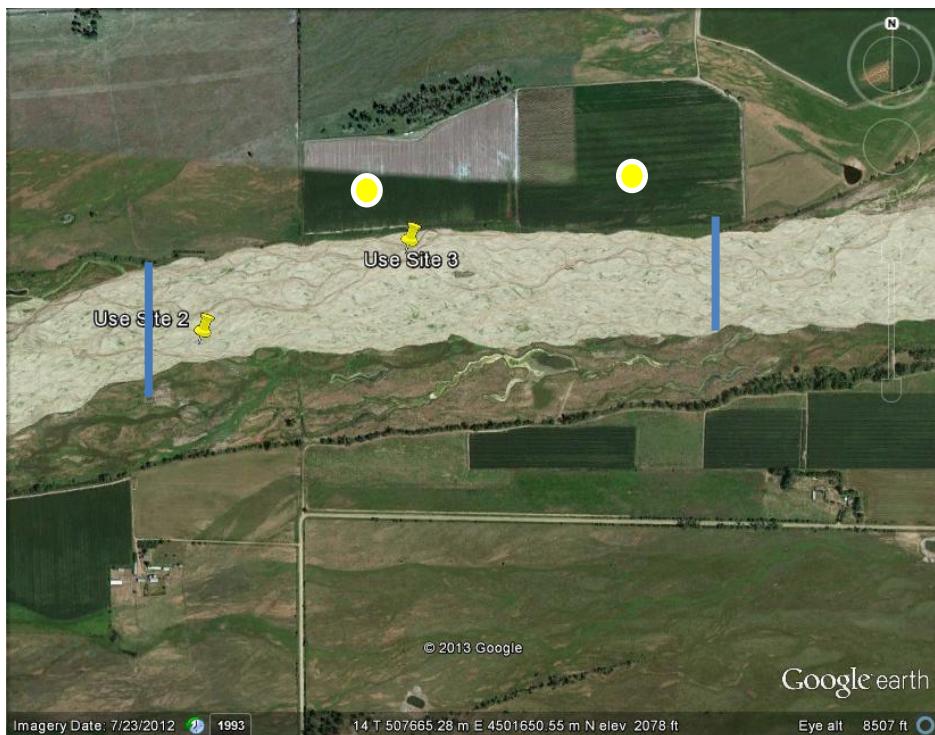


Figure 3. Whooping Crane Use Site 5 near the J-2 return in Gosper County based on GPS location. Radioed Crane Group 2012FA10 used this site.



Figure 4. Platte River discharge (cfs) and gage height at Grand Island.

