Spring 2002 Whooping Crane Migration Monitoring Protocol Implementation Report

Final Report Prepared by

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Final Report Prepared by AIM Environmental Consulting

For Committee's of the Platte River Cooperative Agreement

22 July 2002

Assessment Impact Monitoring Environmental Consulting (AIM) was awarded a contract to assist the Governance Committee and Technical Committee in implementing the *1997 Cooperative Agreement for Platte River Research and Other Efforts Relating to Endangered Species Habitats Along the Central Platte River, Nebraska* (Cooperative Agreement). Our specific task was to implement the protocol developed by the Technical Committee entitled *Monitoring Whooping Crane Migrational Habitat Use in the Central Platte River Valley* (Appendix A in Draft Report dated 29 May 2002). The contract specified the implementation of the draft protocol dated 20 December 2001 along with guidelines presented in the Request for Proposal dated 28 January 2002. We present the results of this study pursuant to the Work Order Agreement dated 4 March 2002.

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. We hired and trained eleven technicians and conducted field work from 21 March through 29 April 2002. Personnel from the Executive Director's Office (EDO) and the U.S. Fish & Wildlife Service office in Grand Island assisted with the training. A set of six data sheets were provided by the EDO (Appendix B in Draft Report dated 29 May 2002) and all data were entered into a Microsoft Access 2000 database set up by the EDO as well.

Two air services were contracted and aerial surveys were conducted near sunrise from 21 March through 29 April 2002 as weather permitted. Censuses were initiated no earlier than 30 minutes before sunrise and typically were completed within 2 hours. 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 (Appendix B in Draft Report dated 29 May 2002).

The study area was divided into two legs. The East Crew surveyed the reach between Chapman and the Highway 10 (Minden) Bridge and the West Crew surveyed from Highway 10

to Highway 283. Each census began on the main channel of the river with both observers looking out the passenger side of the aircraft. When the river transect was completed, one of 7 possible return routes located along the centerline of the main channel and 1, 2, and 3 miles north and south of the river respectively was flown (Appendix C in Draft Report dated 29 May 2002) with observers looking out opposite sides of the aircraft. Flight direction was alternated between east and west with the return transect always flown in the opposite direction. We began flights at the east end of the leg on even days which deviated slightly from the protocol. This was done for safety reasons in order to avoid having the two planes converging on one another near the Minden bridge. If a flight was cancelled, we would go forward with the same return route the next day or until it was complete. The westbound portion of the river transect was flown on the south side of the channel while the eastbound portion flew on the north side. The river transect was flown at 750 feet elevation and the return leg was flown at 1000 feet at a speed of 100 mph.

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. In the event of a whooping crane sighting by the air crew, two ground persons nearest the sighting were contacted and immediately dispatched to the location. Each air crew had a set of aerial photos of the river (Appendix C in Draft Report dated 29 May 2002). The photos were inserted in polypropylene sheet protectors that enabled the observer to accurately mark the roost location on the photo with a grease pencil for later reference. In addition, a GPS reading of the roost location was taken by air crew.

Once a Whooping Crane was located on the ground, habitat use and activity monitoring commenced. These observations were continuous until the bird was either lost or went to roost. Each Whooping Crane sighting was assigned a unique number and later compared with the U.S. Fish and Wildlife Service's sighting records in Grand Island. USFW's definition of a sighting (p. 3-3, Draft Baseline Report 5/30/2001) is:

"…the observation of a single whooping crane or a group of whooping cranes that are migrating together through the area. Confirmed sightings in the same general area (within a reasonable distance of daily crane activities) along the Platte and within one to several days of another sighting is assumed to be the same bird/bird group, unless: 1) the number of birds differs, 2) the bird(s) constitute a bird/bird group in addition to those already known to be in the general area, or 3) the original birds were observed to migrate from the valley or are known to have moved to a different area of the valley. This assumption is necessary because individual cranes cannot be distinguished; very few birds are marked, and continuous surveillance of a crane or crane group using the study area is not possible."

Comment [dc1]: confirm with Wally

Efforts were made to photograph Whooping Crane roost sites from the air. Digital cameras were provided for each aircraft. Channel profiles were measured at riverine roost sites using surveying equipment borrowed from Nebraska Public Power District and the Central Platte Natural Resources District. Stream flow data was provided by the U.S. Geological Survey at 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. Whooping Crane movements, behavior, and diurnal habitat use was recorded when possible. All monitoring activities followed U.S. Fish & Wildlife Service guidelines. Wally Jobman, the Whooping

Crane Migration Coordinator for the U.S. Fish and Wildlife Service, kept our team appraised of the latest sighting reports and census results from the wintering grounds on a regular basis. Landowner permission was obtained prior to accessing any site. All original datasheets and photographs were submitted under a separate cover as a Supplement to this report.

Whooping Crane decoys were placed at 15 randomly selected locations provided by the EDO (Table 1) for the purposes of determining survey detection rates. One location was in a cornfield adjacent to the river and the others were in the river channel. The air crew did not know when or where the decoys were placed. Observations of Whooping Crane decoys were recorded by the air crew and reported to the ground crew. Sandhill Crane use of Program Lands (i.e. Cottonwood Ranch) was documented during the aerial surveys as well.

The EDO established a toll-free 800 telephone number for the public to report Whooping Crane sightings. This number was transferred to a residential telephone equipped with an answering machine since the telephone company would no longer connect it to a cellular phone. It became operable on March 29. Flyers were distributed to prominent bird-watching centers notifying the public of this number (Appendix B in Draft Report dated 29 May 2002).

Results

Aerial Survey.--

CONFIRMED WHOOPING CRANE SIGHTINGS-

Of a possible 40 morning flights, the West Crew flew 22 (55%) missions while the East Crew flew 32 (80%). Fog, low ceiling, precipitation, runway construction, and high winds were factors in cancellations. We recorded 13 sightings of a single Whooping Crane on the river transect (Table 6) (p. 1-6 in photo Supplement). Only two Whooping Crane sightings occurred from the air other than those mentioned above; one on the river 1 mile south on a return transect (1SE) (March 26) and one incidental sighting on the river (March 21). Both sightings were of the same crane while it was still on the river channel. Nine of the 13 (69%) sightings were made flying east to west. Only 1 of 4 (25%) of the days when the crane was not observed yet believed to be in the area was flown east to west. Poorer visibility when flying west to east due to backlighting problems may explain this. A single Whooping Crane was believed to be in the area for 26 days (March 19-April 13) (Wally Jobman, personal communication). We flew on 18 mornings within that time frame. This results in a sighting frequency of 72% assuming a bird was present during each of those flights.

INDEX OF USE-

We completed 104 aerial survey transects out of a possible 160 (65%). Three additional transects were aborted due to weather or mechanical problems. Fourteen Whooping Crane sightings were made on these transects. This results in an index of use of 0.13 sightings per transect. (Frequency of occurrence would be a more accurate term than index of use.)

OTHER WHITE OBJECT SIGHTINGS-

We conducted several on-ground follow-ups of reports by the air crew and confirmed the presence of partial albino Sandhill Cranes and a Whooping Crane decoy but no Whooping Cranes (p.8-9 in photo Supplement).

SANDHILL CRANE USE OF PROJECT LANDS-

Large-scale wetland restoration occurred at NPPD's Cottonwood Ranch last fall (p. 7 in photo Supplement). We searched this entire area during morning flights for both Whooping Cranes and Sandhill Cranes. We did not detect any Sandhill Crane use of project lands on either the river or the wet meadows although cranes were observed flying above the site. Sandhill Cranes did roost on Cottonwood Ranch but departed from the roost prior to the arrival of our aerial survey crew (Jim Jenniges, personal communication). No Whooping Cranes were observed. Sandhill Cranes, Double-crested Cormorants, White Pelicans, and a variety of waterfowl, waders, and shorebirds were observed on the restored wetland area by our ground crew.

Searcher Efficiency Trials.—

A single Whooping Crane decoy was placed at 15 locations between April 5-24 (Table 1). The air crews recorded a decoy/decoys on 6 mornings at 11 locations for an overall detectability rate of 73% (p. 8-9 in photo Supplement). When segregated by strata, the "0-3.5" strata had a 60% detectability rate while the "0" strata had an 80% rate on the river transect (Table 1). No decoys were observed on any of the return transects.

Table 1. Random locations of decoys for detectability trials. Only river transect results are shown.