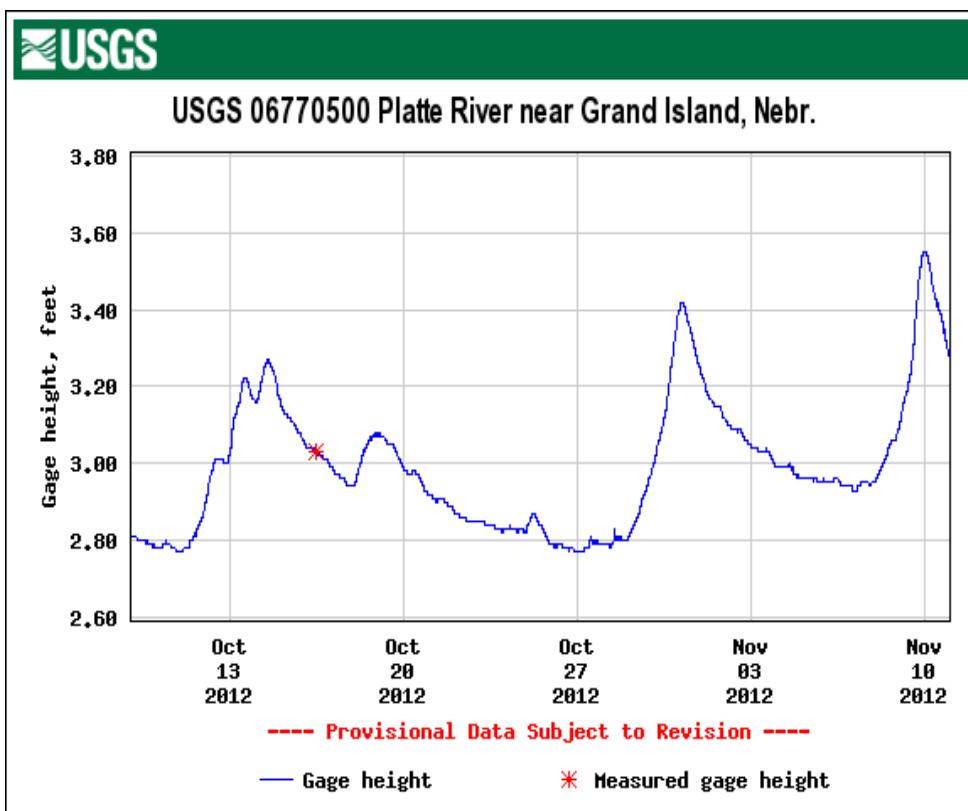
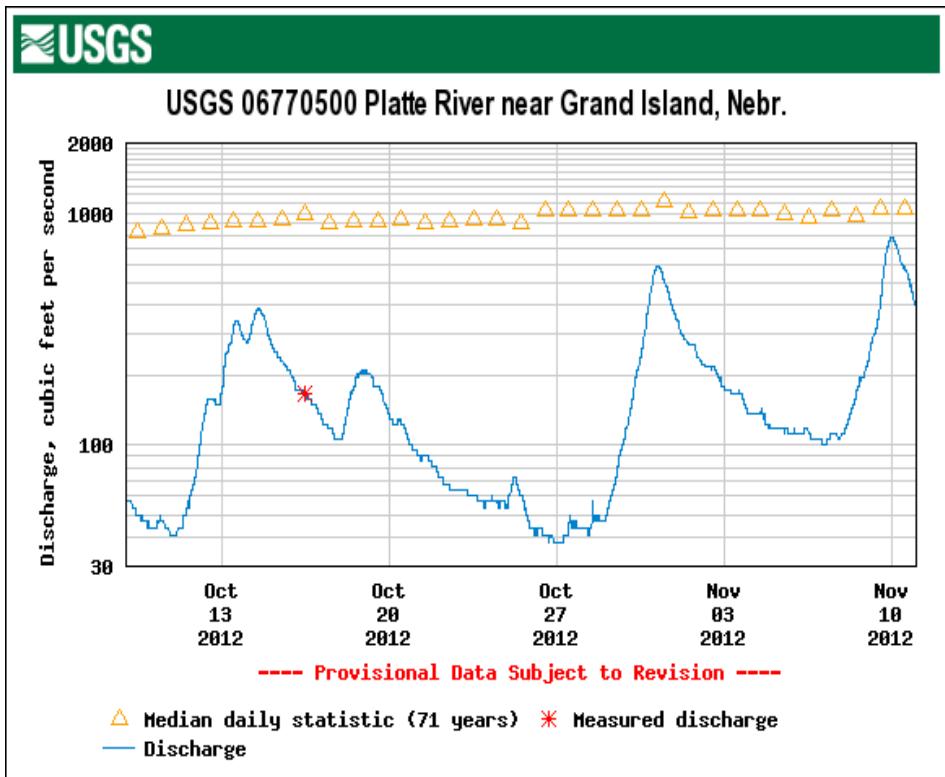


Figure 5. Platte River discharge (cfs) at Kearney.