Decoy ID	Strata	Utmx	Utmy	Habitat	Date Placed	Detected ?
2002SPD01	0-3.5	551377	4516828	Wetted channel	04/19/2002	N
2002SPD02	0-3.5	545772	4514729	Wetted channel	04/19/2002	Y
2002SPD03	0-3.5	534716	4510325	Agriculture corn	04/18/2002	N
2002SPD04	0-3.5	448439	4504875	Wooded river within floodplain	04/09/2002	Y
2002SPD05	0-3.5	544931	4514720	Wetted channel	04/18/2002	Y
2002SPD06	0	447330	4504826	Wetted channel	04/06/2002	N
2002SPD07	0	440582	4507418	Wetted channel	04/06/2002	Y
2002SPD08	0	548772	4515183	Wetted channel	04/19/2002	N
2002SPD09	0	509559	4502261	Wetted channel	04/09/2002	Y
2002SPD10	0	469059	4503700	Wetted channel	04/06/2002	Y
2002SPD11	0	507243	4501855	Wetted channel	04/05/2002	Y
2002SPD12	0	445496	4504984	Wetted channel	04/09/2002	Y
2002SPD13	0	495802	4500671	Wetted channel	04/05/2002	Y
2002SPD14	0	496855	4501066	Wetted channel	04/05/2002	Y
2002SPD15	0	511360	4503012	Wetted channel	04/24/2002	Y

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

ROOST SITES-

We collected riverine roost channel profile data at 9 of 11 locations (Figures 1-9). Note that these profiles do not precisely reflect the conditions when the crane was present due to the alluvial nature of the streambed. A total of 1329 stations (3 readings at each station) were surveyed. Of these, 68 were removed due to errors and 1261 stations were used in the database. We were denied access to collect roost profile data for two of the roost sites located on a single landowners property. All roost locations were documented by our air crew. Photographs depicting the habitat used were taken at each roost site (p.10-27 in photo Supplement). We deviated from the U.S. Fish & Wildlife Service guidelines in that we collected river profile data prior to the migration of the Whooping Crane from the area. Upon consultation, approval was granted by the U.S. Fish & Wildlife Service after they determined that our activities would not likely create any potential disturbance to the bird if it was done during mid-day.

FLOW-

Streamflow measured at the USGS gauging stations located near Overton, Kearney, and Grand Island (Figures 10 & 11) was well below the median streamflow at each of these sites throughout the study period. Note all flow data are provisional and subject to revision. Table 2 depicts the min/max mean values for daily and unit (hourly) flows at each location during this study.

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

	Overton	**Kearney**	**Grand Island**
Min Mean Daily	157	121	358
Date	4/26	4/26	4/25,26
Max Mean Daily	1590	1640	1790
Date	4/2	3/21	3/21
Min Unit (Hourly)	153	112	337
Date	4/26	4/26	4/26
Max Unit (Hourly)	1992	1884	2008
Date	4/10	4/10	4/12
Max Daily Range	1528	1243	889
Date	4/10	4/11	4/12

The greatest range in flow during a 24-hour period was 1528 cfs on April 10 (Table 2) when it went from 1992 cfs to 464 cfs at the Overton gauge, a 77% drop in discharge. The streamflow when a Whooping Crane was observed on the river and when roost channel profiles were measured are shown in Table 3.

Table 3. Hourly flow relationships during Whooping Crane use and channel profile measurements.

	Use	Use	Measured	Measured	Kearney Discharge (cfs)		GI Discharge (cfs)	
Location ID	Date	Time	Date	Time	Use	Measured	Use	Measured
21R	21-Mar	8:12	17-Apr	11:19	1650	461	1780	751
23R	23-Mar	6:45	25-Apr	11:07	672	164	1700	361
24R	24-Mar	6:35	28-Apr	14:35	645	225	1230	375
26R	26-Mar	6:35	17-Apr	10:35	959	473	1080	702
27R	27-Mar	6:42	22-Apr	13:00	1280	369	1230	442
28R	28-Mar	6:35	28-Apr	9:30	1200	220	1490	375
30R	30-Mar	6:25	18-Apr	13:35	581	460	1100	532
1R	01-Apr	6:39	12-Apr	14:08	473	645	960	1548
3R	03-Apr	6:34	-	-	1420	-	797	-
4R	04-Apr	6:25	-	-	1520	-	1250	-
6R	06-Apr	~7:10	-	-	1624	-	1178	-
11R	11-Apr	~7:05	-	-	1415	-	1178	-
13R	13-Apr	~7:10	29-Apr	10:15	1140	250	989	375

DISTANCE TO VISUAL OBSTRUCTION, SUBSTRATE, AND WATER DEPTH-

Visual obstruction from Whooping Crane roost sites are given in Table 4 (p.10-27 in photo Supplement). Substrate was characterized as primarily fine to coarse sand. The average water depth at the roost location was 0.015 ± 0.132 m. The negative depth values reflect lower flows at the time measurements were taken thereby exposing sites that were inundated when the crane was present (Table 3).

Table 4. Visual obstruction distance (m), substrate, and depth (m) at nine Whooping Crane Roost sites.

Location ID	UTM X	UTM Y	VO Upstream Distance	VO Right Distance	VO Downstream Distance	VO Left Distance	Fine Sand %	Coarse Sand %	Small Gravel %	Large Gravel %	Depth at Roost Site (m)
21R	531419	4509433	246	127	240	62	5	80	5	10	0.014
23R	533915	4510592	172	60	212	202	95	5			-0.301
27R	539957	4511709	70	235	60	119	70	20	10		0.019
26R	530363	4508640	390	41	209	266	90	5	5	0	0.125
30R	531259	4509254	550	97	700	300	40	45	10	5	-0.084
1R	530763	4508949	500	154	574	193	100				0.103
28R	529120	4508266	182	125	389	222	95	5			0.023
24R	529679	4508433	232	169	294	89	100				0.071
13R	516473	4504945	140	73	242	66	25	25	50		-0.103

WETTED, BANK TO BANK, AND UNOBSTRUCTED WIDTH-

Table 5 depicts various channel characteristics at roost locations. The --- indicates a visual obstruction >1.5m that occurred on a sandbar. Therefore bank width was not calculated.

Table 5. Physical characteristics of the roost channel (units in m).

Profile ID	Location ID	Unobstr Width	Bank Width	Wetted Width
9	21R	271	271	182
12	23R	262	261	263
15	27R	419	396	107
18	26R	371	---	234
21	30R	399	---	215
24	1R	339	319	278
27	28R	305	305	192
30	24R	264	264	229
33	13R	137	---	38

DIURNAL USE SITES-

Diurnal movements and activity data was collected when possible (Figures 12-14) (p. 28 in Supplement dated 29 May 2002). We followed a single unbanded, adult-plumaged Whooping Crane on 7 days (Table 6). Surface water was not present at any of the off-river use sites. The first confirmed sighting of the season occurred on March 19 southeast of Denman (Wally Jobman, personal communication). We coded this individual 2001SP-01. Our last visual contact of a Whooping Crane (2002SP-15) was on April 13.

Table 6. UTM coordinates of Whooping Crane sightings.

Use Date	Crane Group ID	Location ID	UTMx	UTMy	Air/Ground	Habitat
03/21/2002	2002SP-01	21R	531419	4509433	Air	Wetted Channel
03/21/2002	2002SP-01	21R	531419	4509433	Air	Wetted Channel
03/23/2002	2002SP-02	23R	533915	4510592	Air	Wetted Channel
03/23/2002	2002SP-02	23-02	535763	4505733	Ground	Ag-Corn
03/23/2002	2002SP-02	23-03	534248	4504555	Ground	Ag-Corn
03/23/2002	2002SP-02	23-04	530672	4508505	Ground	Ag-Corn
03/23/2002	2002SP-02	23-01	531221	4508760	Ground	Ag-Corn
03/24/2002	2002SP-03	24R	529679	4508433	Air	Wetted Channel
03/24/2002	2002SP-03	24-01	529395	4503315	Ground	Ag-Corn
03/24/2002	2002SP-03	24-02	529247	4503256	Ground	Ag-SoyBean
04/04/2002	2002SP-12	4R	532705	4510093	Air	Wetted Channel
03/24/2002	2002SP-03	24-01	529395	4503315	Ground	Ag-Corn