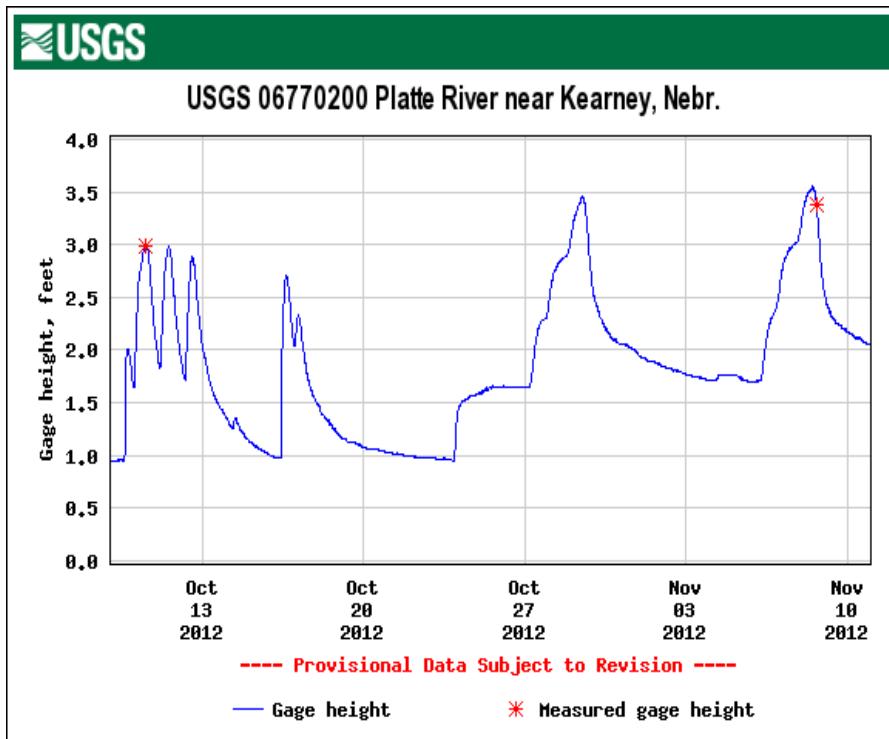
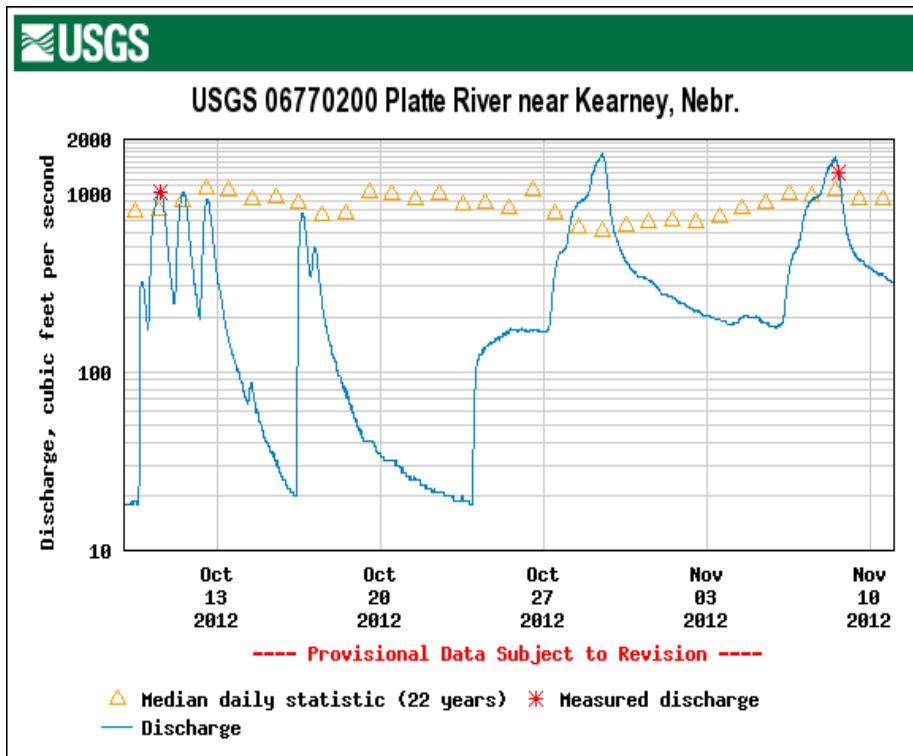


Figure 6. Platte River discharge (cfs) at Overton.

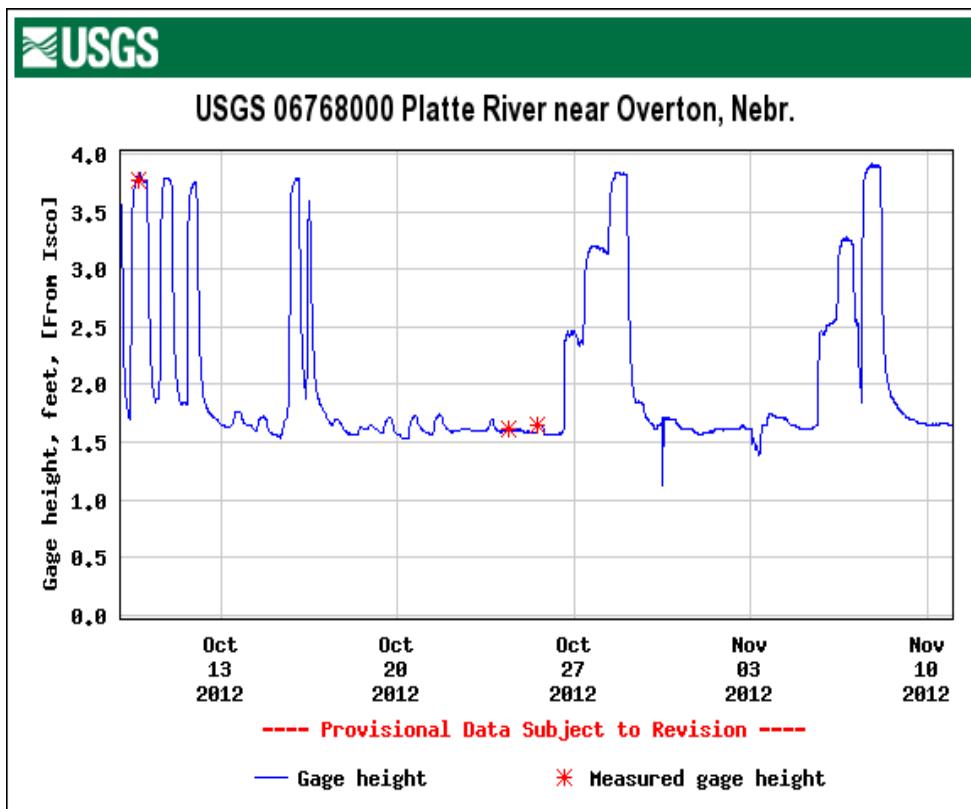
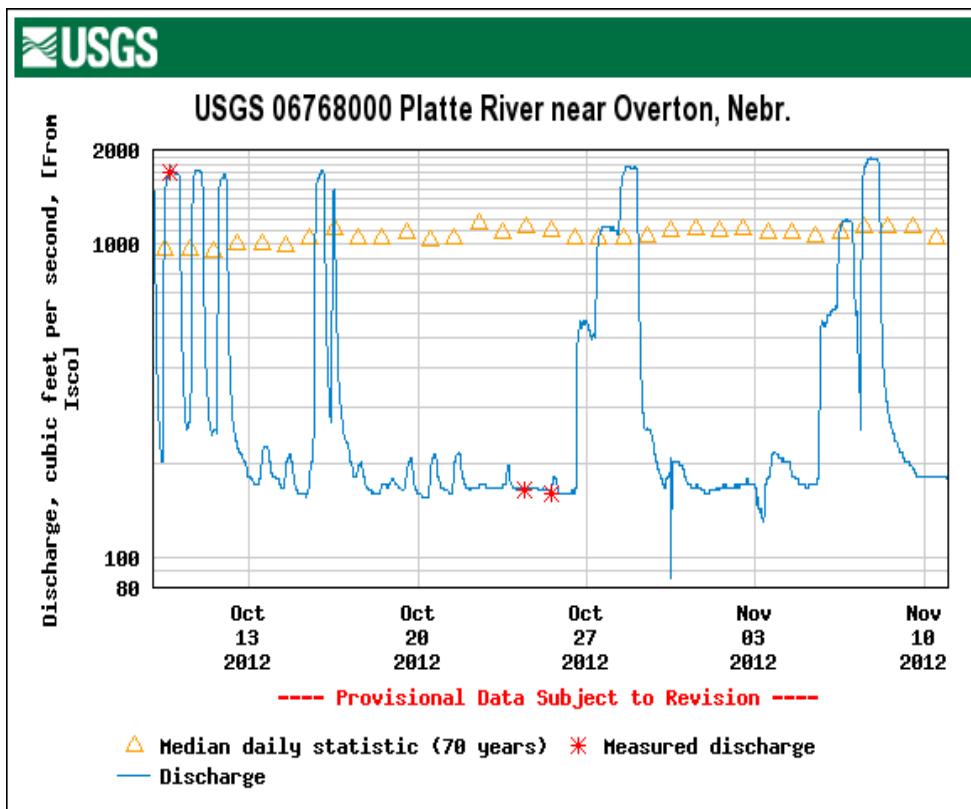


Figure 7. Whooping Crane Use Site 1 about 1 mile east of the Alda bridge (Sec 5 T9 R10 Hall County). Crane Group 2012FA01.