03/24/2002	2002SP-03	24-03	528438	4504415 Ground	Ag-SoyBean
03/24/2002	2002SP-03	24-04	529673	4504667 Ground	Lowland Grass
03/24/2002	2002SP-03	24-05	529475	4504771 Ground	Ag-Corn
03/24/2002	2002SP-03	24-06	528823	4504963 Ground	Ag-SoyBean
03/24/2002	2002SP-03	24-07	528735	4505156 Ground	Ag-Corn
03/24/2002	2002SP-03	24-06	528823	4504963 Ground	Ag-SoyBean
03/24/2002	2002SP-03	24-08	526749	4504222 Ground	Ag-Corn
03/24/2002	2002SP-03	24-09	525490	4504252 Ground	Ag-Corn
03/24/2002	2002SP-03	24-10	525105	4504163 Ground	Ag-Corn
03/26/2002	2002SP-04	26R	530363	4508640 Air	Wetted Channel
03/26/2002	2002SP-04	26R	530363	4508640 Air	Wetted Channel
03/27/2002	2002SP-05	27R	539957	4511709 Air	Wetted Channel
03/28/2002	2002SP-06	28R	529120	4508266 Air	Wetted Channel
03/28/2002	2002SP-06	28-01	527712	4503882 Ground	Ag-Corn
03/30/2002	2002SP-07	30R	531259	4509254 Air	Wetted Channel
03/30/2002	2002SP-07	30-01	527683	4501571 Ground	Ag-Corn
03/31/2002	2002SP-08	31-01	527668	4501200 Ground	Corn/Bean??
03/31/2002	2002SP-08	31-02	527668	4503111 Ground	Corn/Bean??
04/01/2002	2002SP-09	1R	530763	4508949 Air	Wetted Channel
04/01/2002	2002SP-09	01-02	533842	451431 Ground	Ag-Corn
04/01/2002	2002SP-09	01-03	532576	4512468 Ground	Hayed Meadow
04/01/2002	2002SP-09	01-04	532829	4512242 Ground	Ag-Corn
04/01/2002	2002SP-09	01-05	530160	4514114 Ground	Ag-Corn
04/01/2002	2002SP-09	1R	530763	4508949 Ground	Wetted Channel
04/02/2002	2002SP-10	02-01	533360	4511287 Ground	Ag-Corn
04/03/2002	2002SP-11	3R	532705	4510093 Air	Wetted Channel
04/06/2002	2002SP-13	6R		Air	Wetted Channel
04/11/2002	2002SP-14	11R		Air	Wetted Channel
04/13/2002	2002SP-15	13R	516473	4504945 Air	Wetted Channel

LAND-COVER CLASS-

Seventeen of the 34 (50%) use sites were in Ag-Corn, 9 (26%) in Wetted Channel, 4 (12%) in Ag-Soybean, 2 (6%) in Corn/Bean (undetermined), 1 (3%) each in Hayed Meadow and Lowland Grass. A total of 40.7 hours of diurnal habitat (Wetted Channel omitted) observations were made. Of these, 32.6 (80%) hours were in Ag-Corn, 5.0 (12%) in Hayed Meadow, 2.4 (6%) in Ag-Soybean, 0.6 (1%) in Corn/Bean, and 0.1 (<1%) in Lowland Grass. By comparing tilled versus non-tilled diurnal habitat use, 35.6 (87%) hours were in tilled habitats and 5.1 (13%) hours were in non-tilled habitats.

ACTIVITY-

A qualitative assessment of Whooping Crane activity revealed “Feeding” as the most frequently observed activity reported. Other activities reported were: Resting, Preening, Defensive, and Alert. The only activity not reported was Courtship.

Search Effort.--

Ground searches were initiated on 38 occasions over 23 days. A total of 83.3 hours was expended in this effort. Search duration extended from 10 minutes to 5.5 hours. Searches occurred primarily in the morning hours and were generally terminated when the object was found and/or the 2-hour period was reached. Prolonged searches occurred when the probability of a Whooping Crane occurring in the area was high e.g. a sighting occurred during the aerial survey or a reliable sighting report was received. The ground crew was unsuccessful in spotting the Whooping Crane as it departed from its riverine roost on 12 of the 13 mornings it was observed from the air.

Spring Migration Sighting Reports.—

The U.S. Fish & Wildlife Service classified all Program sightings (2002SP-1 to 15) as the same individual and numbered the sighting in the USFWS database as 2002A-1 (Wally Jobman, personal communication). Table 7 compares the Program numbering system with the USFWS database. We believe it migrated from the area on April 13 since it was not observed again.

Table 7. Comparison of Crane Group ID between the Program and USFWS during spring 2002.

Organization	ID #	Dates of Occurrence
USFWS Crane ID	02A-01	3/19 – 4/13
Program Crane ID	2002SP-01 thru -15	3/21,3/23,3/24,3/26-28,3/30-31,4/1-4,4/6,4/11,4/13 respectively

Appendix A shows the chronology of reports received by USFWS for 02A-01. There were 2 incidental sightings of this bird relayed to AIM; one by USFWS on March 25 and one by Whooper Watch on April 3. No ground search was conducted as a result of the March 25 sighting since it was received after the fact. An unsuccessful ground search occurred on April 3 as a follow-up of the Whooper Watch sighting report.

The number of confirmed Whooping Crane sightings in Nebraska beyond those contained herein was two (Wally Jobman, personal communication); one of 2 birds on the Middle Loup River near Arcadia, Valley County from April 4-8 and one of 4 birds on Bazile Creek near Niobrara, Knox County on April 22. Only one probable sighting was reported and that was on April 1 of 2 birds near the golf course at Imperial, Chase County. There were no migration reports from Kansas or Oklahoma and only one from Texas.

Toll-Free Number.--

Ten calls were placed to the toll-free 800 number during the period from March 29-April 29. None were by the public calling to report a Whooping Crane sighting. Rather, they were from project personnel calling to confirm that the number was operable. The cost was $6.49.

Recommendations

Our team members were directed by the Program Manager to critique methodologies, data sheets, etc. for the purposes of offering suggestions to the Technical Committee in order to facilitate an adaptive management approach to future protocol revisions. The following comments, observations, and suggestions are offered as a collective result of this year's effort.

Ground Crew

- Ground crew members felt they should be deployed to locate decoys on occasion to better prepare themselves for the real thing.
- Provide a letter of introduction and/or informational brochure to give to curious on-lookers or landowners.
- Provide a "crib" sheet with procedures and instructions to follow when a Whooping Crane is sighted.

Decoys

- Observer experience improved their confidence during decoy trials. They felt that decoy placement early in the season would best prepare them in developing a search image for detecting actual Whooping Cranes.

Aerial Census

- Flying east to west on the river transect provided the best visibility especially after sun up. By looking to the north, backlighting problems were reduced.
- The policy of flying from the **e**ast on **e**ven days worked well.
- Radio communications should be kept to a minimum.
- Air Midway would not fly when winds were >30 knots. Is this acceptable?
- Obtain pilot's telephone numbers and schedules for the air crew in case questions arise.

Roost Site Evaluations

- The survey crew found that they needed to place the transit partway across the channel in order to obtain reliable readings. If there are no sandbars or islands to place the tripod on, then instability of the tripod results and measurements are not accurate. This is a potential problem in some of the wider channels when flows are more normal.

Data Sheets

- Provide space for vital information on *every* sheet e.g. date, location, observer, time, etc.
- Add *Mileage* to the "Ground Monitoring Observations" form.
- Add *Flow* at nearest downstream and upstream gage on the "Aerial Survey Observations" form.
- Change "County" to "Legal Description" on the "…..Continuous Use Site Log".
- There are currently 2 data sheets with the same title, "…..Use Site Characteristics Form". In order to differentiate between them, we suggest one should be labeled "…..Use Site Characteristics Form Summary" and the other labeled "…..Use Site Characteristics Form Data Entry".
- Edit the "….Summary" form as follows:
    - Add *Use Date*.
    - Add spaces for flow for both the measurement date and the use date for the nearest upstream and downstream gauging stations.
    - Add *Time Start* and *Time End*.
    - Add *County*.
    - Change the diagram to *Upstream*, *North Bank*, *Downstream*, and *South Bank*.
- Edit the "…Data Entry" form as follows:
    - Add *Page __ of __* .
    - Add space for the other UTM coordinate.
    - Add *Use Date* and *Measurement Date*.

Database

- Incorporate or summarize activity information.
- Incorporate streamflow information from the Overton, Kearney, and Grand Island gauging stations.
- Include all white object sightings that the air crew relayed to the ground crew for inspection.

Spring 2002 Costs

The cost of field implementation of this project was about $51,200. The cost of report preparation and database revision was about $14,500 for an estimated total cost of **$65,700**.

Appendix

Appendix A. USFWS notes on single Whooping Crane #02A-01.

List of Appendices in Draft Report (29 May 2002)

Appendix A. Draft Monitoring Whooping Crane Migrational Habitat Use in the Central Platte Valley dated December 20, 2001

Appendix B. Set of Data Sheets, Maps, Sighting Report Flyer, Survey Transect Waypoints

Appendix C. Color-Infrared Aerial Photographs of Blocks and Survey Transects

Supplement Contents dated 29 May 2002

Photographs	28 pp.
Original Raw Data Sheets	197 pp.

Figure 1. Roost channel profile for site 21R. Arrow indicates roost location.

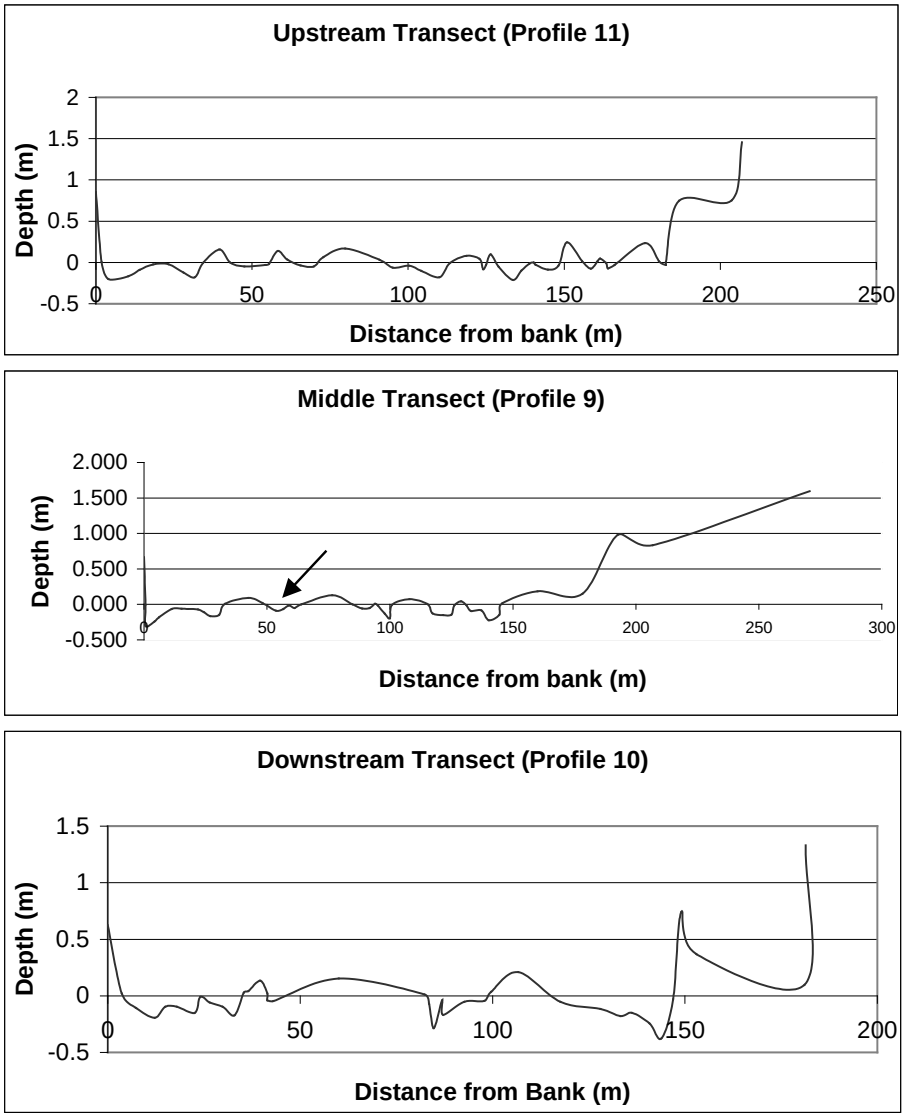

Figure 2. Roost channel profile for site 23R. Arrow indicates roost location.

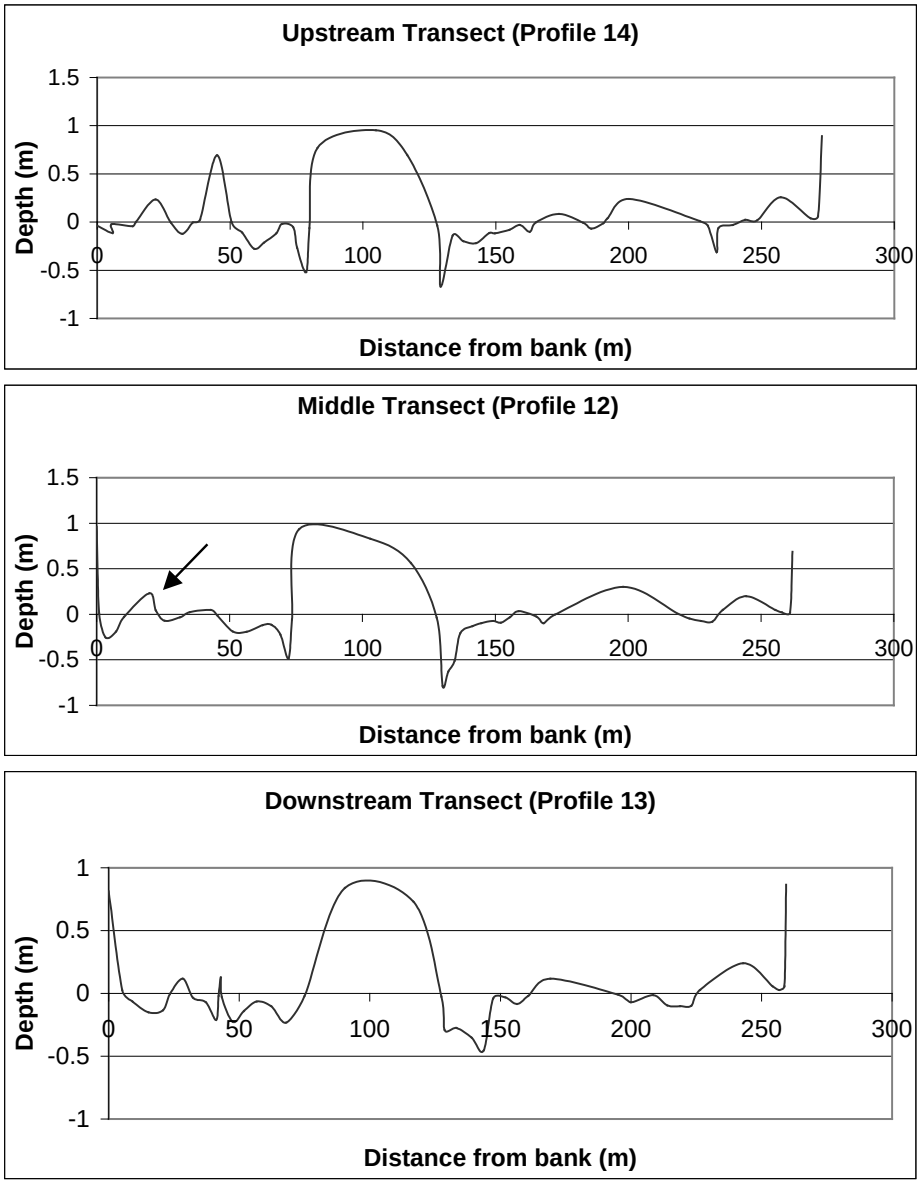

Figure 3. Roost channel profile for site 24R. Arrow indicates roost location.