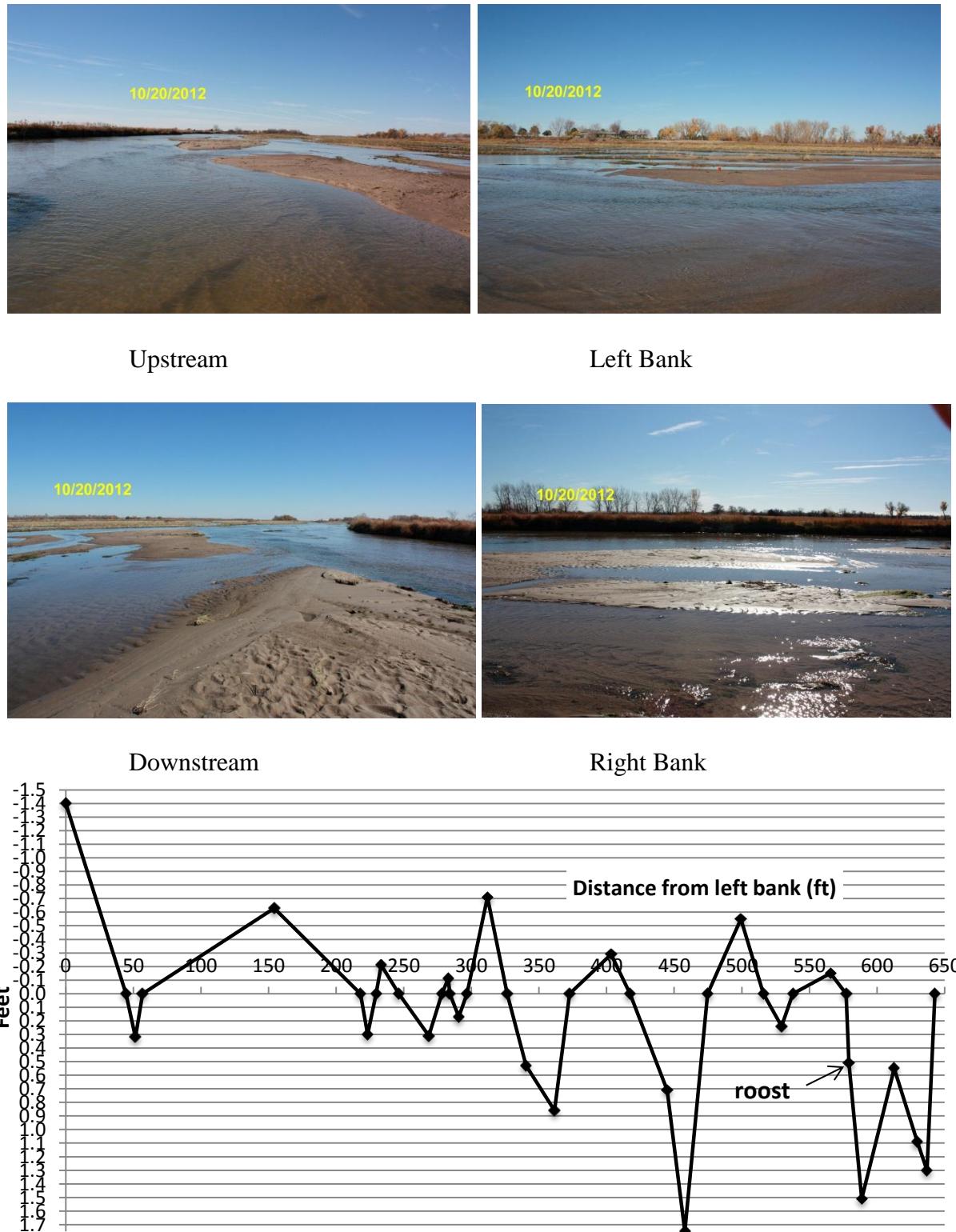


Figure 8. Whooping Crane Use Site 2 about 1.8 miles east of the Minden bridge (Sec 17 T8 R14 Buffalo County). Crane Group 2012FA02-04.