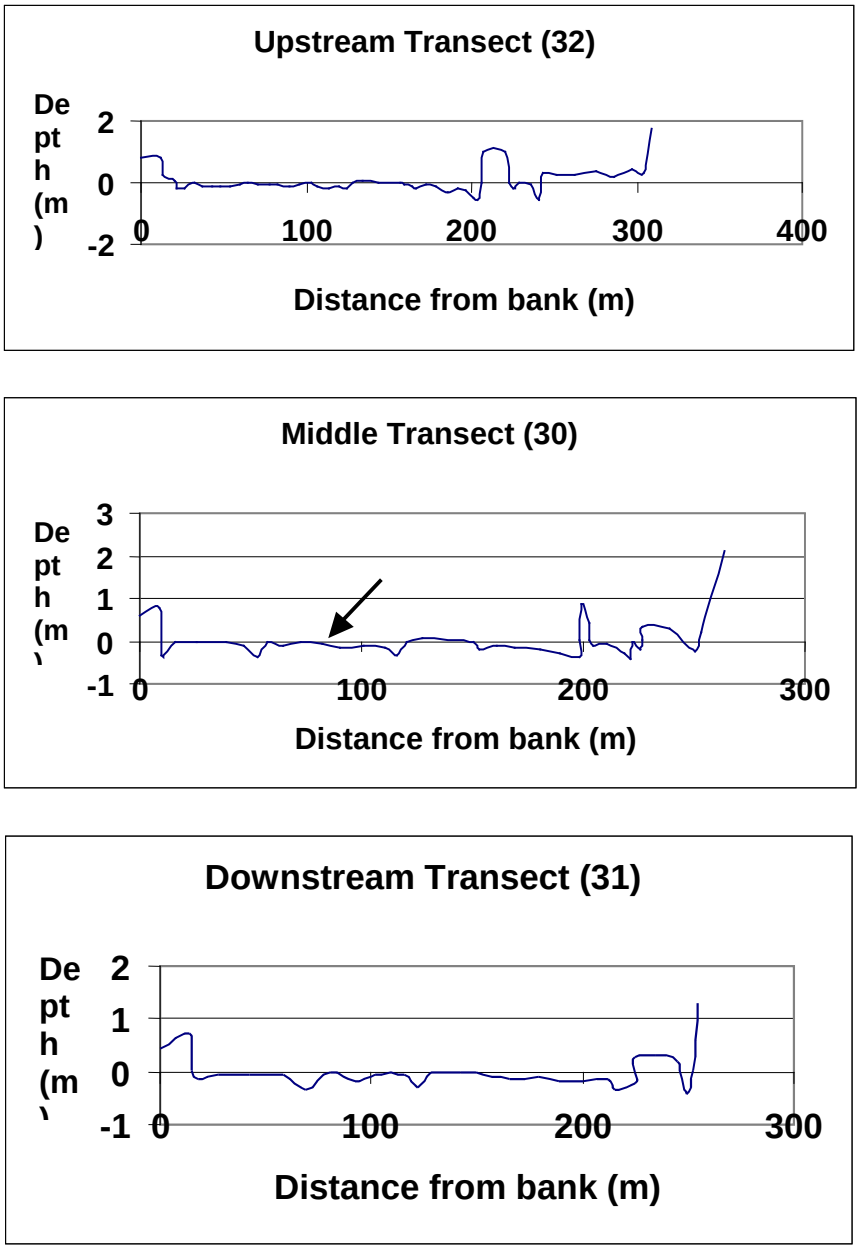

Figure 4. Roost channel profile for site 26R. Arrow indicates roost location.

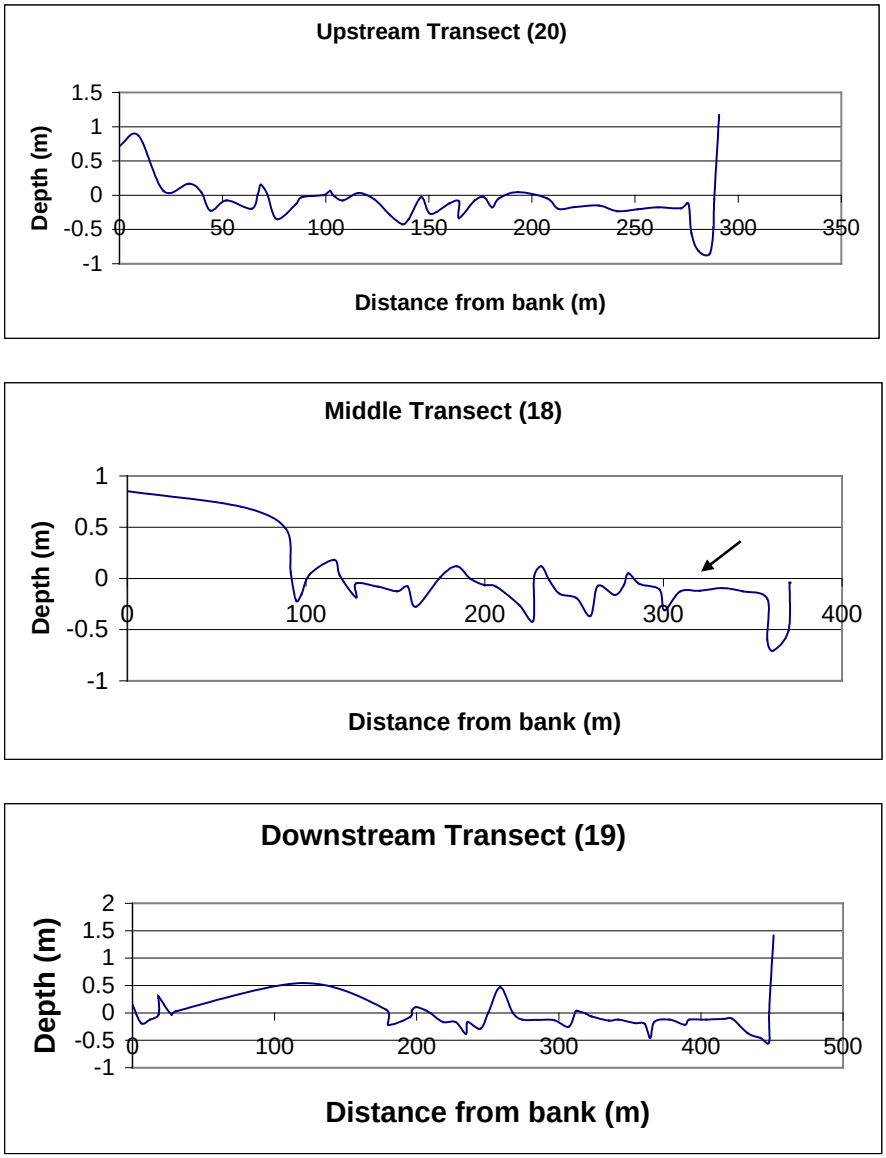

Figure 5. Roost channel profile for site 27R. Arrow indicates roost location.

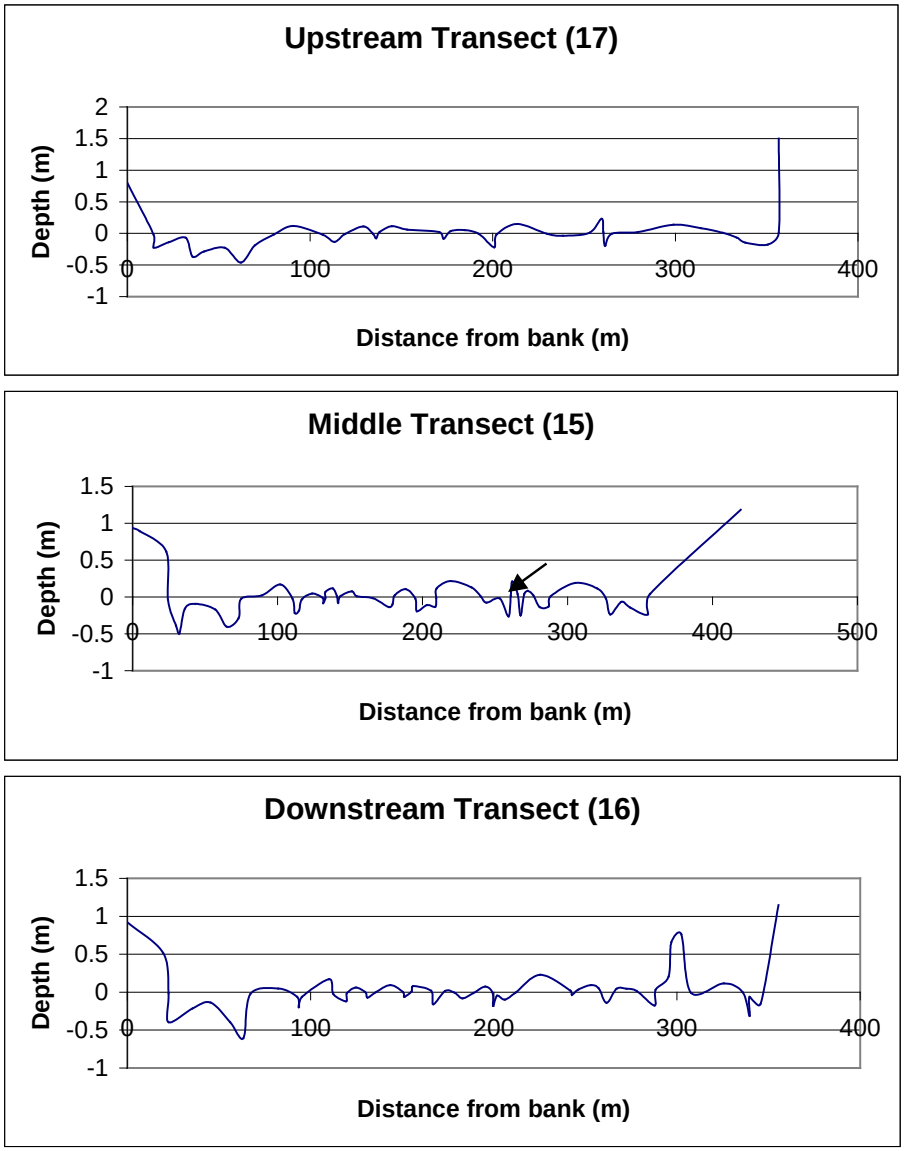

Figure 6. Roost channel profile for site 28R. Arrow indicates roost location.

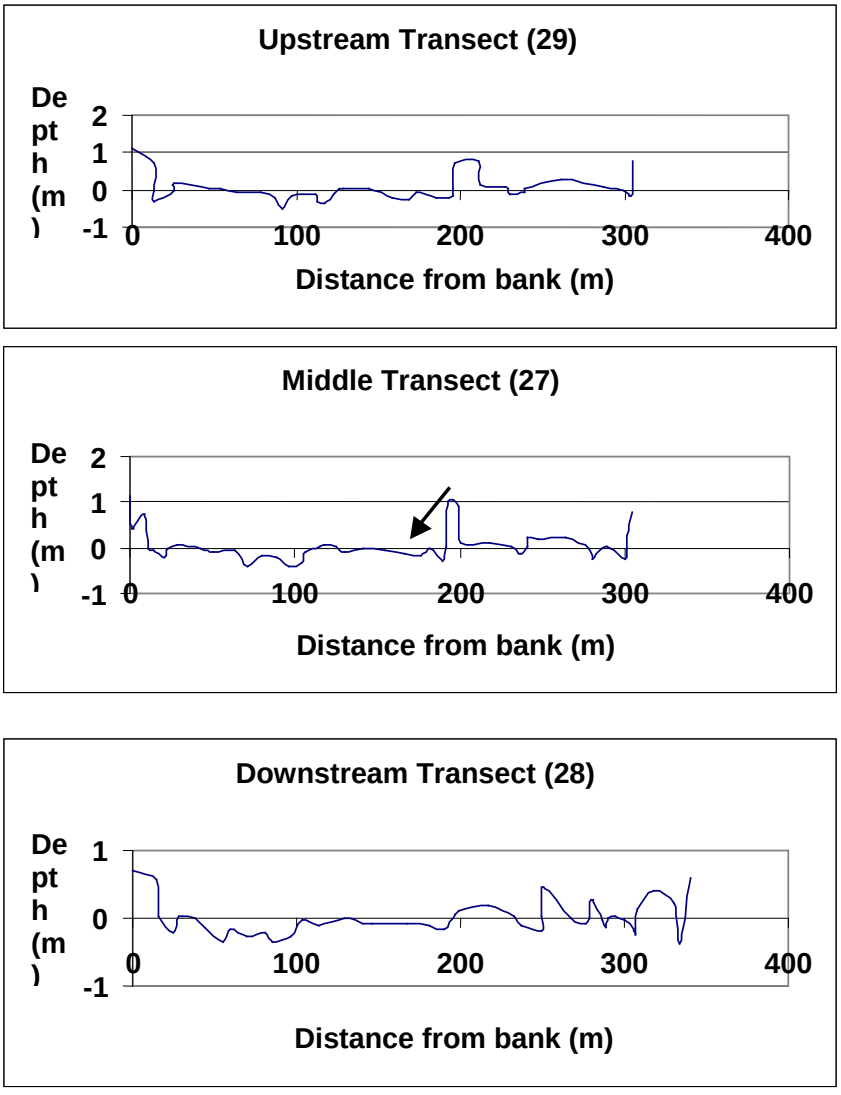

Figure 7. Roost channel profile for site 30R. Arrow indicates roost location.

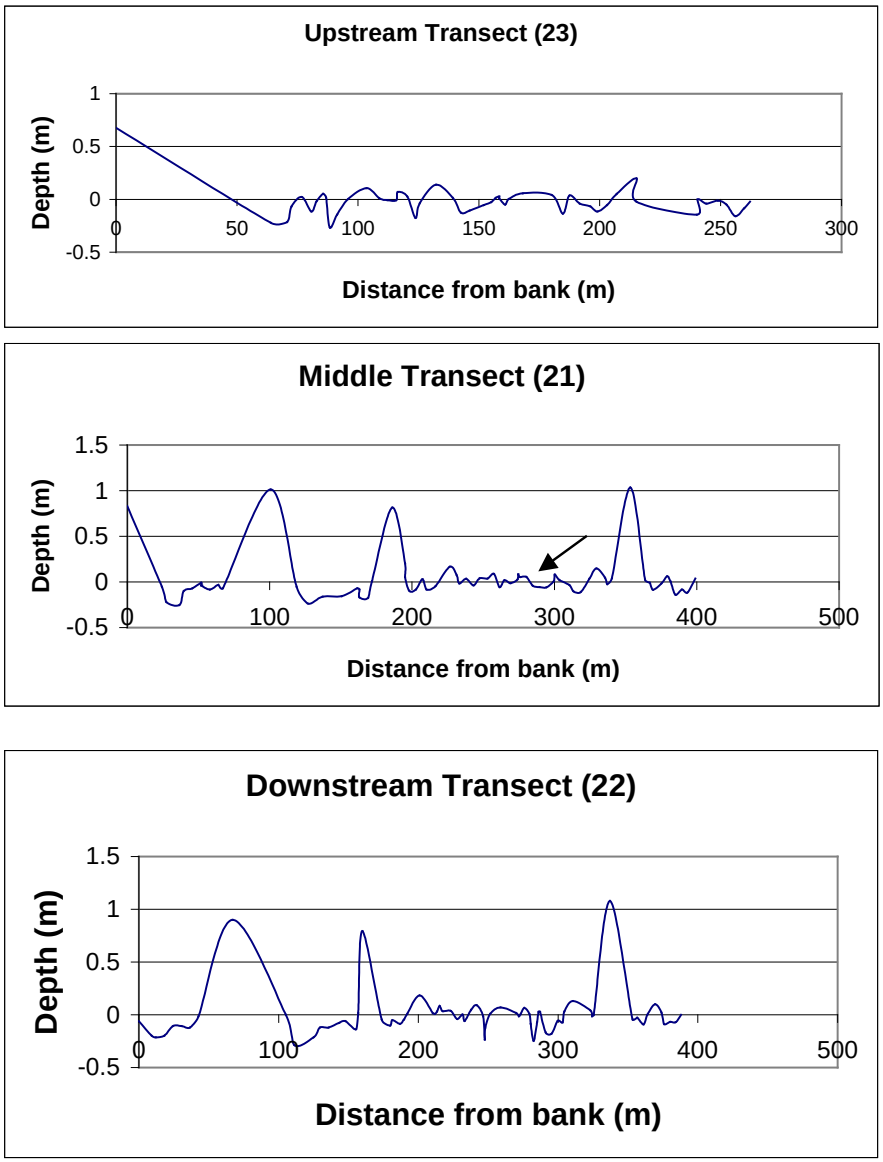

Figure 8. Roost channel profile for site 1R. Arrow indicates roost location.

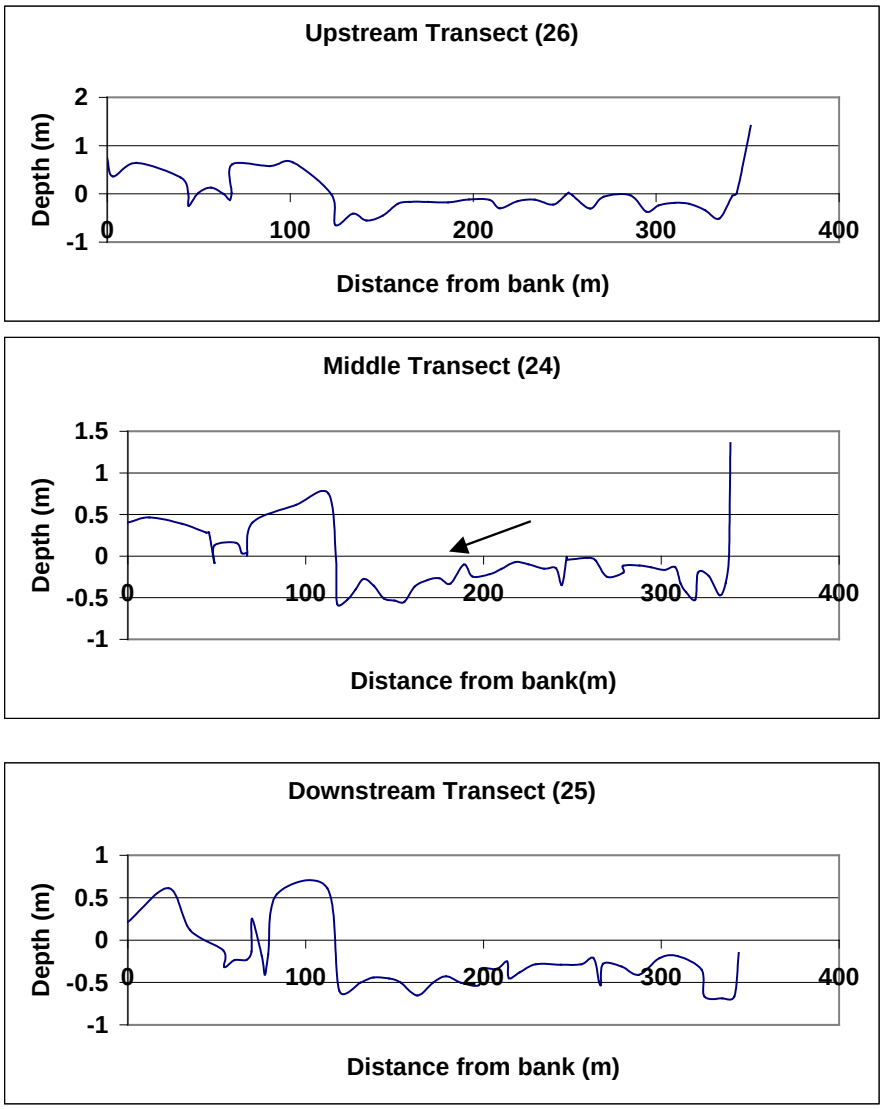

Figure 9. Roost channel profile for site 13R. Arrow indicates roost location.