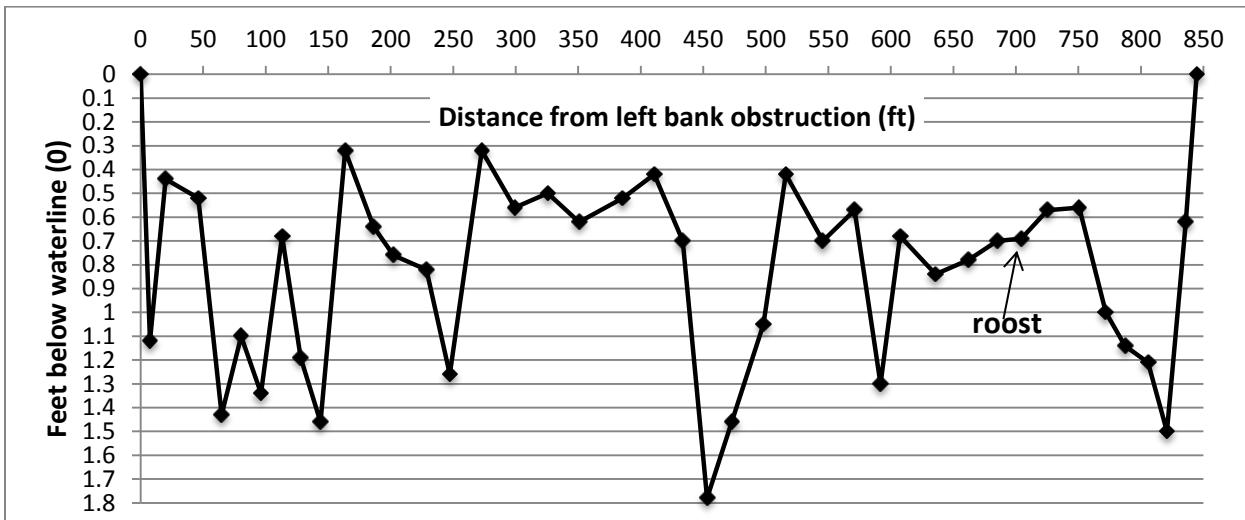


Figure 9. Whooping Crane Use Site 3 about 2.2 miles east of the Minden bridge (Sec 16 T8 R14 Buffalo County). Crane Group 2012FA05.