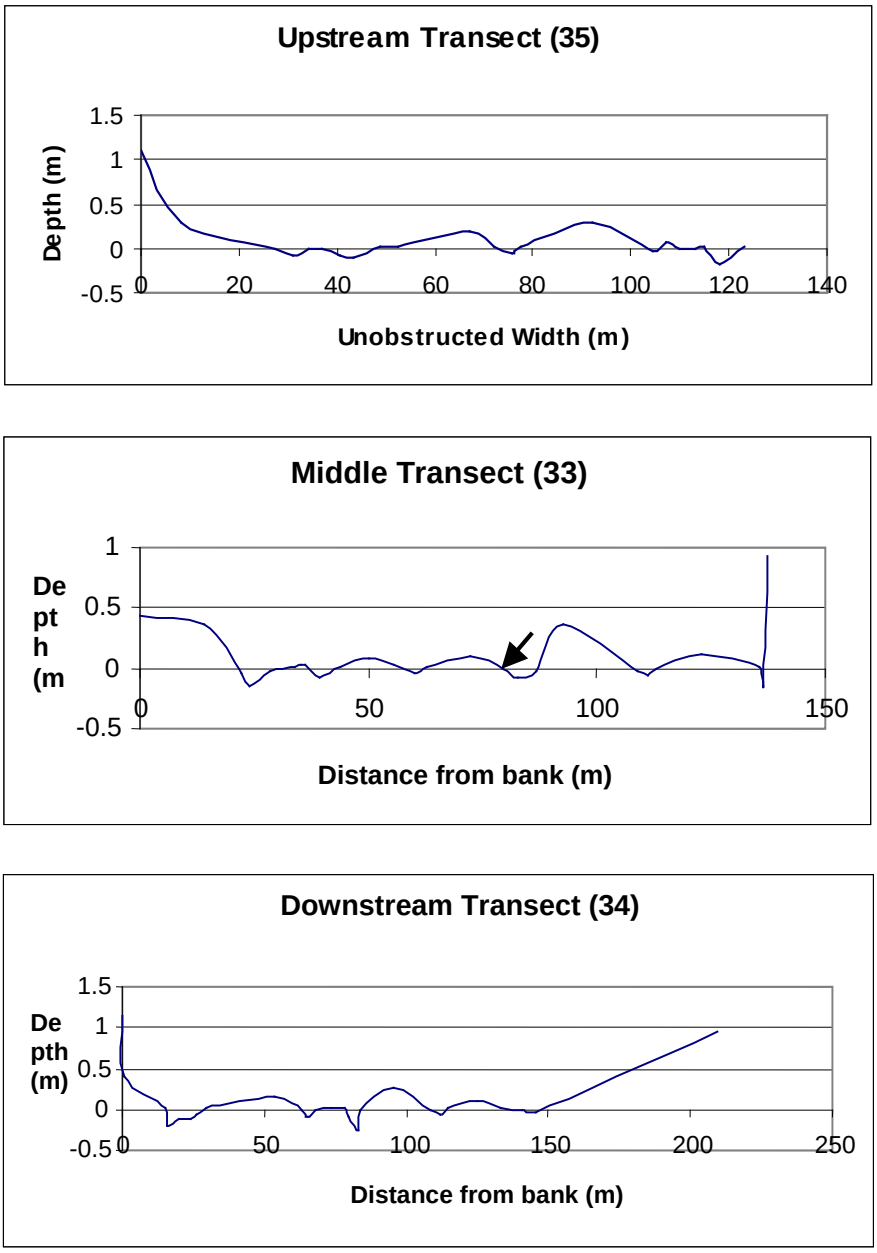

Figure 10. Mean daily flows at Overton, Kearney, and Grand Island.

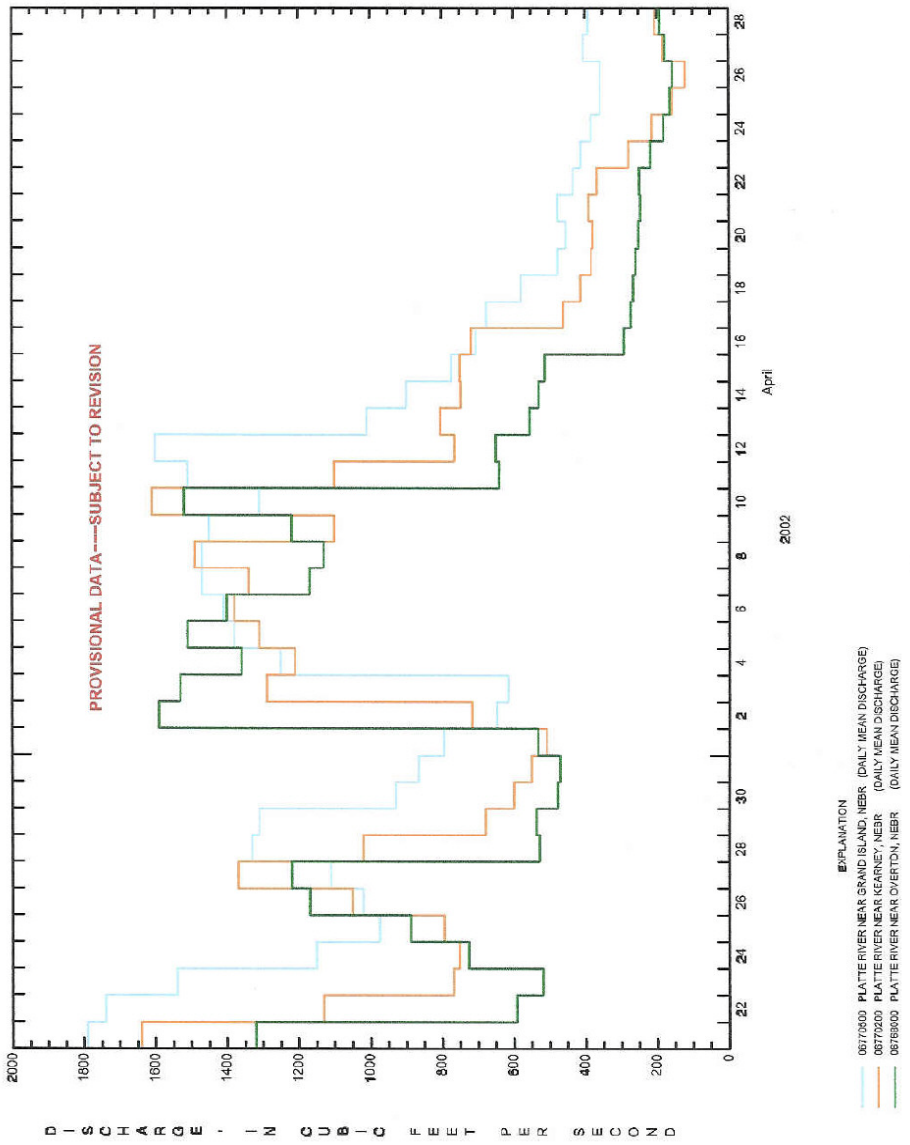

Figure 11. Platte River discharge at USGS gauging stations during the study period. (Provisional data - subject to revision.)

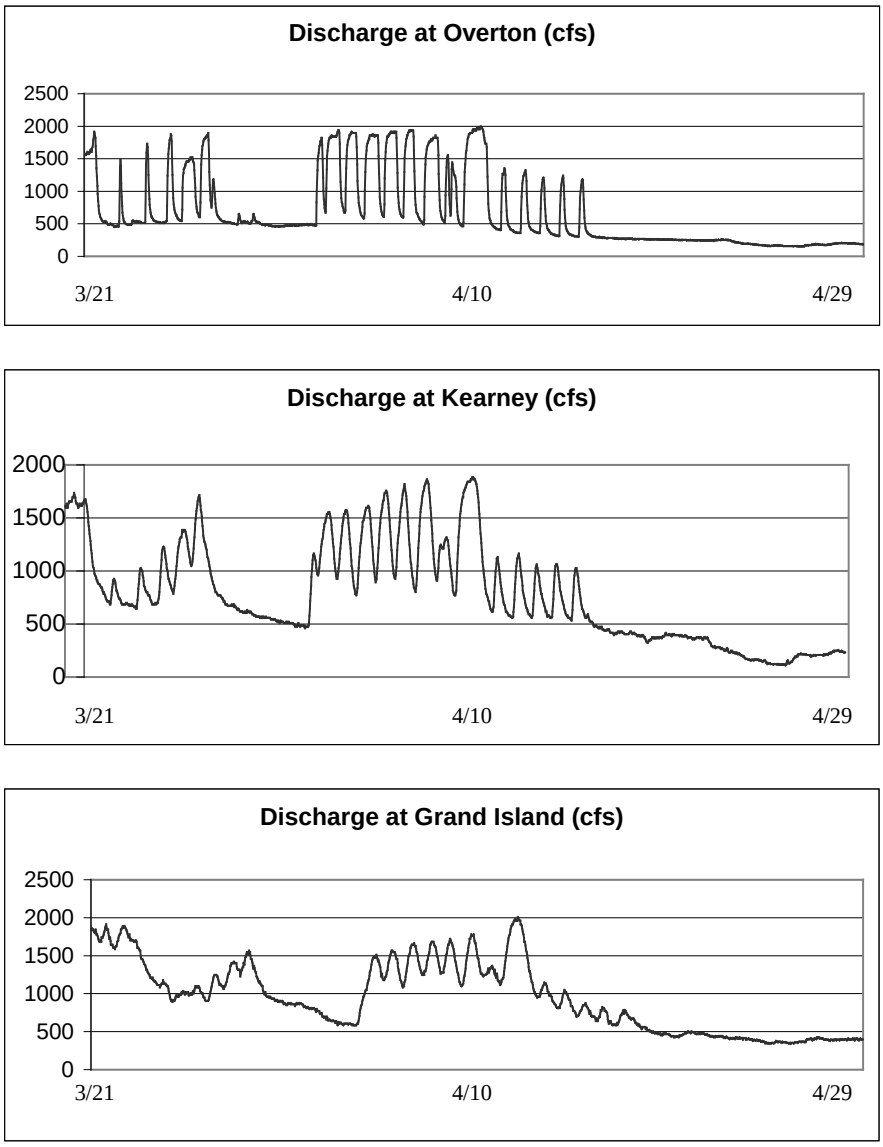

Figure 12. Whooping Crane use sites (blue= roost; yellow= upland).

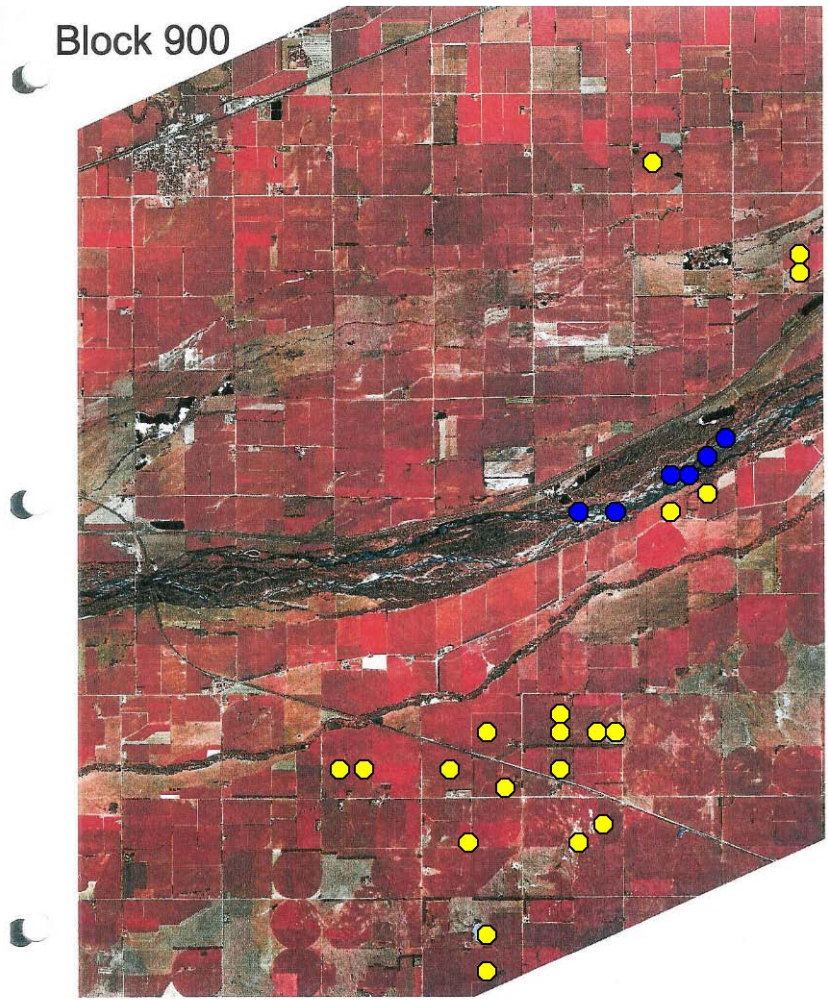

Figure 13. Whooping Crane use sites (blue= roost; yellow= upland).

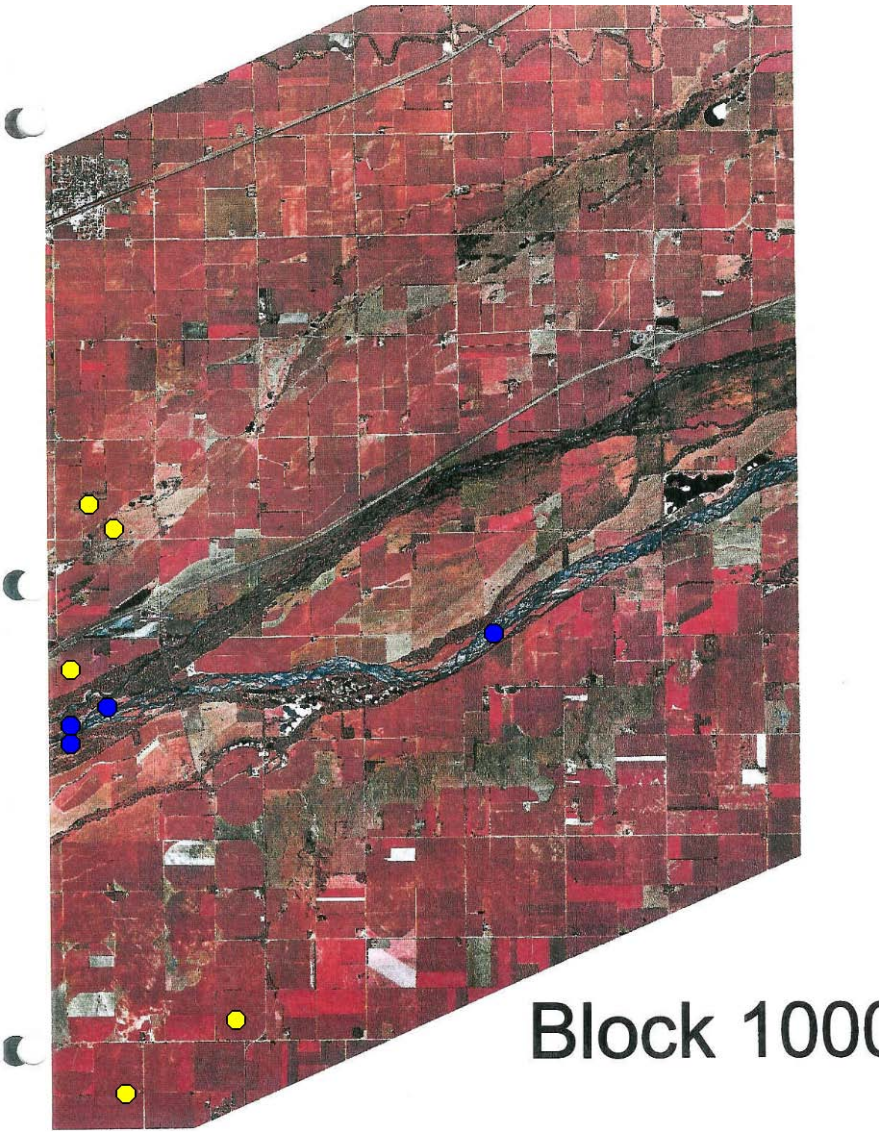

Figure 14. Whooping Crane roost site south of Gibbon.