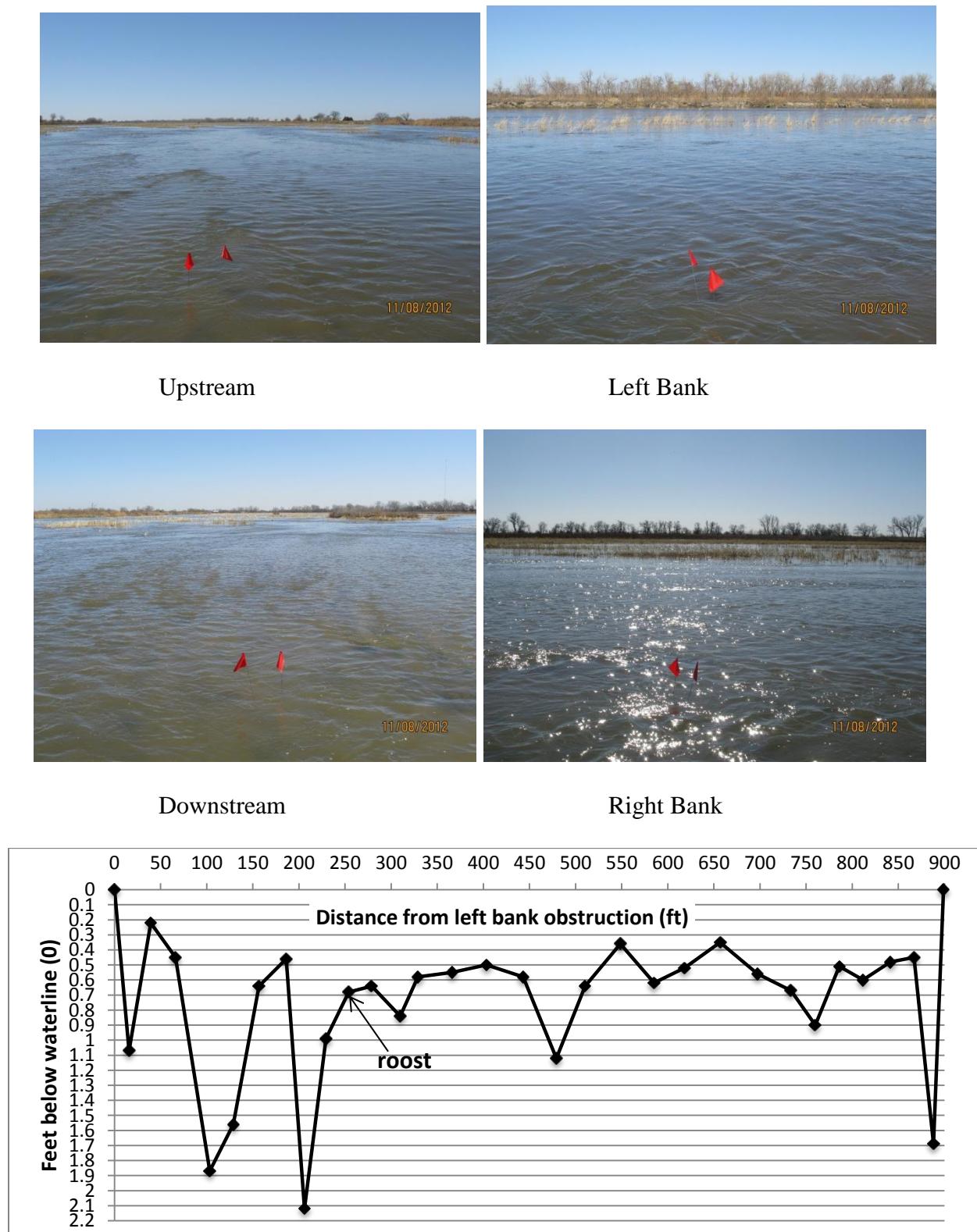


Figure 10. Whooping Crane Use Site 4 about 1.25 miles west of the Minden bridge (Sec 14 T8 R15 Buffalo County). Crane Group 2012FA06-09.



Upstream

Left Bank



Downstream

Right Bank

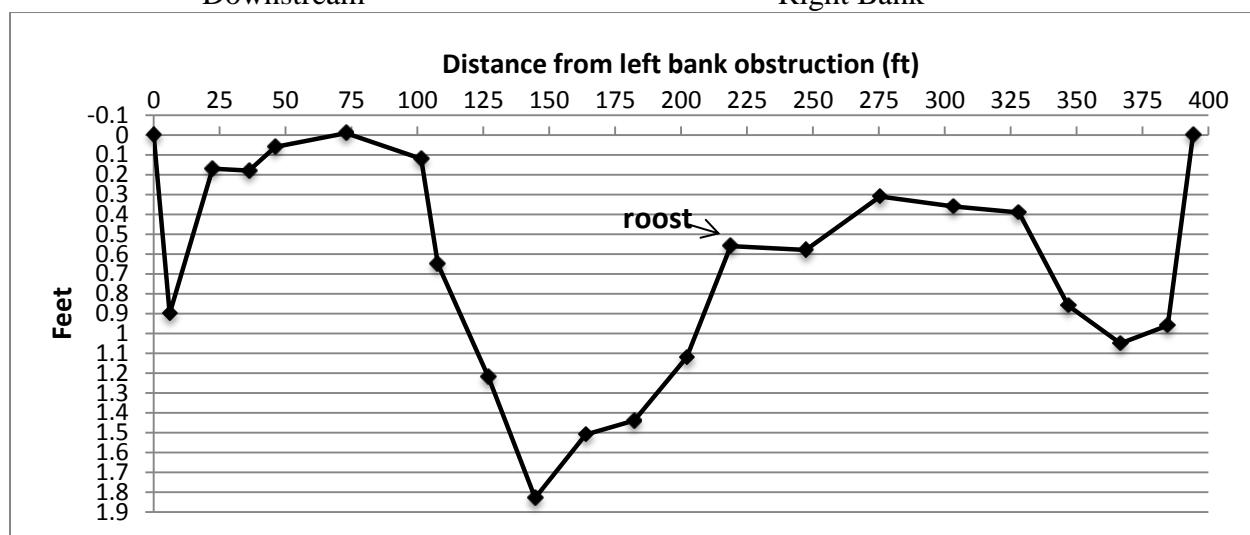


Figure 11. Whooping Crane Use Site 5 about 7 miles west of the Overton bridge (Sec 2 T8 R21 Gosper County). Crane Group 2012FA10.

